INTERREG VA IMPACT EVALUATION – FINAL REPORT

PRIORITY 2 – ENVIRONMENT

Special EU Programmes Body
Comhlacht na gClár Speisialta AE
Special EU Skemes Boadie

Cogent MANAGEMENT CONSULTING

Cogent Management Consulting LLP

17th November 2022

INTERREG VA IMPACT EVALUATION

PRIORITY 2 - ENVIRONMENT

CONTENTS

Page

List of Abbreviations

Abbreviation	Definition
ACT	Argyll and the Isles Coast and Countryside Trust
AFBI	Agri-Food and Biosciences Institute
ABCBC	Armagh City, Banbridge & Craigavon Borough Council
AGM	Annual General Meeting
ALS	Acoustic Listening Station
API	Application Programme Interface
AR	Augmented Reality
ASO	Assistant Scientific Officer
ASSI	Areas of Specific Scientific Interest
AUV	Autonomous Underwater Vehicles
AWQMS	Automatic Water Quality Monitoring Station
AWS	Alternative Water Supplies
BC	Butterfly Conservation
BGS	British Geological Survey
BODC	British Oceanographic Data Centre
BOQ	Bill of Quantities
BWI	BirdWatch Ireland
BWQ	Bathing Water Quality
CABB	Conservation Across-borders for Biodiversity
CAFRE	College of Agriculture, Food and Rural Enterprise
CANN	Collaborative Action for the Natura Network
CAP	Conservation Action Plan
CCGHT	Causeway Coast and Glens Heritage Trust
CENIT	CEntral NITrogen
CEO	Chief Executive Officer
CIS	Community Incentive Scheme
Cogent	Cogent Management Consulting LLP
COMPASS	Collaborative Oceanography and Monitoring for Protected Areas and Species
DAERA	Department of Agriculture, Environment and Rural Affairs
DAFM	Department of Agriculture, Food and Marine
DAP	Drainage Area Plan
DCC	Donegal County Council
DEMs	Digital Elevation Models
DfI	Department for Infrastructure
DM-QMF	Data Management Quality Management Framework
DWD	Drinking Water Directive
DWPAs	Drinking Water Protected Areas
EBR	East Border Region Ltd.
EC	European Commission
ECI	Early Contractor Involvement
EMS	Electronic Monitoring System
ENGOs	European Non-Governmental Organisation
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
EU	European Union
FLC	First Level Control
FT	Full Time
FWMC	Flow-Weighted Mean Concentrations
GAW	Global Atmosphere Watch
GDPR	General Data Protection Regulation
GES	Good Environmental Status
GET	Golden Eagle Trust
GLAS	Green Low-Carbon Agri-Environment Scheme
GMIT	Galway-Mayo Institute of Technology
GSI	Geological Survey of Ireland
GW	Ground water
HSO	Higher Scientific Officer
IE	Intestinal Enterococci

Abbreviation	Definition
IFI	Inland Fisheries Ireland
INHT	Islay Natural History Trust
IOC	International Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange
IUCN	International Union for Conservation of Nature
IW	Irish Water
JNCC	Joint Nature Conservation Committee
KNIB	Keep Northern Ireland Beautiful
LA	Loughs Agency
LAWCO	Local Authority Water and Communities Office
LIS	Land Incentive Scheme
LoO	Letter of Offer
MarPAMM	Marine Protected Areas Management and Monitoring
MCC	Monaghan County Council
MF	Marsh Fritillary
MFTF	Moors for the Future
MI	Marine Institute
MLA	Member of the Legislative Assembly
MM	Montiaghs Moss
MMP	Marine Management Plans
MoU	Memorandum of Understanding
MPAs	Marine Protected Areas
MSFD	Marine Strategy Framework Directive
MS	Microsoft
MSS	Marine Scotland Science
N2K	Natura2000
NGO	Non-Governmental Organisation
NHA	National Heritage Area
NI	Northern Ireland
NIEA	Northern Ireland Environment Agency
NIW	Northern Ireland Water
NMDDC	Newry, Mourne & Down District Council
NPWS	National Parks and Wildlife Service
OB	Optimism Bias
OECMs	Other Effective Area-based Conservation Measures
OTN	Ocean Tracking Network
PE	Population Equivalent
PM	Project Manager
PMO	Programme Management Office
PO	Project Officer
POM	Programme of Measures
PSDP	Project Supervisor Design Process
QUB	Queen's University Belfast
RBMPs	River Basin Management Plans
R&D	Research and Development
RHAT	River Hydromorphology Assessment Technique
ROI	Republic of Ireland
RSPB	Royal Society for the Protection of Birds
SACs	Special Areas of Conservation
SAMS	Scottish Association for Marine Science
SCAMP	Sustainable Catchment Area Plan
SDM	Species Distribution Modelling
SEUPB	Special EU Programmes Body
SESE	Social, Environmental and Scientific Education
Sligo IT	Institute of Technology Sligo
SNH	Scottish Natural Heritage
SPAs	Special Protected Areas
SRC	Short Rotation Coppice
SSCT	Scoring Training Course
SSSI	Site of Special Scientific Interest

Abbreviation	Definition
STFG	South Tyrone Farmers Group
STMB	Scientific and Technical Management Board
StT	Source to Tap
SWAT	Soil and Water Assessment Tool
SWELL	Shared Waters Enhancement and Loughs Agency
SWIM	System for Bathing Water Quality Modelling
TRT	The Rivers Trust
TWMC	Time-Weighted Mean Concentrations
UCC	University College Cork
UCD	University College Dublin
UoG	University of Glasgow
UU	Ulster University
UW	Ulster Wildlife
UKWIR	UK Water Industry Research
UWWTD	Urban Wastewater Treatment Directive
VR	Virtual Reality
WEMP	Water and Environment Management Plan
WFD	Water Framework Directive
WMP	Wildfire Management Plans
WTWs	Water Treatment Works
WWTWs	Wastewater Treatment Works

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

The Special EU Programmes Body (SEUPB) has commissioned Cogent Management Consulting LLP (Cogent) to undertake a longitudinal Impact Evaluation of INTERREG VA Programme (for Northern Ireland, Ireland and Western Scotland) Investment Priority Axis 2 – Environment to include three reports due by end of 2018, end of 2020 and early 2022.

This report represents the final in the series of three impact evaluation reports and provides an overview of the key activities and achievements of each project that was funded under Priority Axis 2. It also includes a brief summary of the previous evaluation findings and is anticipated to contribute directly to SEUPB's programme summary of evaluation findings, to be submitted to the EU Commission.

It is noted that as a consequence of the outworkings of the Covid-19 pandemic and resultant delays caused in the implementation of projects, it should be noted that only one of the nine individual projects supported under Priority Axis 2 has been fully completed at the time of this report (see Table 1.5 for further details). However, for SEUPB's reporting requirements to the EU Commission, it was necessary to develop the final evaluation report at this time.

This section of the report provides an overview of the Interreg VA Programme, Priority Axis 2 – Environment, its aims, and objectives and the nine projects supported.

1.2 Background to the INTERREG VA Programme

Launched in January 2016, the INTERREG VA Programme was one of over sixty funding programmes across the EU that had been specifically designed to address problems that arise from the existence of borders. Borders can reduce economic development, hamper the efficient management of the environment, obstruct travel and hinder the delivery of essential health and social care services.

The INTERREG VA Programme, therefore, aimed to promote greater levels of economic, social and territorial cohesion to create a more prosperous and sustainable cross-border region.

The Programme had a total value of €283m, which was funded as follows:

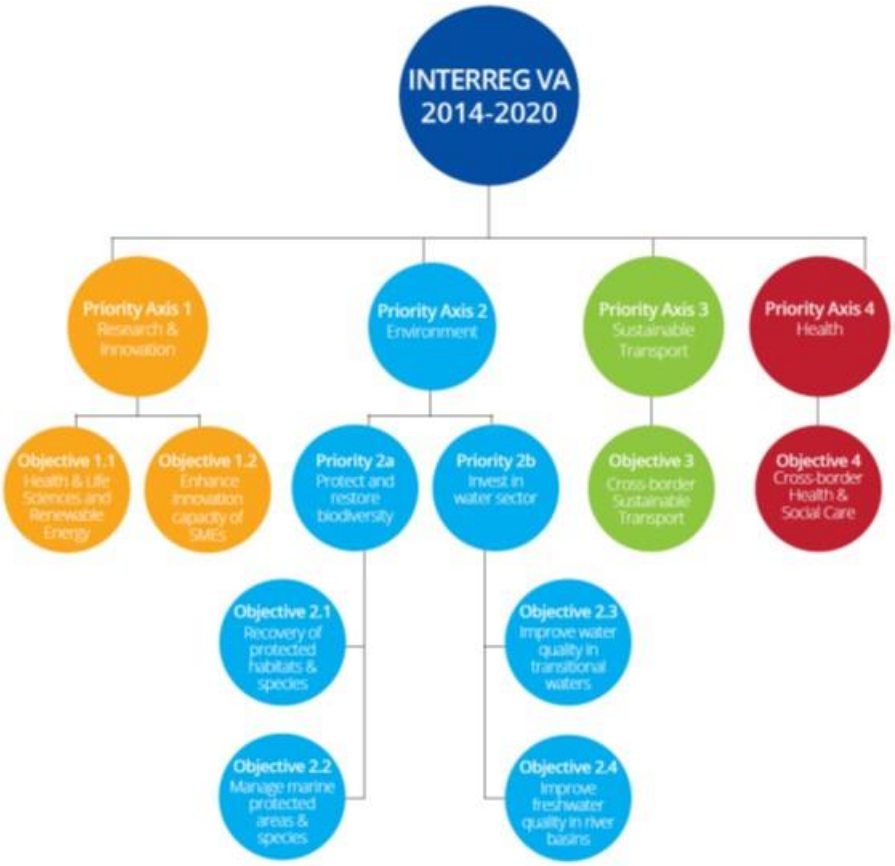
- 85% (€240m) via the European Regional Development Fund (ERDF), which is within the European Structural and Investment Funds (ESIF).
- 15% (€43m) via match funding from non-EU sources e.g. national, regional, local government, a project's own resources or private contributions. Contributions in-kind may be used as match-funding.

NB: arrangements for match-funding may have varied between priority axes of the Programme.

As depicted overleaf, the INTERREG VA Programme had four key priority axes, which were selected to address identified weaknesses in the programme region's economy, as set out in the Cooperation Programme for the INTERREG VA Programme 2014-2020[1]. The Cooperation Programme states that the priority axes are congruent with 'Europe 2020 - A Strategy for Smart, Sustainable and Inclusive Growth' and the priority areas identified for European Territorial Cooperation within the EU Commission Position Papers for the UK and Ireland.

[1] Formally adopted in February 2015.

Figure 1.1: INTERREG VA Programme Priority Axes[2]



The following subsections provide further details of Priority Axis 2: Environment.

1.3 Priority Axis 2: Environment – Rationale & Objectives

1.3.1 Introduction

The key aim of Priority Axis 2: Environment, as reflected in the Cooperation Programme, was to *"encourage investment to achieve a resource-efficient, sustainable economy through the implementation of green infrastructure and environmental risk management strategies".*[3]

The Cooperation Programme also identified that two key challenges in the programme region were anticipated to be tackled through this priority axis, namely the integrity of its:

1. Biodiversity; and
2. Water quality.

[2] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).
[3] The Cooperation Programme identified that the financial allocation for Priority Axis 2: Environment was anticipated to be €84.71m (€72m from ERDF and €12.71m via national match funding).

The **selected investment priorities** under Priority Axis 2: Environment and their **associated objectives** are as follows:

Investment Priority	Associated Objectives
2a - Protecting and restoring biodiversity and soil and promoting ecosystem services, including through Natura 2000, and green infrastructure.	**2.1** Recovery of Protected Habitats and Priority Species **2.2** Manage Marine Protected Areas and Species
2b - Investing in the water sector to meet the requirements of the Union's environmental acquis and to address needs, identified by the Member States, for investment that goes beyond those requirements.	**2.3** Improve Water Quality in Transitional Waters **2.4** Improve Freshwater Quality in Cross-Border River Basins

1.3.2 Objective 2.1 – Recovery of Protected Habitats and Priority Species

The Need for Investment

The need to protect the environment was one of the key themes in the EU 2020 Strategy. It was also one of the needs and priorities identified in the socio-economic profile of the Region and the Position Papers from the European Commission for the United Kingdom and Ireland. It was anticipated that investment by the programme in this important area would be aimed at ensuring that designated habitat sites of cross-border importance and identified areas for priority species achieve or be approaching favourable conditions. These were anticipated to include nationally designated areas, areas of specific scientific interest (ASSI), sites of special scientific interest (SSSIs), natural heritage areas (NHAs)) and European designated areas (special protection areas (SPAs) and special areas of conservation (SAC)). Other areas for breeding wader species and marsh fritillary that were not designated were also considered where they were regarded to be important to the ecological functioning of habitats within the designated site network. It was envisaged that in many cases, sites would be close to or straddle the border. However, it was anticipated that other sites further from the terrestrial border, including those in Western Scotland, might be included, where the site was of cross-border significance.

It was anticipated that increased levels of integration in the planning and management of the environment across the region would result in the development of best practice methodologies and increased levels of public sector efficiency. It was also anticipated to lead to increased awareness of, and responsiveness to, the potential threats of climate change to habitats and species.

Aim of the Investment Priority & Specific Objective

The aim of Objective 2.1 was, therefore, to *"promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species".*

To achieve this objective, the expected logic was that it would be necessary to invest in increased cross-border integrated planning and management of habitats and species, using best-practice methodologies. It was anticipated that this investment would lead to results beyond the lifetime of the Programme in the form of increased compliance with EU directives in the area of environmental protection.

The three jurisdictions had prioritised seven protected habitats and seven priority species. These were selected from habitats and species common to all three jurisdictions and included habitats that had an important role in connectivity between protected areas and protected species that migrate across the eligible region. All habitats and species selected for investment were taken from this priority list:

Protected Habitats	1. Alkaline fens 2. Blanket bog 3. Active raised bog 4. Marl Lakes	5. Calcareous fens 6. Petrifying springs with tufa formation 7. Transition mires and quaking bogs
Priority Species	1. Hen Harrier 2. Marsh Fritillary 3. White-clawed crayfish 4. Breeding waders (curlew, lapwing, redshank and snipe)	5. Golden plover 6. Corncrake 7. Red grouse

1.3.3 Objective 2.2 – Manage Marine Protected Areas and Species

The Need for Investment

The Marine Strategy Framework Directive (MSFD) required EU Member States to co-operate in the management of regional seas to meet Good Environmental Status by 2020. It was considered that increased cooperation in this area could help mitigate climate change impact. The need for a coherent approach across the region was considered to be particularly relevant in this area because of the shared waters. Maintaining biodiversity is a requirement to achieve Good Environmental Status and an inherent part of the delivery of MSFD is to develop an ecologically coherent network of Marine Protected Areas across Europe. With the marine environment coming under increasing pressure from human activity, it is envisaged that such a network will ensure that biodiversity is safeguarded.

Studies illustrate that the marine environment shared by Northern Ireland, Ireland and Scotland is regarded as having one of the greatest renewable energy resources in Europe, with the capacity to support economically viable wind, wave and tidal energy projects. Within the confines of a network of marine protected areas, developments need to be managed and mitigated in a manner which will promote, sustain and conserve the marine environment. Investment by the programme in this area was aimed at increasing the capacity for integrated planning and management of marine resources and increasing the effectiveness of cross-border marine management strategies. It was anticipated that new cross-border cooperation strategies would be developed based on existing and newly acquired data. In turn, it was envisaged that this would lead to an increase in compliance with the EU MSFD.

It was further envisaged that investment by the programme would lead to an increased understanding of and ability to capitalise on the marine resources in the region. This was anticipated to include an increase in the availability of comprehensive mapping programmes; the development and growth of a regional "blue economy" based on the maritime resource and the alignment of regional activities with the EU Atlantic Strategy and Action Plan.

Aim of the Investment Priority & Specific Objective

The aim of Objective 2.2 was to *"develop cross-border capacity for the monitoring and management of marine protected areas and species".* [4]

To achieve this objective, the expected logic was that it would be necessary to invest in cross-border data capture and mapping for the development of joint marine management and development activities. It was anticipated that the sustainability of this activity beyond the lifetime of the Programme would be evidenced by the creation of a regional marine innovation centre that would provide a focal point for these activities. It was envisaged that this would result in an increased contribution to the achievement of the targets associated with EU Marine strategies.[5]

[4] The Output Indicator Guidance document for Objective 2.2 (January 2016) states that Marine Protected areas (MPAs) or conservation areas are locations which receive protection because of their recognised natural, ecological and/or cultural values. Special Protected Areas (SPAs) with marine components are defined as those sites with qualifying Birds Directive species or regularly occurring migratory species that are dependent on the marine environment for all or part of their lifecycle, where these species are found in association with intertidal or sub tidal habitats.

[5] Source: Cooperation programmes under the European territorial cooperation goal, (Interreg VA) United Kingdom-Ireland (Ireland-Northern Ireland-Scotland).

1.3.4 Objective 2.3 – Improve Water Quality in Transitional Waters

The Need for Investment

Within the Programme area, Ireland and Northern Ireland share the following transitional water bodies:

1. Carlingford Lough - between County Louth in Ireland and County Down in Northern Ireland; and
2. Lough Foyle - between County Derry~Londonderry in Northern Ireland and County Donegal in Ireland.

According to the Programme's Citizens' Summary[6], cross-border collaboration was essential to improve the water quality of these shared transitional waters and thus efficiently address the requirements of the Water Framework Directive[7]. In particular, this specific objective was anticipated to seek to achieve a good or high-water quality status for these two shared transitional waters. Modelling of cross-border waters can identify the potential sources of pollution and the optimum way to achieve and maintain good water quality status. Consequently, it was considered that such modelling would identify the most effective interventions and improvements required for the sewage network and wastewater treatment works that impact the shared transitional waters.

It was also anticipated that the Programme would facilitate the implementation of common approaches to the management of water resources and the sharing of best practices and technical expertise across the eligible region, drawing on the relative strengths of the three jurisdictions.

Aim of the Investment Priority & Specific Objective

The aim of Objective 2.3 was, therefore, to *"improve the water quality in shared transitional waters"*.

To achieve this objective, the expected logic was that it would be necessary to invest in cross-border solutions and the joint management of water bodies that straddle the border. It was anticipated that this would result in long-term impacts on the quality of water in the region beyond the lifetime of the Programme.

1.3.5 Objective 2.4 – Improve Freshwater Quality in Cross-Border River Basins

The Need for Investment

To improve water quality across the region, it was considered necessary to promote the shared management of shared water resources and to invest in cross-border solutions to achieve the targets within the EU Water Framework Directives. It was anticipated that investment by the programme would lead to an improvement in the baseline condition of water quality, physical structure, and habitat in several cross-border catchment areas. In turn, it was envisaged that this would contribute towards the achievement of targets relating to good water quality and ecological status of all water bodies (rivers, lakes, groundwater, transitional).

Importantly, it was considered that such improvements in water quality might mitigate the need for capital investment and contribute to reducing operating costs whilst also protecting and enhancing biodiversity.

It was further anticipated that the investment would provide for an increase in the level of cross-border integrated management of river catchment areas and the development of shared solutions to meet EU targets concerning water quality. It was considered that there were also opportunities to share best practice approaches across the region and that this would, in turn, lead to an increased number of water bodies with the higher classification of moderate, good or high quality and a decreased number of water

[6] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).
[7] Which is an EU directive that commits EU member states to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore) by 2015.

bodies classified as poor or bad quality, in line with the designations contained within EU Water Directives.

It was anticipated that interventions supported under this Objective would focus on the following:

- The river catchment activities would be limited to river catchments where the area is on both sides of the Northern Ireland / Ireland border.
- The location of the groundwater wells would be on both sides of the Northern Ireland / Ireland border to support monitoring and pollution of the river catchment activities.
- The sustainable catchment area management modelling and plan would be a cross-border plan focusing on a freshwater capture area, encompassing activities in areas exclusive to some of the border counties of Ireland and the adjacent border counties of Northern Ireland.
- Knowledge transfer and exchange of best practices within the three jurisdictions.

Aim of the Investment Priority & Specific Objective

The aim of Objective 2.4 was, therefore, to *"improve freshwater quality in cross-border river basins"*. Within the Programme area, Ireland and Northern Ireland share the following 11 cross-border river basins[8]:

Table 1.1: Cross-Border River Basins	
1. Blackwater River	7. Finn Foyle River
2. Burnfoot River	8. Flurry River
3. Castletown River	9. Foyle Deele River
4. Derg River	10. Lower Erne River
5. Fane River	11. Upper Erne River
6. Finn Fermanagh River	

To achieve this objective, the expected logic was that it would be necessary to invest in cross-border solutions and the joint management of water bodies that straddle the border. It was anticipated that this investment would lead to an improvement in the baseline condition of water quality, physical structure, and habitat in several cross-border catchment areas.

1.3.6 Summary of Specific Objectives, Result Indicators and Targets

Table 1.2 provides a summary of the Specific Objectives, Result Indicators and Targets for Priority Axis 2: Environment:

Table 1.2: Specific Objectives, Result Indicators and Targets			
Specific Objective	**Result Indicator**	**Baseline**	**Target**
2.1 To promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species	The percentage of selected protected habitats in or approaching a favourable condition	1%	10%
2.2 To develop cross-border capacity for the monitoring and management of marine protected species in the region	Cross-border capacity for monitoring and management of marine protected areas and species	A little collaboration	A lot of collaboration
2.3 To improve the water quality in shared transitional waters	The percentage of shared transitional waters in the region with good or high quality	0%	100%
2.4 To improve freshwater quality in cross-border river basins	The percentage of cross-border freshwater bodies in cross-border river basins with good or high quality	32%	65%

[8] As outlined in the Call Documentation issued for Objective 2.4.

The Output Indicators associated with Axis 2: Environment and its Specific Objectives are summarised below:

Table 1.3: Anticipated Output Indicators		
Output Indicator	**Measures by Number of:**	**Number**
Surface Area of Habitats supported to obtain a better conservation status	Hectares	4,500
Conservation action plans	Conservation action plans	25
The network of buoys for regional seas	Networks	1
Models developed to support the conservation of marine habitats and species	Models	5
Marine Management Plans for designated protected areas	Complete plans	6
System for the prediction of bathing water quality and the installation of real-time signage	Systems	1
Additional population benefiting from improved wastewater treatment	People	10,000
Sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters	Projects	2
Cross-border drinking water Sustainable Catchment Area Management Plans	Plans	1
Cross-border groundwater monitoring wells installed	Wells	50
River water quality improvement projects	Projects	3

The INTERREG VA Citizens' Summary suggested that the outputs featured above might be achieved through the following **indicative actions/activities**:

Table 1.4: Indicative Actions[9]
Objective 2.1
• Development of mapping of protected habitats and sites of cross-border relevance; • Development and implementation of conservation action plans for protected sites of cross-border relevance; • Tangible conservation actions for protected habitats and species; • Conservation management and protection activities to encourage sustainable natural regeneration of species populations; • Development and sharing of best practices and enhancement of skills in ecosystem management; • Development and use of databases to assist conservation actions; • Removal of invasive species; • Research into species and habitats, including the impact of climate change, which supports the actions within the Programme; and • Education and outreach activities.
Objective 2.2
• Development and implementation of cross-border management plans for marine protected areas and species; • Mapping of marine/seabed environment; • Creation of a network of marine protected areas; • Research and development in the marine environment (including the impact of climate change); • Marine skills initiatives; • The coordinated research programme of direct relevance to the management challenges of the eligible area; • Knowledge and data sharing; and • Prediction model development and signage for short-term pollution and real-time management of bathing water quality in coastal waters.

[9] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).

Table 1.4: Indicative Actions[9]
Objective 2.3
• Research and development in wastewater treatment technologies, including the use of sustainable technologies with direct relevance to the shared transitional waters; • Creation of demonstration sites in the catchment areas to illustrate best practice wastewater treatment methodologies; and • Sewerage network and wastewater treatment projects to protect and enhance the Water Framework Directive classification of the cross-border catchment areas.
Objective 2.4
• Development and implementation of integrated river basin management plans and actions; • Development and implementation of a management plan and projects for designated drinking water protected areas so that Water Framework Directive water classifications can be maintained and improved; • Activities related to the improvement of river water quality; • Activities related to freshwater quality management research; and • Activities related to establishing groundwater monitoring wells.

1.4 Overview of Projects and Partners

There were five calls for applications under Priority Axis 2: Environment. A two-stage process was then initiated by SEUPB's Joint Secretariat to assess applications submitted under each of the calls.[10] Full details of the assessment process, including admissibility criteria, were outlined for applicants in the 'Call Documentation' and the 'Guide for Applicants'.

In total, ten projects were approved by the IVA Programme Steering Committee, however the Lead Partner for one of the projects approved under Objective 2.2 subsequently withdrew its application, leaving nine projects to go forward. As illustrated below:

- Two projects were funded under Specific Objective 2.1;
- Four projects were funded under Specific Objective 2.2;
- 1 Project was funded under Specific Objective 2.3; and
- Two projects were funded under Specific Objective 2.4.

Details of the **nine projects** approved by the INTERREG VA Programme Steering Committee (which excludes the project that withdrew under Objective 2.2) are included in the table overleaf. As illustrated, the Lead Partners for each of the nine projects were from the statutory and voluntary sectors across Northern Ireland and Ireland, and included a range of project partners, with an interest in the environment.

[10] Stage one - short application form and admissibility checks. Stage two – submission of full business plan and associated appendices (prepared in line with SEUPB's Business Plan Guidance).

Table 1.5: Projects Approved for Funding – Named Project Partners (source: Letters of Offer issued by the SEUPB)			
Project Ref	**Lead Partner**	**Project Name**	**Named Project Partners**
Objective 2.1			
032	Newry, Mourne & Down District Council	Collaborative Action for the Natural Network (CANN)	• Monaghan County Council • Argyll & The Isles Coast and Countryside Trust • East Border Region • Agri-food and Biosciences Institute • Armagh Banbridge and Craigavon Borough Council • NatureScot • Ulster Wildlife • Ulster University • Institute of Technology Sligo, now known as Atlantic Technological University Sligo • Golden Eagle Trust
037	Royal Society for the Protection of Birds (RSPB) NI	Cooperation Across-borders for Biodiversity (CABB)	• Birdwatch Ireland • Butterfly Conservation • NI Water • Royal Society for the Protection of Birds Scotland • Moors for the Future
Objective 2.2			
034	Agri-food and Biosciences Institute (AFBI)	Collaborative Oceanography and Monitoring for Protected Areas and Species (COMPASS)	• Scottish Association for marine species • Marine Scotland Science • Inland Fisheries Ireland • Marine Institute
038	University College Dublin (UCD)	System for Bathing Water Quality Monitoring (SWIM)	• Keep Northern Ireland Beautiful • Agri-Food and Biosciences Institute
5059	Agri-food and Biosciences Institute (AFBI)	Marine Protected Areas Management and Monitoring (MarPAMM)	• NatureScot • Birdwatch Ireland • University College Cork • Marine Scotland • Scottish Association for Marine Science • Ulster University
5060	Loughs Agency	Sea Monitor 2	• Marine Institute (MI) • University of Glasgow (UoG) • Queen's University, Belfast (QUB) • Agri-Food and Biosciences Institute (AFBI) • Galway-Mayo Institute of Technology (GMIT) • University College, Cork (UCC) • Ocean Tracking Network, Dalhousie University (Canada) • The University of California, Davis (USA)
Objective 2.3			
005	Northern Ireland Water (NIW)	Shared Waters Enhancement and Loughs Legacy (SWELL)	• East Border Region • Loughs Agency • Irish Water • Agri-food and Biosciences Institute
Objective 2.4			
029	Northern Ireland Water (NIW)	Source to Tap	• Irish Water Ltd • Agri-food and Biosciences Institute • Land-Incentive Scheme – farmers (beneficiaries not partners) • The Rivers Trust • Ulster University • East Border Region Ltd
027	Donegal County Council	CatchmentCARE	• Agri-food and Biosciences Institute • Loughs Agency • Armagh, Banbridge and Craigavon Borough Council • Inland Fisheries Ireland • University of Ulster • British Geological Survey • Geological Survey Ireland

As reflected in Table 1.6, as a consequence, largely of the outworkings of the Covid-19 pandemic and its associated restrictions, each of the nine projects received extensions to their original anticipated end dates.[11]

Table 1.6: Summary of Projects Approved for Funding[12]				
Lead Partner	**Project Name**	**Operational start date**	**Original Anticipated end date**	**Latest (in July 2022) Revised Operational end date**
Objective 2.1				
Newry, Mourne & Down District Council (NMDDC)	CANN	01/01/2017	31/12/2021	31/12/2022
RSPB NI	CABB	01/01/2017	31/12/2021	30/09/2022
Objective 2.2				
Agri-food and Biosciences Institute (AFBI)	COMPASS	01/01/2017	31/03/2022	30/09/2022
University College Dublin (UCD)	SWIM	01/01/2017	30/06/2022	31/12/2020
AFBI	MarPAMM	01/01/2018	31/03/2022	30/09/2022
Lough Agency	SeaMonitor 2	25/07/2017	31/03/2022	31/03/2023
Objective 2.3				
Northern Ireland Water (NIW)	SWELL	18/11/2014	31/12/2022[13]	30/04/2023
Objective 2.4				
NIW	Source to Tap	01/10/2016	31/03/2022	30/09/2022
Donegal County Council	CatchmentCARE	01/10/2017	31/10/2022	30/06/2023

[11] The most recent amendment is noted here, with further detail of previous extensions detailed in the respective project sections.
[12] Source (unless otherwise stated): Letters of Offer issued by the SEUPB.
[13] The SWELL Project was disaggregated into two phases. The original LoO taking into account only Phase 1 had a completion date of 30/04/2018. Further to this SEUPB issued a second Letter of Offer (dated 21 January 2019), inclusive of Phases 1 and 2 with an end date of 31/12/2022.

The nine projects that were funded received original Letters of Offer awarding cumulative ERDF and Government Match funding of c. €85.5m towards total projects costs of €88.0m.

Table 1.7: Summary of Projects Approved for Funding									
		Per Original LoOs[14]				Per Latest LoO (July 2022) / SEUPB's EMS[15]			
Lead Partner	**Project Name**	**ERDF**	**Govt. Match**	**Other**	**Total**	**ERDF**	**Govt. Match**	**Other**	**Total**
Objective 2.1									
NMDDC	CANN	€7,995,366	€1,234,948	€175,999	**€9,406,313[16]**	€7,982,379[17]	€1,228,435	€180,220	**€9,391,034**
RSPB NI	CABB	€4,195,586	€575,145	€165,254	**€4,935,985**	€4,195,586	€575,145	€165,254	**€4,935,985**
Subtotal		**€12,190,952**	**€1,810,093**	**€341,253**	**€14,342,298**	**€12,177,965**	**€1,803,580**	**€345,474**	**€14,327,019**
Objective 2.2									
AFBI	COMPASS	€5,362,299	€658,883	€1,705,259	**€7,726,441**	€5,362,299	€658,883	€1,705,259	**€7,726,441**
UCD	SWIM	€891,530	€157,377	€59,451	**€1,108,358**	€1,120,378	€197,774	€74,923	**€1,393,075**
AFBI	MarPAMM	€5,385,015	€608,158	€368,144	**€6,361,317**	€5,381,268	€607,948	€371,641	**€6,360,857**
Lough Agency	SeaMonitor 2	€4,014,271	€627,166	€81,234	**€4,722,671**	€4,014,271	€627,166	€81,234	**€4,722,671**
Subtotal		**€15,653,115**	**€2,051,584**	**€2,214,088**	**€19,918,787**	**€15,878,216**	**€2,091,771**	**€2,233,057**	**€20,203,044**
Objective 2.3									
NIW	SWELL	€29,790,464	€5,257,141	-	**€35,047,604**	€29,790,464	€5,257,141	-	**€35,047,604**
Subtotal		**€29,790,464**	**€5,257,141**	-	**€35,047,604[18]**	**€29,790,464**	**€5,257,141**	-	**€35,047,604**
Objective 2.4									
NIW	Source to Tap	€4,173,433	€736,488	-	**€4,909,921**	€4,173,433	€736,488	-	**€4,909,921**
Donegal County Council	CatchmentCARE	€11,723,570	€2,068,865	-	**€13,792,436**	€11,723,570	€2,068,865	-	**€13,792,436**
Subtotal		**€15,897,003**	**€2,805,353**	-	**€18,702,357**	**€15,897,003**	**€2,805,353**	-	**€18,702,357**
Total		**€73,531,534**	**€11,924,171**	**€2,555,341**	**€88,011,046**	**€73,743,648**	**€11,957,845**	**€2,578,531**	**€88,280,024**

As illustrated above, as a consequence of project amendments, which led to the cumulative ERDF and Government Match grant awarded to projects increasing from c€85.5m to €85.7m. The rationale for changes in individual project budgets is discussed within the respective sections of this report that relate to individual projects (i.e. Sections 3 to 11).

[14] Source: Letters of Offer issued by the SEUPB.

[15] Total project costs have been detailed to reflect the latest LoO available to the Evaluation Team, however at the time of writing for some projects the latest LoO available on SEUPB's EMS had been superseded by costs outlined in project cost tables on the EMS Website. Therefore, in instances where the LoO had been superseded the latest project costs and funding split have been detailed using the most up to date materials available on EMS.

[16] The CANN project originally received a Letter of Offer (dated 20th June 2017) outlining total project costs of €8,349,688. However, this was later extended (LoO dated 25th October 2018) after the INTERREG VA Steering Committee approved (on 24th July 2018) an additional €1,056,625 following a secondary application for the inclusion of Cuilcagh Mountain as an additional site within the CANN project. The revised total anticipated cost at this point was €9,406,313.

[17] The Evaluation Team was unable to ascertain the funding split for the CANN project from SEUPB's EMS therefore the funding split was provided by SEUPB in an email received 26/08/2022.

[18] NB The SWELL project received an original Letter of Offer (dated 31st January 2017) offering a grant of up to a maximum of €3,282,787 (ERDF + Government Match Funding) to be expended and claimed by 30th April 2018 (The period of assistance was for 42 months starting on 1st November 2014 and completing on 30th April 2018). This Letter of Offer was later superseded by a second letter of offer that incorporated both Phase I and Phase II of the project.

1.5 Anticipated Project Contribution to Output Indicators

The contribution that each of the nine projects was anticipated to make to the Priority's Output Indicators is detailed below:

Table 1.8: Projects Approved for Funding – Stated Contributions to Output Indicators (source: Letters of Offer issued by the SEUPB)

Output Indicator	Objective and Project Ref									Total
	2.1		2.2				2.3	2.4		
	CANN	CABB	COMPASS	SWIM	MarPAMM	SeaMonitor 2	SWELL	Source to Tap	CatchmentCARE	
4,500 ha of habitats supported to attain a better conservation status	3,650	2,228								**5,878**
25 conservation action plans	27	8								**35**
1 network of buoys for regional seas, including telemetry and oceanographic monitoring (e.g. for seals, cetaceans and salmonids)			1	-	-	-				**1**
5 models developed to support the conservation of marine habitats and species			3	-	4	5				**12**
6 complete marine management plans for designated protected areas			-	-	6	3				**9**
1 system for the prediction of bathing water quality and the installation of real-time signage			-	1	-	-				**1**
10,000 additional people benefiting from improved wastewater treatment							10,000			**10,000**
2 sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters							2			**2**
3 river water quality improvement projects completed								-	3	**3**
50 cross-border groundwater monitoring wells installed								-	50	**50**
1 cross-border drinking water Sustainable Catchment Area Management Plan								1	-	**1**

1.6 The Evaluation – SEUPB's Requirements & Methodology

To fulfil the requirement of Article 114(1) of the Common Provisions Regulation (EU No: 1303/2013), SEUPB's Managing Authority has submitted to the Commission an Evaluation Plan for the INTERREG VA Programme[19]. The Evaluation Plan has been put in place to facilitate learning and maximise the proposed investments of the Programme[20]. The Plan outlines two types of evaluations:

1. **Implementation Evaluations** which will assess the efficiency and effectiveness of the implementation mechanism established for the programme (these will not form any part of this assignment); and

2. **Impact Evaluations** will be carried out on each priority axis to test the intervention logic of that priority axis and form a view of the effectiveness and impact of the investment.

In relation to the Impact Evaluations, the Plan states that the evaluations will assess achievements as regards effectiveness (the attainment of the specific objectives set and of the intended results), efficiency (the relationship between the funding disbursed and the results achieved) and impact (the contribution of the programme to the end-objectives of the EU Cohesion Policy).

SEUPB has commissioned Cogent to undertake a longitudinal Impact Evaluation of Priority Axis 2 – Environment to include 3 reports due by end of 2018, end of 2020 and early 2022.

The overall focus of the evaluation is to assess (at three stages of implementation), the impact of the interventions within the 'Environment' Priority Axis. As a full implementation evaluation is being undertaken across INTERREG VA concurrently with the Impact Evaluation, **the Impact Evaluation does not seek to assess the implementation of projects nor how the Programme is operating. Rather than addressing financial and operational issues,** the purpose of the impact evaluation is learning, through an exploration of the contribution of the Programme to the movement of the Result Indicator, to inform the remainder of the INTERREG VA Programme and potential future programming periods.

As such, the Impact Evaluation Team is required to address the following:

- To what extent have the Specific Objectives been achieved?
- To what extent have the targets for the Result Indicators been achieved?
- Comment on the effectiveness and added value of cross-border collaboration in relation to the specific objectives?
- What external factors have impacted, positively or negatively, on the achievement of the Specific Objective?
- What new ways of working/partnerships/relationships have been created as a result of activities carried out within the priority axis?
- Identify key areas of best practice and learning;
- What level of mainstreaming has occurred for cross-border delivery of environmental work?
- Are there barriers to cross-border cooperation that the priority axis is not addressing?

[19] The Evaluation Steering Group (ESG), a sub-group of the Programme Monitoring Committees for the PEACE IV and INTERREG VA Programmes, was established to ensure the effective implementation of the Evaluation Plan for each Programme.

[20] Article 56(3) of Regulation (EC) No: 1303/2013 requires that an evaluation should assess how the support provided has contributed to the achievement of the objectives of the programme. Article 54 requires the impact evaluation to comment on the contribution of the priority axis to the EU 2020 objectives. In addition, Article 7 of the above regulation requires that Member States ensure equality between men and women and the integration of a gender perspective are taken into account and promoted throughout the preparation and implementation of the programmes, including in the monitoring and evaluation of the programmes. Article 7 also specifies that the programme authorities must take appropriate steps to prevent any discrimination on any of the specified grounds. Article 8 requires that the objectives of the funds shall be pursued in line with the principle of sustainable development and with the European Union's promotion of the aim of preserving, protecting and improving the quality of the environment taking into account the polluter pays principle.

- What is the contribution of the priority axis to:
  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development?

1.6.1 Methodology

Across the three distinct cycles of research, the Evaluation Team employed the following methodology:

- Consulted with SEUPB personnel both to identify report-specific requirements and to identify any project-specific issues encountered or developments of note;
- Extensive desk research activities that encompassed detailed reviews of materials such as:
- INTERREG VA policy and operational documents, such as the Cooperation Programme;
- Policy and strategy documents of specific relevance to individual projects and/or the eligible region;
- Project applications and supporting materials;
- Letters of Offers and subsequent amendments (where relevant);
- Analysis of all monitoring data available on the progress of projects supports including both activities undertaken and their financial expenditure against budget;
- Extensive engagement with the nine individual projects to assess project against targets and key achievements.

2. THE POSITION PRIOR TO THE FINAL REPORT

2.1 Introduction

As reflected in Section 1, the specification for the evaluation requested that this final report provide a brief summary of the findings featured in the previous evaluation reports. At a high-level, the first two reports considered the following:

1. The first report considered the mobilisation of the nine projects and their early progress towards achieving their output indicators. This early activity also naturally led to a detailed consideration of the intervention logic associated with the priority axis;
2. Given the considerable upheaval caused to many aspects of organisations' operations and people's lives, the second report placed a particular emphasis on the impact of the pandemic on projects, emerging risks and barriers to the successful completion of projects, and the identification of methods by which such risks or barriers could be minimised.

This section provides a summary of the key findings that featured in those reports.

2.2 The Mobilisation of Projects

At the time of the first report, each of the nine projects were, for the most part, at early stages in their rollout, and whilst some had encountered some operational issues, none reported any issue pertaining to their mobilisation that they considered, at that time, to be significant enough to ultimately affect the successful delivery of their project. At that time, the projects reported that good progress had been made, for example, in the creation of own internal (within the partnerships) management structures and the recruitment of key project personnel, but also importantly that substantive progress had been made with important external stakeholders, such as landowners and local communities. Across each of the projects, fieldwork, such as site surveys had also begun.

However, during consultation with the project partnerships, the uncertainty associated with the UK's pending withdrawal from the EU ('Brexit') was highlighted as an external factor that had (at that time – late 2018) the potential to impact on both project activity and the achievement of the Specific Objectives. It was noted by several of the project partnerships that the nature and extent of any future arrangements between the EU and the UK was not clear (at that time) and consequently they were of the view that there was a risk that future environmental legislation across Ireland, Northern Ireland and Scotland could diverge post 'Brexit', with different regulatory regimes and standards applying across the UK (Scotland and Northern Ireland) and the EU (Ireland). It was suggested that this had the potential to impact on the relationship between the project partners (and in turn, project delivery), as each would be required to adhere to the relevant legislation in their respective jurisdiction.

At that time, several of the project partnerships noted that the project monitoring requirements required them to report upon the progress that their project had made to the respective result indicator for their Specific Objective area, but they were unclear as to how they were meant to measure progress in practice, and to the extent to which SEUPB required their project to contribute to/achieve the result indicator.

Based on its review of the output and result indicators/targets established for the Investment Priority, the Evaluation Team was of the view that greater focus should have been placed on ensuring that all indicators/targets were Specific, Measurable, Achievable, Realistic and Timebound. For example:

- In relation to the Results Indicator associated with Objective 2.2, it was anticipated that the four projects (COMPASS, SWIM, MarPAMM and Sea Monitor 2) would enhance cross-border capacity for monitoring and management of marine protected areas and species by stimulating levels collaboration. However, it was unclear what constitutes either the baseline ('a little') or the target ('a lot of') levels of collaboration or how any change would ultimately be measured;

- In relation to the Result and Outputs Indicators associated with Objective 2.3, the SWELL project promoters noted that the result indicator anticipated that the percentage of shared transitional waters in the region with good or high quality would increase from a baseline of 0% to 100%, whilst the output indicator target envisaged that the SWELL project would contribute to (inter alia) 10,000 people benefiting from improved wastewater treatment. However, the SWELL project partnership noted that whilst the project intended to deliver a programme of measures to improve water quality and thus contribute towards the achievement of *"good status"* of the receiving waters:

  – The project could not guarantee that any improvement would be made to WFD status by 2023. They noted that there were several external reasons, beyond the control of the water companies, as to why this was the case, including diffuse pollution, industrial discharges, changes in catchment practices e.g. Rural Development Programmes, the Nitrates Directive etc. Based on these points, the project partnership and the Evaluation Team were of the view that greater attention could have been given to ensuring the result indicator target was more achievable (as a direct result of project activity) and realistic;
  – The results indicator target was not achievable for the SWELL project in isolation given the level of funding and external factors that also had the potential to impact upon its achievement.

The points raised by the project partnerships were discussed with SEUPB and NISRA who advised that the approach adopted in setting specific the development of the Result Indicators was in line with guidance issued by the EU during March 2014 concerning monitoring and evaluation during the programme period 2014-2020.[21] The guidance document outlined the following advice:

- The intended *result* is the specific dimension of well-being and progress for people that motivates policy action, i.e. what is intended to be changed, with the contribution of the interventions designed.
- Once a result has been chosen it must be represented by appropriate measures. This can be done by identifying one or more result indicators. *Result indicators* are variables that provide information on some specific aspects of results that lend themselves to be measured.
- Different factors can drive the intended result towards or away from the desired change.
- *Outputs* are the direct products of programmes; they are intended to contribute to results;
- The values of result indicators, both for baselines and at later points in time, in some cases can be obtained from national or regional statistics. In other cases, it might be necessary to carry out surveys or to use administrative data, such as registry of enterprises or unemployment benefit recipient data.
- In relation to evaluation, the guidance notes that changes in the result indicator are due to the actions co-financed by the public intervention, for example by the Funds, as well as *other factors*. In other words, the difference between the situation before and after the public intervention does *not* equal the effect of public intervention:

  Change in result indicator = contribution of intervention + contribution of other factors

As such, SEUPB and NISRA advised that the result indicators were not anticipated to measure the direct impacts of the projects supported and instead they were anticipated to measure changes in the characteristics of a given area due to programme interventions and / or other factors (i.e. external to the Interreg VA programme), and provided the following commentary concerning individual result indicators:

[21] Programming Period 2014-2020, Guidance Document on Monitoring and Evaluation of European Cohesion Policy, European Regional Development Fund (March 2014)

Table 2.1 NISRA's Commentary on Result Indicators and Targets		
Specific Objective	**Result Indicator**	**NISRA Commentary**
2.1 To promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species	The percentage of selected protected habitats in or approaching a favourable condition from a baseline of 1% to a target of 10%	The 2023 target of 10% was set on the following basis: • The anticipated recovery of habitat of an additional 4500 ha would increase the 2014 value of 1%, by approximately 4.5%, to 5.5% by 2023. • It was also envisaged that mapping selected protected sites, would contribute a further 4.5% towards the 2023 target. As the result indicator was utilised in the calls for applications and during project assessment. It was considered that proposing this baseline and target was the correct approach to direct the investment to the areas of greatest need and to optimise its impact.
2.2 To develop cross-border capacity for the monitoring and management of marine protected species in the region	Cross-border capacity for monitoring and management of marine protected areas and species from a baseline of 'a little collaboration' to a target of 'a lot of collaboration'.	NISRA advises that it was recognised at the outset that the measurement of this result indicator might be considered somewhat subjective and difficult to measure in practice, but notes that no other suitable baseline indicator was available (or would have been available within the timeframes) at the time the INTERREG Result Indicators needed to be agreed for the Cooperation Framework document.
2.3 To improve the water quality in shared transitional waters	The percentage of shared transitional waters in the region with good or high quality from a baseline of 0% to a target of 100%	The 2023 target of 100% was set in agreement with Northern Ireland Environment Agency. NISRA noted that given that the investment was anticipated to contribute to a significant improvement in the elements of water quality it was agreed that the appropriate 2023 target for both transitional water bodies should be set at 'Good', albeit it was recognised that this may not be achieved due to the 'one out, all out' rule.
2.4 To improve freshwater quality in cross-border river basins	The percentage of cross-border freshwater bodies in cross-border river basins with good or high quality from a baseline of 32% to a target of 65%	The 2023 target of 65% was set in agreement with Northern Ireland Environment Agency and is in line with the Water Framework Directive River Basin Management Plans. This result indicator followed the Water Framework Directives' one-out-all-out principle, where the overall status of the water body would be determined by the lowest status from any of the 40 standards that are assessed.

2.3 The Impact of the Pandemic on Projects (in December 2020)

Given the considerable upheaval caused to many aspects of organisations' operations and people's lives, the second report placed a particular emphasis on the impact of the pandemic on projects, emerging risks and barriers to the successful completion of projects, and the identification of methods by which such risks or barriers could be minimised.

The key findings from the Evaluation Team's consultation with project partners at the time (December 2020) of the second report included:

- 5 of the 9 projects considered that the onset of the COVID-19 pandemic and the associated lockdown and disruption to normal working practices had created a risk that their project would not fully achieve its aims and objectives.
- 7 of the 9 projects had made some adaptations to their project as a result of the COVID-19 pandemic;
- 4 of the 9 projects considered that their project would likely require an extension to its originally anticipated timescales to complete successfully;
- 1 of the 9 projects considered that they would likely not be able to spend their full budget allocation.

It should be noted that the Evaluation Team spoke with the projects at a time (end of August/start of September) when COVID-19 restrictions had been eased/lifted to some extent and projects may have been more optimistic about the project's ability to achieve its aims and objectives within the original timeframe. However, at the time of that the second report was being drafted (late December 2020) further restrictions were being implemented in Northern Ireland and the Republic of Ireland, which created further risk to cross-border collaboration activities.

Given the uncertainty, the Evaluation Team recommended that SEUPB continued (as it had been doing throughout the pandemic) to regularly monitor the activity undertaken and progress made by each project. In particular, the Evaluation Team noted that it would be important to engage with projects to discuss potential changes to project activities, timelines or budgets.

It is understood that SEUPB's Joint Secretariat subsequently asked each of the projects to formally report back in early 2021 as to any further project amendments that might be required as a consequence of the pandemic.

The remainder of this report relates to the position of projects at the time of consultation concerning the development of this final evaluation report i.e. the period April to June 2022.

3. CANN - COLLABORATIVE ACTION FOR THE NATURA NETWORK

3.1 Introduction

This section of the report considers the Collaborative Action for the Natura Network (CANN) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 1 – Recovery of Protected Habitats & Priority Species.

3.2 Project Overview

3.2.1 Rationale for the Project

Stores of carbon peatlands and wetlands are important in helping to tackle climate warming; as homes for nature, they are special and unique; and as the raw ingredient of rural farming, tourism and crofting they are vital. They offer a range of vital ecosystem services, such as filtering of drinking water, regulation of water flows in wider catchments and carbon sequestration. On the other hand, degraded peatlands are responsible for an estimated 6% of anthropogenic CO2 emissions globally. Some of the other services they provide are distinct to the jurisdictions, for example, the contribution of peat to the Scottish whisky industry.

INTERREG VA has identified seven priority habitats, where the overall conservation status is poor, as summarised below.

Table 3.1: INTERREG VA priority habitats and their conservation status across the three jurisdictions

Habitat code	Habitat name	Northern Ireland	Ireland	Scotland
7230	Alkaline fens	Bad-declining	Bad-unknown	Bad - stable
7110	Active raised bog	Bad-declining	Unfavourable bad	Inadequate - declining
7130	Blanket bog	Bad-unknown	Bad-declining	Bad - stable
3140	Hard oligmesotrophic waters	Bad-declining	Bad-declining	Bad-unknown
7210	Calcareous fens	Bad-unknown	Bad-unknown	Not present
7220	Petrifying springs	Unknown	Unfavourable-Inadequate	Bad - improving
7140	Transition mires	Bad-declining	Bad-unknown	Inadequate - stable

However, designating sites alone has not been enough to achieve favourable conservation status. Protection mechanisms, such as statutory measures to prevent damaging operations from occurring, have not necessarily prevented further degradation.

In addition, the jurisdictional border in Ireland has hampered efforts to manage the peatland resource across the region. Before the introduction of INTERREG VA, there were no cross-border networks that allowed managers to co-operate, share information and implement landscape-scale conservation. To this end, the CANN project – a consortium of public bodies, third-level institutions, charities and local government authorities from Ireland, Northern Ireland and Scotland - has sought to carry out several activities across 24 separate sites, including:

- Delivery of 27 Conservation Action Plans (CAPs);
- With direct conservation actions to be delivered on 20 of these sites. This was anticipated to involve improving the conservation status of 3,650 ha[22] (hectare) of Special Areas of Conservation (of which over half is in private ownership, predominantly farmers) to contribute towards the programme output of 4,500 ha of habitats supported to improve conservation status.[23]

[22] NB: While aspects of the project's progress reports and its Letter of Offer (dated 25th October 2018) state 3,605 ha, during consultation the Lead Partner confirmed that the correct figure is 3,650 ha.
[23] According to the project partners, they would aim to achieve this output, by selecting 4,605 ha of selected protected habitats on which direct conservation actions would take place.

3.2.2 *Project Partners*

The CANN project partnership was led by Newry Mourne & Down District Council (NMDDC), and was made up of the Agri-Food and Biosciences Institute (AFBI); Argyll & The Isles Coast and Countryside Trust (ACT); Armagh City, Banbridge & Craigavon Borough Council (ABCBC); East Border Region (EBR); Golden Eagle Trust (GET), the Institute of Technology Sligo (Sligo IT) (now known as Atlantic Technological University Sligo), Monaghan County Council (MCC), NatureScot (previously Scottish Natural Heritage (SNH)), Ulster University (UU) and Ulster Wildlife (UW).

3.2.3 *Project Overview, Objectives and Activities*

A key objective of this project was to strengthen cross-border cooperation to facilitate the recovery of selected habitats and priority species and meet the targets of the EU Birds and Habitats Directives and the EU Biodiversity Strategy. Recovery of these wetland and peatland habitats is considered to be vital for the provision of a range of ecosystem services across the region e.g. carbon sequestration and climate change mitigation; water quality and hydrological regulation; and aesthetic and cultural services such as tourism and recreation.

The CANN partnership intended to produce:

- Conservation action plans for 27 (across 24 sites[24]) Special Areas of Conservation[25] across six of the seven priority habitats: alkaline fens, blanket bog, active raised bog, hard oligo-mesotrophic waters (marl lakes), calcareous fens, and transition mires/quaking bogs. Across the three jurisdictions, the seven priority habitats were in 'unfavourable' condition. The continuing decline of these unique habitats and species was a global issue and ensuring protection and restoration was an obligation for all EU Member States. Each of the sites had been drawn from the SEUPB Priority Site List. It should be noted that for 20 of the sites, the project partnership also intended to deliver direct conservation actions; and
- Site-specific species action plans for five INTERREG VA priority species: white-clawed crayfish, hen harrier, breeding waders (curlew, redshank, snipe), golden plover, and red grouse. It was anticipated that species experts within the consortium would produce a list of recommended activities to improve the conservation status of targeted species and these will then be adapted and tailored per site and appropriate actions incorporated into each of the 27 conservation action plans where target species are recorded.

It was anticipated that the conservation action plans and mapping of these areas would follow an agreed common methodology to identify best practice actions across the three jurisdictions. The project partners considered that this approach would result in higher standards of conservation work and greater efficiency of delivery.

Given that environmental management had not historically been a core element of agricultural education (and much of the targeted land was in the ownership of farmers), CANN also proposed to offer training courses to help build capacity within the land-based sector and develop an understanding of the management of designated sites.[26] It was anticipated that landowner engagement would be secured through farm visits and information meetings in local halls and community centres and engagement with

[24] Although the number of sites is 24, the number of plans is 27 as three of the proposed sites are cross-border and it is anticipated that a plan will be produced for both the NI and ROI aspects of the site (albeit, it is anticipated that the two plans will 'speak' to each other).

[25] NB Stretching over 18% of the EU's land area and almost 6 % of its marine territory, the Natura 200 network is the largest coordinated network of protected areas in the world. It offers a haven to Europe's most valuable and threatened species and habitats is a network of nature protection areas in the territory of the European Union. It is made up of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated respectively under the Habitats Directive and Birds Directive. All of the action plans will cover Natura 2000 sites i.e. SAC or SPA designated sites.

[26] It is noted that at the time of the CANN partnership application to INTERREG, the project partners had had preliminary contact with landholders across the three jurisdictions who had indicated support for restoration activities. Indeed, it was noted that farming representatives from Sliabh Beagh and Boleybrack had been actively engaged with site management planning for some time.

existing local organisations – gun clubs, fishing clubs etc. In addition, it was envisaged that farmer networks would be targeted through the Irish Farmers' Association, Ulster Farmers' Union and NI Agricultural Producers' Association.

The CANN project also proposed to facilitate the establishment of the first formal environmental trust to be established to manage the overall conservation and protection of a cross-border habitat (at Sliabh Beagh). The Partnership's funding application advised that two active Group Water Schemes and a Tidy Town Committee wanted to be more involved in the protection of this important habitat. It was considered that the establishment of a demonstration site, interpretative signage and stakeholder engagement would respond to the needs of those who wanted to learn more about this important wildlife habitat.

It was anticipated that the project's objectives would be achieved in consultation and through liaison with key stakeholders, landowners, and farmers. Conservation work would be undertaken in conjunction with local partnerships, such as those already established for Sliabh Beagh. It was anticipated that this would be comprised of members of the local community as well as farmers and landowners, representatives of government departments and state agencies and NGOs. It was proposed that these local partnerships would be linked directly to the project and would form the basis of local advisory groups set up as part of the implementation of the conservation actions at each site.

To deliver the project activities, seven work plans were developed, as follows:

Table 3.2: Summary of CANN Project Work Plans (Per Progress Reports)
1. Project Mobilisation/Management
2. Mapping, Scientific Monitoring and Evaluation (implementation)
3. Conservation Action Plans (implementation)
4. Upland Peatland & Associated Species (implementation)
5. Freshwater and Lowland Wetlands/Peatlands (implementation)
6. Cuilcagh Mountain SACs (implementation)
7. Communications Activities

3.2.4 Anticipated Outcomes and Results

It was anticipated that this activity would contribute toward the programme-specific result *'to increase the total area of these habitats approaching favourable conservation status from the current baseline of 1% to over 10% of selected protected habitats by 2023.'*

3.3 Project Budget to July 2022

The CANN project originally received a Letter of Offer (dated 20th June 2017) offering a grant of up to a maximum of €8,173,689 (ERDF + Government Match Funding) to be expended and claimed by 31st December 2021, towards total anticipated project costs of €8,349,687.85. However, this was later (LoO dated 25th October 2018) extended after the INTERREG VA Steering Committee approved (on 24th July 2018) an additional €1,056,625 following a secondary application for the inclusion of Cuilcagh Mountain as an additional site within the CANN project. The revised total anticipated cost at this point was €9,406,313.

A further revised LoO (dated 29th September 2021) was issued which granted an extension to the project, approved the reduction of the overall budget and saw the reallocation of budget between categories[27]. This LoO offered a grant of up to a maximum of €9,210,814 (ERDF + Government Match Funding) to be expended and claimed by 31 December 2022 towards revised anticipated total project costs of €9,393,660. As reflected in Section 2.3, this extension was required due to the impact of COVID-19 and the resultant delays in the project partnership being able to get onsite.[28]

Further to the above, the Evaluation Team's review of SEUPB's EMS indicates that there has since been a further reduction in the overall budget (to €9,391,035) and a reallocation of budget between categories, as reflected below. As of July 2022, the project had reported a total estimated expenditure of €7,971,255 equivalent to 85% of the total project budget.

Table 3.3: Project Costs – Anticipated and Estimated Actual July 2022 (€)

Summary Budget	Anticipated Total	Estimated Expenditure in July 2022[29]			
		Reported to JS by First Level Control (FLC)	Pipeline Expenditure (excluding items deemed ineligible by FLC)	Total Estimated Expenditure	% of total budget
Staff Costs	4,532,528	3,685,757	449,652	**4,135,408**	91%
Office and Administration Costs	679,879	552,862	67,446	**620,308**	91%
Travel and Accommodation Costs	389,367	304,746	30,754	**335,500**	86%
External Expertise and Services	3,090,750	2,017,639	419,891	**2,437,530**	79%
Equipment Costs	556,510	410,054	32,455	**442,509**	80%
Infrastructure and Works	142,000	-	-	-	-
Total	**9,391,035**	**6,971,056**	**1,000,199**	**7,971,255**	**85%**

Discussion with the CANN project partnership in March/April 2022 indicates that they are confident that almost all of the project budget will be spent by the anticipated end date of December 2022.

[27] SEUPB advised that the reduction in the overall budget was as a result of underspend by Scottish partners, as whilst the ERDF portion of funding could be transferred (and reprofiled) to non-Scottish partners, the Scottish match funding was confined to Scotland and could not be transferred to non-Scottish partners.
[28] Source: Consultation with SEUPB (30th November 2021)
[29] Source: SEUPB's EMS 13th July 2022.

3.4 Contribution to the Achievement of the Priority's Specific Objectives & Result Indicators

This section considers the CANN project's key achievements and the extent to which the CANN project has:

- Contributed to the achievement of the Priority's Specific Objectives; and
- Contributed to the achievement of the targets for the Result Indicators.

The section also identifies any external factors that have impacted, positively or negatively, the project's ability to contribute to the achievement of the Specific Objective.

3.4.1 Key Activities Undertaken (to June 2022)

The Evaluation Team's review of the CANN project partners' progress reports indicates that key activities and key achievements since the interim evaluation report (between April 2020 and June 2022) include the following:[30]

Table 3.4: Key Activities

Period	Dates	Key Achievements/Points of Note
14	1st April 2020 – 30 June 2020	• During this period, the first lockdowns relating to the COVID-19 pandemic began, with project staff beginning to work from their homes. • The project partners developed a 'COVID-19 impact document' that outlined the anticipated (at that time) impact on the project of the pandemic-related restrictions. This was sent to SEUPB and relevant Government Departments.
15	1st July 2020 – 30 September 2020	• NMDDC assessed the quotations that had been received for the Lough Arrow interpretation panels, with the contract subsequently awarded. • A Job Description was developed for the Maagheraveely/Kilrooskey Stakeholder Officer and sent to SEUPB for its review. It was anticipated that this position would be recruited by NMDDC.
16	1st October 2020 – 31 December 2020	• Drain blocking was completed for over 120 ha of land. • A contractor was appointed to undertake conifer removal works. • Drain blocking took place and a conifer removal contractor was appointed at Sliabh Beagh. • Removal works at Uragaig Common Grazing (Colonsay) were completed and Rhododendron removal took place at Duich (Islay). • In terms of rhododendron control, the contractor tackled the larger, denser areas at Peatlands Park, whilst UW and Lough Neagh Landscape Partnership cleared smaller plants elsewhere in the Park. UW also finished rhododendron control at Fairy Water Bogs and progressed the same at Tully Bog as well as finishing conifer control at Moneygal. • Two major reports, representing three years of surveys across two freshwater SACS, were completed by external contractors. • At Cuilcagh, the erosion gully restoration work at Lough Atona was completed, except for stock exclusion fencing, and all peat dams were installed at Gortmaconnell. Local landowners were also trained in these techniques. • A contractor had analysed LiDAR data and had identified and costed 17 potential restoration areas. • A final draft of the wildfire management plan was circulated to stakeholders and feedback was incorporated. • Work on the grazing management plan progressed, with stakeholder meetings held with landowners.

[30] Please note that the key achievements have been documented in respect to the most recent project progress reports that were available to the Evaluation Team at the time of writing (July 2022). The most recently available collated project progress report for the project was for period 21 (January – March 2022). Therefore, key achievements in period 22 have been taken from the latest available individual partner progress reports.

Table 3.4: Key Activities		
Period	**Dates**	**Key Achievements/Points of Note**
17	1st January 2021 - - 31st March 2021	• A large area of invasive conifer trees was cleared on Sliabh Beagh whilst significant progress was made on the wildfire management plan. The production of a wildlife information booklet was also commissioned for Sliabh Beagh. • Ten draft CAPs were submitted to NIEA at the end of February 2021. • Habitat restoration works continued with the contractor finishing treatment of the second of three large dense areas of rhododendron on Peatlands Park. Furthermore, CANN staff and volunteers addressed more widespread invasion elsewhere in the Park, whilst finishing the second year of treatment at Tully Bog. Four large multi-lock dams were installed during this period at Peatlands Park and Fairy Water. • The Collie rhododendron removal tender was evaluated early in January and awarded. • Open water sampling on Lough Arrow was completed, as was a draft report detailing the findings from this monitoring.
18	1st April 2021 – 30th June 2021	• Ulster Wildlife completed one year of ammonia deposition sampling at five SACs, whilst NIEA had taken over sampling at three SACs. • Rhododendron control along the paths at Peatlands Park continued and consents for scrub control & use of the Robocut at a Lecale Fen were submitted.
19	1st July 2021 – 30th September 2021	• 7 conservation action plans were finalised. • A second nutrient limitation trial was completed by UU. Crayfish surveys and work on further draft CAPs were carried out. • Radon sampling on Lough Arrow was completed. • AFBI completed habitat reports for all sites based on revisions to habitat maps. • A contract was awarded to Coomhola Salmon Trust to deliver the Lough Arrow Education programme.
20	1st October 2021 – 31st December 2021	• NMDDC and Ulster Wildlife staff travelled to Cuilcagh in October to meet the NI Finance Minister and discuss the CANN Project. • A signage tender was advertised and awarded during this period with planning meetings taking place with partners. • Steady progress was made concerning the raised bogs, with drain blocking completed at Ballynahone and Bomackatall contributing 225ha to the 'hectares supported' output. • A corporate volunteering day was held at Peatlands Park in November with a team of 12 clearing rhododendron from across 6ha. • Four finalised CAPs were submitted to NIEA. • A wildfire awareness day was also hosted in collaboration with NIFRS and NIEA, to showcase the techniques and equipment used to manage and respond to wildfires. • Monaghan County Council advertised tenders for conifer removal, drain blocking and nest protection. The conifer removal was completed in October from the ASSI. • Sligo IT continued with water table data collection activity on Cuilcagh Mountain SAC. SCIR workshops were conducted with Ulster Wildlife on handling and manipulating the 3D imagery.
21	1st January 2022 – 31st March 2022	• A CANN project presentation was compiled and presented at the SEUPB online conference (Impact Evaluation of INTERREG VA Priority 2 - Environment - CANN) on 23 March. • Ulster Wildlife submitted several draft final CAPs to NIEA for review including Ballynahone, Lecale Fens, Peatlands Park, and Curran. • Stakeholder engagement activity continued, with Ulster Wildlife developing an online questionnaire and hosting online, in-person and farmer drop-in events. Ulster Wildlife also participated in and delivered multiple communication and promotion opportunities, including appearances on BBC Newsline and the Home Ground TV programme alongside Cuilcagh landowners.

Table 3.4: Key Activities		
Period	**Dates**	**Key Achievements/Points of Note**
		• NatureScot reported that it was close to finalising 7 CAPs. • Sligo IT issued a final draft of the Lough Arrow CAP to NPWS for review. • Nine contracts were awarded under the Communications Work Package.
22	1st April 2022 – 30th June 2022 (From Partner Progress Reports)	• The NMDDC project team attended best practice trips in Abbyleix in April and Ayr in Scotland in May. • NMDDC assisted the Institute of Technology Sligo with a launch event for the bio-secure lanes at Lough Arrow on 7th April and organised two workshops at Peatlands Park in June. • The main CANN signage project panels were designed and signed off by SEUPB. • The Duich CAP was completed in this period. • The Argyll and The Isles Coast and Countryside Trust secured funding from the Esmee Fairbairn Foundation and Peatland Action in this period for a possible CANN follow-on project. Furthermore, their staff also completed tree planting at the Duich riverbank. • The Institute of Technology Sligo sent a final draft of the CAP for Lough Arrow to National Parks and Wildlife Service for review.

3.4.2 External Impact Factors

Discussion with the CANN Project Partners indicates that the project encountered a number of issues during its delivery. The issues and barriers encountered included:

Impact of the Pandemic

The Evaluation Team's discussions with the CANN Project Partnership during November 2020 as part of the Interim Evaluation report identified that the pandemic and the related restrictions on the movement of people meant that:

- During the periods of lockdown, CANN staff began to work remotely. However, no staff were furloughed;
- Fieldwork was placed on hold, which had a consequent impact on data collection and monitoring activities;
- There were delays in receiving some materials and the cost of some materials had increased;
- Face-to-face community engagement activities ceased; albeit online approaches were explored;
- However, progress was made to allow landowners to conduct some works such as fencing and drain blocking themselves.

However, the project partnership reported that a positive that emerged from the pandemic was that the project partners had to increase the regularity of their workplan meetings to adapt to working remotely. An outcome of this was considered to be a strengthening of the relationship between the project partners.

Nonetheless, at that time, the project partners advised that the CANN project was behind schedule, and the partnership considered there to be a risk that the project would not fully achieve the aims and objectives that had been outlined within its Letter of Offer. In particular, the project partners were concerned that the reduction in the quantity of monitoring data that they could gather, due to the loss of a field season, would have a detrimental impact on the project's impact.

Consequently, the CANN project requested several project amendments including:

- A number of amendments to delay the end dates of several contracts and/or restructure some of the works. This enabled contractors to restructure their workplans and continue desk-based work where possible, delaying onsite activities until towards the end of the contracts.
- Many small amendments to activities to assist in project delivery and ensure that the overall project remained deliverable.

As outlined in Section 1.5, to both facilitate the suggested amendments and to allow the CANN project further scope and time to both implement fieldwork (which could only be undertaken on a seasonal basis) and gather and collate the monitoring data, the project received a one-year extension to the project to 31st December 2022.[31]

Upon the easing of lockdown restrictions, the project was able to recommence its fieldwork activities, albeit often with protective measures in place and data analysis etc. continuing from home.

However, even with the one-year extension awarded by SEUPB, the Project Partnership advised that as a consequence of the COVID-19 restrictions, the quantity of monitoring data will be less than originally envisaged due to the loss of a 'field season'. For example, only three nutrient trials could be completed instead of the four that had originally been planned.

Impact of Brexit

A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Discussion with the Project Partnership indicates that beyond some volatility associated with exchange rate fluctuations, Brexit had no significant impact on the project.

3.4.3 Variation to Planned Activities

Discussion with the project partnership indicates that a small number of activities that had been proposed originally were not implemented, or not implemented in the way or extent that was originally proposed. These included:

- The CANN project stopped its plans to re-locate white-clawed crayfish populations within the network of lakes at Magheraveeley-Kilrooskey. Only one of the lakes (Horseshoe Lake) held a crayfish population above the threshold for favourable status, but this was on a declining trajectory.[32] The Project Partnership advised that its work over the last five years had identified that translocation of this species was not a feasible plan and indeed a previous translocation attempt had failed.[33] In addition, the project found invasive zebra mussels in the lough, indicating connectivity with other water bodies suggesting that crayfish plague may also have moved in and could have played a part in this failure. With populations so fragile, it was determined that only waters with no connectivity to other lakes or rivers and no fishing stands can support good crayfish populations or become ark sites.
- As reflected in Section 2.2, the project had originally proposed to facilitate the establishment of the first formal environmental trust to be established to manage the overall conservation and protection of a cross-border habitat (at Sliabh Beagh). However, in discussion, the project partnership advised that during the rollout of the project, it became clear that it would be difficult to establish a formal trust. Instead, a less formal cross-border wildlife group was established.
- As noted above, only three nutrient trials could be completed instead of the four that had originally been planned.
- As tensions had arisen between the project and a small group of local landowners at Boleybrack Mountain in Co. Leitrim, the Boleybrack site had to be withdrawn from the project.
- Much of the planned direct community engagement activities had to be cancelled, however this activity was augmented through online workshops and the production and distribution of video-based guidance, which ensured that links with communities were maintained.

[31] To facilitate the completion of the Final Evaluation report within SEUPB's required timeframe, discussions with the project partnership were undertaken during March/April 2022, meaning that the project continued to have circa 9 months before it was anticipated to complete.
[32] The threshold is measured as catch per unit effort (CPUE) and should be above one.
[33] Between 2013 and 2015, an attempt was made to move crayfish from Horseshoe lake to Knockballymore; however, surveys have not found a single crayfish in the new site.

- As part of the development of the Wildfire Management Plans, it was anticipated that controlled burning would take place; however, departmental guidance changed, and the project followed the new guidance to use alternative means.
- There was a significant reduction in land owner engagement schemes, both as a result of issues identifying land owners and with covid limiting engagement.

3.4.4 Progress Towards the Project Output Indicators

As of March 2022, the CANN Project Partnership had not yet fully achieved the anticipated (approved) project outputs, but according to the Project Lead, the project was proceeding according to its revised work plan. In March 2022:

- 24 (89%) of the project's anticipated 27 conservation action plans had been successfully developed and approved by the appropriate governmental bodies.
- More than half (2,042 ha) of the anticipated 3,650ha of targeted nature and biodiversity habitat areas had been supported to attain a better conservation status. The CANN partnership advised that the 2,042 ha should be considered the minimum that the project has achieved as it was working with SEUPB to fully identify how this metric should be measured. The consultee noted, for example, that the project might undertake work on 2.7ha of a specific site, but the entire site (1,327ha) would be improved as a result of the work.

Table 3.5: Project Output Indicators

Programme Output Code	Name of Output	Programme Output Indicator Target	CANN Project Target	Progress (as of March 2022)[34]
CO23:	Nature and biodiversity Surface area of habitats supported to attain a better conservation status (hectares)	4,500 ha	3,650ha	2,042ha
2.111	Conservation Action Plans	25	27	24

Of note, the CANN project partners advised that unfortunately in one specific area (Boleybrack Mountain in Co. Leitrim) tensions had arisen between the project and a small group of local landowners. This culminated in that site having to be withdrawn from the project. However, positively, the project team had gathered sufficient data to produce a draft Conservation Action Plan for that particular site, which it was envisaged would provide a legacy for future action beyond the lifetime of the project.

3.4.5 Key Achievements (to March 2022)

Despite the series of enforced restrictions imposed upon the CANN projects caused by the Covid-19 pandemic, the CANN project partnership endeavoured to continue work on each of its selected sites, albeit adhering to respective jurisdictional guidelines throughout. Indeed, in some areas during periods of restrictions, landowners themselves progressed the work, where they were deemed capable. Other project activities that did not require the project partners to be on site such as data analysis were able to be completed whilst staff worked from their homes.

Although much of the planned direct community engagement activities had to be cancelled, this activity was augmented through online workshops and the production and distribution of video-based guidance, which ensured that links with communities were maintained.

Discussion with the project partners indicates that they consider the following to be amongst the CANN project's key achievements (as of March/April 2022):

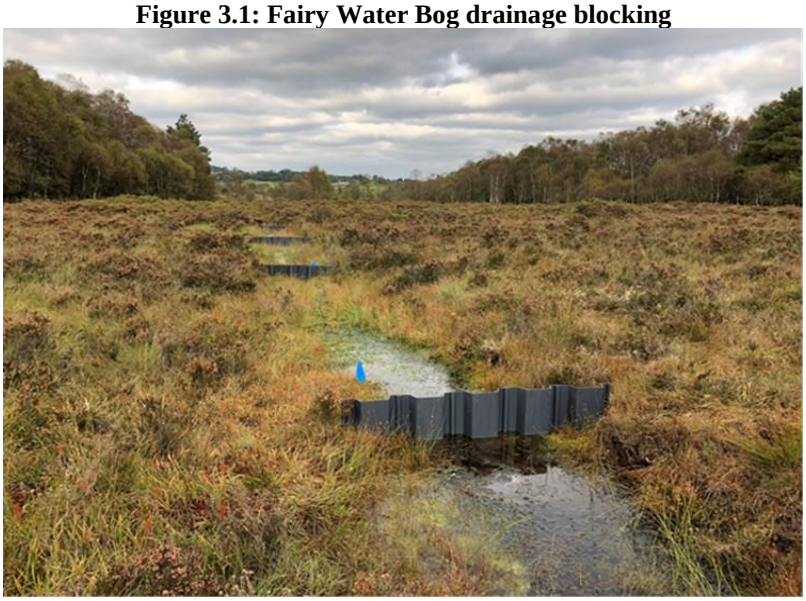
- An important outcome of the CANN partnership was the formation of the partnership itself, which the project partners consider would not have been possible in the absence of INTERREG VA

[34] Source: Consultation with CANN Project Manager.

funding and its ability to identify shared common goals. The partnership notes that in advance of the project, many of the project partners had not worked with one another before and little activity had been undertaken to assess how the recovery of selected protected habitats and priority species might be achieved through enhanced cross-border cooperation;

- The project partnership considers its work to restore degraded blanket bog and issues associated with erosion gullies and peat hagg on Cuilcagh Mountain, which straddles the Irish border between Counties Fermanagh and Cavan to be amongst its most significant and high-profile pieces of work and reflective of the potential of cross-border cooperation. This project received coverage on BBC News.
- The project's work with two farmers who had helped restore Lough Altona. The farmers suggested an innovative idea to use sheep's wool as an alternative to coir (a natural fibre extracted from the outer husk of a coconut, which had to be shipped in from India) as a means of addressing soil erosion. Supported by the CANN partnership, the farmers applied for and received an Invest NI Innovation Voucher to investigate its potential to create sheep wool logs with the assistance of IT Sligo, a CANN project partner. Subsequently, in November 2021, the project held a Peatland Restoration workshop with participants from the CABB project, the water service, academia, local farmers and CANN partners which trained them in the use of this new material and the techniques for laying it.
- In February 2020, the project beat nine other competitors to be awarded the Best Environmental/Ecological Project at the 2020 All Ireland Community and Council Awards. The project was also a finalist in the Europe-wide competition, Innovations in Politics Awards. The CANN project reached the last ten in the Ecology section of the awards, whittled down from over 400 entries drawn across Europe.
- The project partners consider the biosecurity activities undertaken at Lough Arrow, Co. Sligo to have been a particular success. Work was undertaken in 2019 to investigate and combat the invasive pondweed Elodea nuttallii on Lough Arrow. The Elodia had invaded the lake and overwhelmed the native Charophytes/stoneworts (green algae that grow on the bottom of alkali limestone lakes). As well as damaging the biodiversity of the lough, the Elodia was getting tangled in fishing boat engines, causing severe damage. Elodia is easily transferred to other water bodies, so CANN worked with local and visiting anglers to create temporary weed-free lanes by laying down long sheets of jute on the floor of the lough. This combatted Elodia but still allowed the Charophytes to grow through the fabric. Temporary buoys were also laid to mark the safe lane and cleaning stations around the lake.
- Across each of the partnership's selected sites, considerable remedial works had been implemented, which included drain blocking, fencing, rhododendron control and coir roll placement, and which were considered to have the potential to have considerable long-term positive impacts on protected habitats and priority species.

Figure 3.1: Fairy Water Bog drainage blocking



- The project partners also made several important discoveries, including:

  - In July 2019 adult Marsh Fritillary butterflies were recorded at two new locations on the Sliabh Beagh, which straddles the Irish border between County Monaghan in the Republic of Ireland and County Fermanagh and County Tyrone in Northern Ireland. One adult was found at the Northern Ireland end of the site, whilst another was found on the Irish side. These new locations were several kilometres from the previously recorded populations. The Marsh Fritillary is Ireland's only European protected insect, listed as an Annex II species under the Habitats Directive.
  - In late 2018, the project discovered a rare species of snail known as the Desmoulin's whorl at a bog in Co. Down. The discovery was made by a team of specialists who were carrying out field surveys at the Lecale Fens Special Area of Conservation site, just outside Downpatrick.
  - During surveying on Islay in August 2021, the Conservation Officer found a new colony of rare orchids called Irish Lady's Tresses near a survey site. These orchids are only known at four locations on Islay. A total of 14 flowering plants were discovered, the greatest number of any single site to date. These plants are quite rare, mainly found in northern and western Ireland and the west coast of Scotland.

- Beyond the 24 cross-border sites that had (in March 2022) Conservation Action Plans developed, the project partners had developed Wildfire Management Plans (WMP) which included guidance on implementing a cross-border approach to responding to wildfires.[35] The project partners considered this to be a key example of an increased level of cross-border integration in the planning and management of the environment across the region that would not have been possible in the absence of the CANN project.
- The CANN project partners consider that the project has contributed to increased awareness of the potential threats of climate change to habitats and species, noting that extensive stakeholder engagement and outreach work had been undertaken as the project rolled out. Indeed, it was noted that each of the CAPs that had been developed required in-depth stakeholder engagement and the development of good relationships. The project held various seminars and workshops to promote key messages, as well as created videos and press releases. An example of such activity where the CANN partnership sought to raise awareness of peatland science in the run-up to COP26, was the Partnership's series of Twitter posts that used an ancient form of Japanese poetry, the haiku, (or in this case, the "sci-ku" or scientific haiku), to communicate key aspects of peatland science.

[35] A WMP aims to help stakeholders and responders understand the fire risk and the landscape management needed to alter fire behaviour in an area, as well as reducing the risk of further landscape-scale fires in the future. The plan provides recommendations to encourage actions to sustainably manage the environment, improve responders' (e.g. fire-service and local landowners/fire rangers) capacity to control wildfires and reduce their impact on peatland habitats.

- Other examples of the project achieving the involvement of wider stakeholders and communities included:

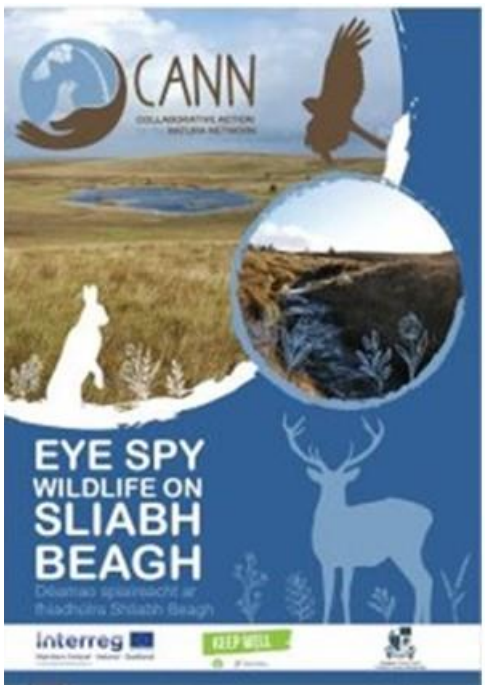
  - The first community engagement pilot was carried out by the Islay Natural History Trust (INHT), a charity dedicated to helping local people appreciate and learn more about the geology and wildlife on Islay, Inner Hebrides is-lands. In cooperation with CANN, INHT led the 'Celebration of Peat - Our Wonderful Peat & Bog' campaign to celebrate the bogs and wetlands on Islay, but also the neighbouring islands of Jura and Colonsay, consulting with local distilleries, Gaelic language groups and schools. This included creating a Peatland Passport to encourage spotting and recording wetland species, running guided walks, a community project to look at all the Gaelic words for bogs and wetplaces and local schools taking part in the John Muir award.
  - Following the success of the pilot, the same approach was adopted around Peatlands Park in Co Armagh, where the CANN team built relationships with four community organisations: Birches Action Rural Network, Tamnamore Community Development Association, Maghery Matters and Blackwater Community Barge. None of the four groups previously had a particular interest in environmental issues and all saw Peatlands Park as a government-owned site that had little connection to their group and the local community. However, through engagement, this perception changed. To increase the relevance of the project to these groups, the area of interest was extended from Peatlands Park to the riparian corridor of the River Blackwater and the shores of Lough Neagh. As part of this extensive project, it was discovered that many local people had connections to the old Church Hill Estate, which was purchased by NIEA to form Peatlands Park, where they were able to tell stories of grandparents working long and difficult hours extracting peat to power the mills in Portadown. This oral history became key to CANN's work[36].
  - Events were organised by a new environmental grouping established to celebrate and protect the important wildlife habitats between the River Blackwater and the Bann, as part of the outreach work of the CANN project. For example. local people enjoyed a guided culinary and foraging walk around Peatlands Park and had the opportunity to brew pine needle tea and produce apple juice.
  - In May 2021, Edwin Poots MLA explored Cuilcagh, focusing on meeting farmers who were contributing to tackling the net-zero carbon challenge. He heard from local farmers John Sheridan, whose land has been badly affected by erosion, and Aidan and Pascal McGovern, who had been trained, by the project, to carry out delicate restoration work on eroded peatland. Mr Poots also visited Peatlands Park as Minister for the Environment. On this visit, he launched the consultation of the new Peatlands Strategy for Northern Ireland and spoke with Dr Trish Fox, CANN Senior Technical Officer, about plans for drain blocking on the site.
  - In October 2021, Finance Minister Conor Murphy MLA, visited Cuilcagh to discuss the financial costs of re-wetting upland bogs and the financial implications of not doing so. This visit was of particular significance as the COP26 was on the horizon, and Dr Ian Garner of Ulster Wildlife was able to explain his project looking at the cost-benefit analysis study of dealing with accelerating peatland erosion in Northern Ireland. The work is funded by the Esmée Fairbairn Foundation and the James Hutton Institute. Dr Garner commented that from a cost/benefit perspective, investing in peatland restoration in support of net-zero aligned with the UK Committee on Climate Change's report and that the ratios seen were in the range of 1:2 to 1:10.
  - The Community Peatland Project funded by CANN was launched at an open day at the Islay Natural Heritage Trust's (INHT) visitor Centre in Port Charlotte over the 2021 Easter Weekend. The INHT ran this community-based initiative on CANN's behalf until 2022. A booklet was developed that members of the public could use to help them explore Islay and Jura's peatlands. It had two parts: the first encouraging people to discover the flora and fauna of the bogs, and the second, in conjunction with the Museum of Islay Life, was a section on the cultural history of the peatland and associated artefacts held by the museum. The booklet also featured a series of suggested walking routes.

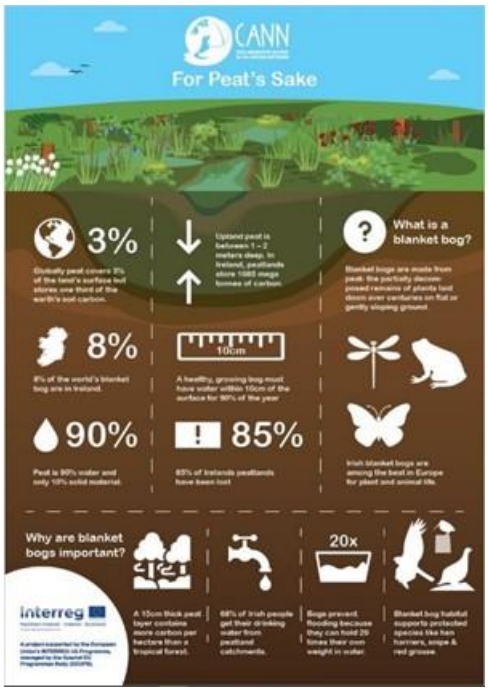
[36] Source: SEUPB Project Case Study: Collaborative Action for the Natura Network (CANN) - Community Engagement with CANN Sites

- The project developed a series of publications as part of its wider stakeholder/community engagement work, including:

  - Monaghan County Council's Library Service reached out to the CANN project and its officers working on Sliabh Beagh, to see if there was a way of helping enrich the lives of local citizens by making the limited (at that time) lockdown walks more meaningful. As the CANN project wished to encourage more 'citizen science' on the mountain, it took the opportunity to avail of the Library's Keep Well COVID funding[37] to create the 'Eye Spy Wildlife on the Sliabh Beagh' booklet. The booklet features twenty species of birds, terrestrial animals, insects, and plants found on Sliabh Beagh. Spotter points are collected depending on how rare or common the species is. Users are encouraged to use their mobile phones to scan a QR code to record what they see with the National Biodiversity Data Centre. QR technology is also used to link users to the bird song and other sounds that might help them identify what they are looking at or listening to. Monaghan County Library Service celebrated the launch of the booklet by decorating the windows of all its branch libraries throughout the county with hand-painted images of the animals and plants featured in the booklet. The booklet is available for free from libraries and has been delivered to all primary schools throughout County Monaghan.
  - The CANN project published an A5 infographic - For Peat's Sake – a Bog Infographic, which details What is a bog? Why are bogs important? How can a bog be damaged? How can bogs be protected and managed?

Figure 3.2: Examples of CANN Publications





[37] The Keep Well campaign aimed to show people of all ages how they could enhance their mental health and physical wellbeing by adding healthy and helpful habits to their daily and weekly routines. The CANN project believed that recording wildlife on a regular walk would add richness and encourage people to go out more often. The citizen science of data gathered in this way is considered essential to the long-term health of the mountain and the long-term health of the people encouraged to walk. That is, unless the CANN team knows where specific species live, it is difficult to conserve them. Consequently, this approach means that walkers can provide the eyes and ears to record this information.

3.4.6 The Priority's Specific Objectives & Result Indicator Target

Discussion with both SEUPB and the CANN project partnership indicates that both have found it difficult to monitor progress against Objective 2.1's Result Indicator for a number of reasons including:

- The specific means by which the Result Indicator would be measured was not identified at the outset, nor was the method by which the project's activity would be considered to contribute to the indicator. For example, the CANN Project Manager advised that whilst the project had undertaken works on an area of 2.7ha Lough Arrow, the work was anticipated to improve the condition of the entire Lough (1,327ha). The project partnership advised that it was continuing (in March 2022) to work with SEUPB to identify which area of land it could include in its reporting;
- A further complication was the recognition that whilst considerable remedial works had been undertaken by the CANN project partnership at sites across the eligible region, it would take a long-time (possibly up to 10-15 years) in many cases to fully ascertain whether the works undertaken had facilitated the recovery of selected protected habitats and priority species or whether the habitats might be considered to be in or approaching a favourable condition.

Table 3.6: Specific Objectives, Result Indicators and Targets

Specific Objective 2.1	Result Indicator	Baseline	Target
To promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species	The percentage of selected protected habitats in or approaching a favourable condition	1%	10%

Nonetheless, the CANN project partnership considers that its development of the 24 CAPs (at the time of consultation) would help ensure that designated habitat sites of cross-border importance and identified areas for priority species would achieve or would be approaching favourable conditions in coming years. The Partnership noted that many threats to the habitats and their indigenous species had been removed from the various sites which would have an immediate beneficial impact, but the full merits would only be seen over the medium-longer term (10+ years).

3.5 Best Practice and Learning

This section considers whether the CANN project has resulted in any areas of best practice and learning.

The CANN project partners had made links with other relevant EU projects (e.g. the LIFE-funded 'Restoring Active Raised Bog in Ireland's SAC Network 2016-2020' project) and good practice visits had occurred (e.g. during March 2019) to assist with knowledge transfer[38]. An outworking of this activity was the appointment of the same external ecologist to both the LIFE-funded project and the CANN project, which the CANN project partners considered was greatly benefiting both projects, as it was providing continuing opportunities for shared learning and the identification of best practice.

Whilst not yet (at the time of consultation) completed, the CANN project partners advised that they intended to develop 'lesson learned guides' which it envisaged would help inform future peatland work.

In terms of learning for SEUPB, the CANN project partners highlighted the need for improvements to the eMS, including the ability to merge individual partner reports into the overall progress report.

[38] It is of note that the CANN project plan has been developed on the basis of the best available science and by applying best practice principles and approaches that have been successful elsewhere e.g. BurrenLIFE & AranLIFE which are both cited as examples of best practice by the European Commission.

3.6 Effectiveness of Cross-Border Working and Partnership Working

This section considers aspects of the CANN project's collaborative and partnership working including:

- The effectiveness and added value of the CANN project's cross border collaboration in relation to the specific objectives; and
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The CANN Project Partners advise that designating sites alone in each of the three jurisdictions has not been enough to achieve favourable conservation status. Protection mechanisms in place, such as statutory measures to prevent damaging operations occurring, have not necessarily prevented further degradation. However, and of key importance, the jurisdictional border in Ireland has hampered efforts to manage the peatland resource across the Island. Prior to the introduction of INTERREG VA, there were no cross-border networks that allowed managers to co-operate, share information and implement landscape-scale conservation. To this end, the CANN project – a consortium of public bodies, third-level institutions, charities and local government authorities from Ireland, Northern Ireland and Scotland implemented a number of activities to enhance the effectiveness of cross-border collaboration in relation to the specific objectives and new ways of working that would not otherwise have been possible in the absence of INTERREG VA. These include:

Joint Development	The development of the CANN project involved 11 project partners – Newry, Mourne & Down District Council; East Border Region, Monaghan County Council; Armagh, Banbridge & Craigavon Borough Council; Agri-Food and Biosciences Institute; Institute of Technology Sligo; Ulster Wildlife; University of Ulster; Golden Eagle Trust; NatureScot; and Argyll and the Isles Coast and Countryside Trust. The partnership considered itself to be unique and suggested that it had been designed to maximise the cross-border added value for each region, through drawing on expertise from all three jurisdictions. Both prior to the project's commencement and since its launch, the project partners have met regularly, refining the scope to enable the delivery of the full suite of INTERREG VA output indicators. The project partners consider that the considerable environmental expertise within the consortium had proven invaluable during both the development and implementation phase and that strong collaboration has continued throughout the project lifecycle. The partners identified 'best practice' from across the three jurisdictions that had been used as the foundation for the project. For example, NatureScot had developed new mapping techniques and protocols that were being trialled in all regions. The project partners were also ensuring to work in a complementary fashion with the Department of Arts, Heritage & the Gaeltacht, which was implementing its LIFE funded 'Restoring Active Raised Bog in Ireland's SAC Network 2016 – 2020' project in Ireland (only). The approach to peatland restoration was common across both the CANN project and theirs and joint visits to both projects' sites have been undertaken e.g. site visits to NPWS were undertaken in March 2019.
Joint Implementation	The CANN project brought together a diverse range of partners across the three jurisdictions together for the first time to work on a cross-border basis. A steering committee comprising all partners was responsible for the implementation of the project at a strategic level. This committee met bi-monthly, appraising progress towards Letter of Offer conditions and was also addressing any unexpected challenges (such as those at Boleybrack) that had been encountered during implementation. In addition, the formation of a collaborative best practice network was an integral feature of the CANN project's joint implementation. Education and outreach support, best practice and volunteer support was a further shared function, as was the project infrastructure for recruiting and up-skilling volunteers.

Joint staffing	A number of the partners, such as the Agri-Food Biosciences Institute and the Golden Eagle Trust, were also delivering outputs on a cross-border basis with shared staffing structures. Ulster Wildlife's constitution allowed for staff to work in the counties of Ulster outside of the six counties within Northern Ireland. The PhDs funded through the project were working on a cross-border basis with co-supervision by IT Sligo, AFBI and UU. In addition, the expertise of the applied research team within the collaboration were available to the consortium as a whole to assist with implementation of the project e.g. upland ecologist employed by IT Sligo.

The CANN project partners consider that there was much to be learned from the approaches adopted within each region. They suggest that it was fair to say, that peatland restoration had been more advanced in the Republic of Ireland and Scotland than it had been in Northern Ireland and considered that INTERREG VA provided the Northern Irish partners with a valuable chance to learn from others' expertise. On a smaller scale, innovative restoration techniques had been trialled successfully in Northern Ireland and the other partners had an opportunity to learn from those.

Similarly, habitat mapping techniques had been developed in Scotland and the CANN project was allowing the project partners to take this mapping approach and trial it within each region to assess the relevance and determine the costs and benefits.

3.7 Contribution of the Project to Policy Objectives

This Section considers the contribution of the CANN project to key policy objectives in the eligible region. In doing so the section considers the project's contribution to:

- EU Cohesion Policy and EU 2020 objectives;
- The horizontal principles of equality and sustainable development; and
- Other key policies.

3.7.1 EU Cohesion Policy and EU2020 Objectives

The CABB project has helped to contribute towards delivering the Cohesion Policy with targeted investment in key priority areas including promoting climate change adaption, risk prevention and management, preserving and protecting the environment and promoting resource efficiency research and supporting the shift towards a low-carbon economy.

Whilst the CANN project was not overtly focused on economic growth, it encouraged stakeholders to engage in 'smart' and 'sustainable' growth through, for example, sharing knowledge with landowners on habitat management. The adoption of such techniques served to contribute to areas of the EU prospering in a low-carbon, resource-constrained world while **preventing environmental degradation, biodiversity loss and unsustainable use of resources**. In turn, this contributes to the EU2020 targets for climate change and energy (i.e. that the "20/20/20" climate/energy targets should be met, including an increase to 30% of emissions reduction if the conditions are right).

3.7.2 The Atlantic Strategy

The CANN project does not contribute to the aims and objectives of the 'Atlantic Strategy'.

3.7.3 The Horizontal Principles

The CANN project aimed to protect and improve the quality of the environment - a key component of sustainable development and as such it contributed (at least in part) to the EU's three Horizontal Principles, per the following discussion:

Sustainable development	The fundamental principle of the CANN project was that it would make a positive contribution to the sustainable development of valued sites and habitats. Recovery of these wetland and peatland habitats was vital for the provision of a range of ecosystem services across the region e.g. carbon sequestration and climate change mitigation; water quality and hydrological regulation; and aesthetic and cultural services such as tourism and recreation. The concept and design of CANN revolved around ensuring the development of ongoing community guardianship of the project sites and the creation of a cross-border partnership to support this ongoing work. The CANN project addressed the threats that have caused priority habitats to be in 'unfavourable' conservation condition and led to a serious decline priority species. The project carried out conservation actions on selected protected habitats to improve the condition and manage biodiversity at a landscape scale. As advised by the Convention on Biological Diversity, the project partners adopted a *"strategy for the integrated management of land & living resources that promotes conservation & sustainable use in an equitable way".* This was achieved through a process of adaptive management (i.e. a continuous cycle of sustainable development) collaboratively designed and based on partners' experience of delivering biodiversity projects at both a local and European level. This was established from the outset through the Conservation Action Plans which delivered an agreed common methodology established to identify best practice actions across the three jurisdictions. It was anticipated that this approach would result in higher standards of conservation work and greater efficiency of delivery. The CANN Outreach Programme promoted quality of life and reduced health inequalities by encouraging access to the natural environment and an appreciation of its features. It was anticipated that this would improve local communities' knowledge of habitat and species and help to foster a sense of responsibility and guardianship within communities which would ensure ongoing awareness, ownership and responsiveness of communities to potential threats and impacts, including climate change, to habitats and species. The CANN Steering Group also adopted a 'green' policy throughout its project delivery, in order to reduce its carbon footprint and to lead behavioural change. This was carried out, for example, by maximising its ability to use digital communication (e.g. video and teleconferencing) instead of travelling to meetings. In addition, scientific monitoring and evaluation formed a key component of the CANN's project partnership's management tracking species and habitat responses to management activities over the lifetime of the project.

Equal opportunities and non-discrimination	Equality was embedded at all operational levels of the project, all individuals involved undertook an equality and diversity online module to recognise the value of diversity. The CANN project partners made a positive contribution to equal opportunities. This has included: • By abiding by all relevant legislation - Section 75 of the Northern Ireland Act 1998, the Employment Equality Act (1998) and the Equal Status Act (2000), as amended by the Equality Act (2004) in Ireland and the Equality Act (2006) in Scotland - in addition to each partner's own organisational commitments to equality and diversity, whilst recruiting for the project. • Requiring that all staff involved undertook an Equality and Diversity online module to recognise the value of diversity. Completing this module is mandatory for all CANN staff. • Throughout project delivery, the partners sought to ensure that no individual was discriminated against based on sex, marital status, pregnancy/maternity, race or ethnic origin, religion or belief, educational attainment, disability, age, sexual orientation and gender reassignment. These principles were applied to all project participants, employees, beneficiaries and volunteers. • At each of its sites and partner work bases, the partners sought to ensure that a workplace environment is established which will encourage and value diversity. • The nature of CANN necessitates working with isolated rural locations and the participation of the communities directly involved is being encouraged throughout project delivery. An essential element of the CANN project partners' approach was to nurture ownership and ongoing guardianship of project sites. This was achieved through engagement and outreach activities with all associated parties. • CANN included a confidential monitoring survey with registration forms for landowners participating in farm plans, volunteers registered with CANN, members of the local advisory groups etc. These forms were analysed for equality considerations.
Equality between men and women	• As noted above, throughout project delivery the partners sought to ensure that no individual was discriminated against based on all equality considerations, including gender. These principles were applied to all project participants, employees, beneficiaries and volunteers.

3.7.4 Contribution to Other Strategies

The CANN partnership's activities and objectives aligned with many regional and national action plans and strategies, including:

- The NI Blanket Bog Habitat Action Plan (2003);
- Ireland's Peatland Conservation Action Plan 2020;
- The Hen Harrier NI Species Action Plan;
- The Red Grouse NI & ROI Species Action Plans (2013);
- NI Curlew Species Action Plan;
- The NI Habitat Action Plan Lowland Raised Bog (2003);
- The NI Habitat Action Plan Fens (2005);
- The NI HAP for Marl Lakes (2005);
- The government policy statement Conserving Peatland in Northern Ireland;
- The NPWS Hen Harrier Threat Response Plan;
- The Scottish Government's performance target 'Improve the condition of protected nature sites';
- The 2020 Challenge for Scotland's Biodiversity - A Strategy for the conservation and enhancement of biodiversity in Scotland document;
- The Scottish Government's Peatland Action Programme and Scotland's National Peatland Plan (2015).

3.8 Potential Legacy Impacts

The CANN Project Partnership consider that the project has the potential to achieve a variety of legacy impacts beyond the lifetime of the project, including:

- The CANN project partners advise that an exit strategy has been incorporated into the CANN project from the outset. During the lifecycle of the project, the exit strategy is being supported through capacity building of the landowners and also the development and upskilling of a volunteer network that will be able to assist with ongoing site management. The project partners consider that this will be an important project legacy and a key element of the exit strategy. For example, structures have been established on Islay and at Peatlands Park to facilitate the local community playing an active role in the guardianship of the areas. It is anticipated by the project partners that these structures will improve local communities' knowledge of habitat and species and should help to foster a sense of responsibility within the communities which will ensure ongoing awareness, ownership and responsiveness to potential threats and impacts, including climate change, to habitats and species.
- Across the CANN project, the use of the European Nature Information System (EUNIS)/Annex 1 habitat classification will ensure common standards across the three jurisdictions and will ensure the accurate identification of Annex 1 habitats. The EUNIS system is now legally required under the INSPIRE Directive (Infrastructure for Spatial Information in the European Union) which sets out EU wide data sharing protocols. However, at the outset of the CANN project, this classification was not widely used in the UK or Ireland. Therefore, mapping under the project has developed the use of this approach.
- The existence and implementation of the 24 Conservation Action Plans which have been approved by the appropriate governmental bodies in each respective jurisdiction. It was considered by the project partners that this has very evident scope to deliver upon Objective 2.1 - To promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species. The CAPs developed provide details of the pressures and threats at each site and allow for future agri-environment / management prioritisations, which the project partners consider may still be relevant in 20 years' time.
- Related to this, the project partners consider that the collation of baseline datasets for SACs will provide a better understanding of the areas and help to inform future strategies for their management and conservation;
- In addition, the work undertaken as part of the project is anticipated to mean that a large number of degraded habitats will move towards being in a favourable condition long after the project has been completed, with many threats removed and works undertaken to restore the habitats and improve the fortunes of the species that inhabit them.
- The project partners consider that there will be a considerable legacy impact from the extensive stakeholder and community outreach and training that was undertaken. Training was provided to landowners, local stakeholders and volunteers to provide them with the knowledge and skills to safely carry out works so that conservation objectives can continue to be met long after the CANN project is over. Training provided through the CANN project included:

  - Landowners were trained in hagg-reprofiling techniques and installation of coir rolls to slow the flow and reduce the erosion at Cuilcagh, and within the SAC around Lough Atona;
  - Chainsaw Maintenance & Felling up to 200mm (Maintenance, cross-cutting & felling);
  - Trailing towing;
  - Pesticide and Herbicide Training.
  - A series of online training sessions were delivered during 2020. This included Online Consultation Methods with Dialogue Matters and webinars hosted by Kate Flood on Cultural Ecosystems and by Brendan Dunford on working with farmers and the wider community.
  - In July 2021, an online workshop was delivered, studying Wildfire Management in Ireland. Over 100 participants, from as far afield as South America, UAE and India, took part, where they gained an in-depth understanding of the history, practice, science and application of wildfire management as it has been experienced in projects across Ireland over the last decade[39].

[39] Source: SEUPB Project Case Study: Collaborative Action for the Natura Network (CANN) - Wildfire Management Planning for CANN sites

4. CABB – COOPERATION ACROSS-BORDERS FOR BIODIVERSITY

4.1 Introduction

This section of the report considers the Conservation Across-Borders for Biodiversity (CABB) project, which was awarded grant funding under Priority Axis 2 – Environment, Specific Objective 1 – Recovery of Protected Habitats & Priority Species.

4.2 Project Overview

4.2.1 Rationale for the Project

A need to improve the conservation status of priority habitats and protected species comes largely from the statutory agencies (e.g. NIEA, NPWS, NatureScot)[40] – their obligations under the Birds and Habitats Directives, and the need to deliver actions outlined in country Biodiversity Strategies. Need also comes from the CABB project partners – RSPB, Birdwatch Ireland and Butterfly Conservation, who seek to deliver on their charitable objectives concerning the conservation of priority habitats and species and NI Water, which as a government-owned company, has both a biodiversity duty to fulfil but also gains ecosystem service benefits and cost savings from the restoration of peatland at Garron SPA.

The underlying causes of the habitat degradation and species population crashes are complicated and prolonged but, the project partners consider that the main difficulty in addressing the issue is a lack of funding within statutory agencies, either to carry out work themselves or to fund others to do so and limited NGO and partner funding. Severe cuts to the relevant statutory bodies across the eligible areas, both in terms of funding and staffing, have resulted in a reduced capacity to deliver for protected habitats and priority species. ENGOs have also been impacted by cuts to the statutory agencies and have limited resources.[41]

4.2.2 Project Partners

Conservation Across-Borders for Biodiversity (CABB) is a partnership of RSPB NI (lead partner), Birdwatch Ireland, RSPB Scotland, NI Water, Butterfly Conservation and (providing advice on peatland restoration) Moors for the Future (MFTF).

4.2.3 Project Overview, Objectives and Activities

The overall objective of the CABB project was to bring about the recovery of protected habitats (active raised and blanket bog) and priority species (breeding waders and marsh fritillary at key sites) on a cross-border and cross-country basis. Indicative actions that the CABB project aimed to deliver included:

- Mapping of protected sites;
- Development and implementation of 8 Conservation Action Plans (CAPs);
- Conservation action for habitats and species;
- Development and sharing of best practices; and
- Education and outreach.

It was anticipated that at the outset, baselines would be established in mapping, habitat quality and species numbers thus informing and facilitating monitoring and evaluation.

[40] Of note, these same statutory agencies also provided support to a sub-section of the current partnership (RSPB NI, BWI and RSPB Scotland) in the previous INTERREG IVA-funded HELP project, which focused on work for priority species. The CABB project builds and expands on this earlier project.
[41] An ENGO is a non-governmental organisation in the field of environmentalism.

Whilst it was anticipated that the project would present opportunities for both the statutory agencies and the project partners in helping deliver on their statutory and charitable objectives, it was also considered to have the potential to reach a wider range of beneficiaries, including:

- Repairing the Gruinart Sea Wall was anticipated to provide benefits to **farmers/landowners, local communities, and tourists** by ensuring that the integrity of the site for farming, public access (a road runs through it), and conservation was protected and that it remained in favourable conservation status.
- Restoring peatland at Muirkirk Uplands SSSI was anticipated to benefit the **Scottish government and the statutory agencies**, who wanted to see this particular site, previously damaged by open-cast coal mining be brought into a favourable condition
- Replacing the cot at Lough Erne was anticipated to provide benefits to the **RSPB** which owns or manages over 40 islands in the Lough but would also benefit local farmers enabling them to continue to move stock between their mainland and island holdings. Also, it was considered that the purchase of specialist machinery at Lough Erne, designed to enable rush cutting on inundated grassland, would ensure sites previously in unfavourable condition for breeding waders could be restored, enabling farmers to graze them effectively.
- In Ireland, there were options in place for breeding waders in the agri-environment scheme (GLAS), however, this did not include capital works or advisory, both of which were considered to be essential to the conservation of breeding waders. Provision of these through the CABB project was anticipated to be supported by the statutory agencies and would be of benefit to **farmers** to help them meet the scheme requirements.
- Fencing of NPWS land at Dunragh/Pettigo SAC was anticipated to enable grazing lets to be offered to local farmers.

A CABB Project Board was established to oversee the implementation of the project. It sought to ensure that all objectives, timescales, budgets etc. were managed and delivered upon. The CABB Project Board met every 2 months initially and once the project was established this moved to quarterly thereafter. The NIEA, National Parks and Wildlife Service and the NatureScot were represented in the CABB project board and were involved in an advisory capacity.

The RSPB NI director also reported to the Director of Operations within the RSPB and acted as the link between the Project Board and RSPB Chief Executive.

A dedicated Programme Manager (RSPB NI) managed the day-to-day delivery of the project. The Programme Manager and the Administration and Finance Officer provided the secretariat function to the Board and managed all aspects of the project including finances, reporting on progress/communications, claims processing and general liaison with SEUPB.

A CABB Working Group oversaw the delivery of the project in each of the three jurisdictions. This group met every two months initially and quarterly thereafter. It was chaired by the Programme Manager and included delivery leads from Project Delivery Groups and project partners. The CABB working group aimed to ensure clear lines of communication and accountability between staff 'on the ground' and the CABB Project Board. Project Delivery Groups met every six weeks, and included key staff from Area Delivery Groups and relevant representatives from the statutory agencies.

To deliver the project activities, nine work plans were developed, as follows:

Table 4.1: Summary of CABB Project Work Plans (Per Progress Reports)
1. Project Management
2. Montiaghs Moss, Northern Ireland (implementation)
3. Fermanagh, NI & Ireland (implementation)
4. Garron Plateau CAP & Actions (ex. Drain Blocking) (implementation)
5. Scotland (implementation)
6. Ireland (implementation)
7. Marsh Fritillary work access key sites (implementation)
8. Garron Plateau Restoration: Drain Blocking (NI Water) (implementation)
9. Communication

4.2.4 Anticipated Outcomes and Results

On an overall basis, the CABB partnership proposed to contribute to the programme outputs by producing 8 CAPs and ensuring 2,228 ha of habitats were supported to attain a better conservation status.

Ultimately, it is anticipated that CABB would result in a suite of protected sites across the eligible area that were mapped, had conservation action plans in place and were in favourable condition as a result of conservation action. In addition, it was anticipated that UK and Ireland priority species (breeding waders and marsh fritillary) would also have actions put in place to improve their conservation status on a cross-border basis. This was considered to be new work that had not been possible to carry out through any other means (other than via INTERREG VA).

It was anticipated that the 'on-the-ground' physical work delivered, best practices explored and shared, learnings embedded in future work, upskilled staff, and key findings shared with colleagues at an EU level, would influence future policy and the relationships and partnerships formed with stakeholders at and beyond CABB sites would endure well beyond the project's lifetime thus leaving a sustainable legacy.

4.3 Project Budget to July 2022

The CABB project received a Letter of Offer (dated 7th July 2017) offering a grant of up to a maximum of €4,770,731 (ERDF + Government Match Funding) to be expended and claimed by 31st December 2021, towards total anticipated project costs of €4,935,984.

The CABB project received a revised Letter of Offer (dated 28th June 2018) which approved the reallocation of the budget between categories. Furthermore, the Evaluation Team's review of SEUPB's EMS indicates that there has since been an extension to the project end date to 30th September 2022 and a further reallocation of the budget between categories, as reflected below. As of July 2022, the project had reported a total estimated expenditure of €4,371,927 equivalent to 89% of the total project budget.

Table 4.2: Project Costs – Anticipated and Estimated Actual July 2022 (€)

Summary Budget	Anticipated Total	Total Estimated Expenditure in July 2022[42]			
		Reported to JS by First Level Control (FLC)	Pipeline Expenditure (excluding items deemed ineligible by FLC)	Total Estimated Expenditure	% of total budget
Staff costs	1,657,500	1,237,335	304,741	**1,542,076**	93%
Office and administration	248,625	185,523	45,711	**231,234**	93%
Travel and Accommodation	140,196	77,174	10,379	**87,552**	62%
External expertise and services	628,630	455,083	261,125	**716,208**	114%
Equipment	544,010	519,052	16,433	**535,485**	98%
Infrastructure and works	1,717,022	1,156,636	102,737	**1,259,372**	73%
Total	**4,935,984**	**3,630,802**	**741,125**	**4,371,927**	**89%**

Discussion with the CABB project partnership in March/April 2022 indicates that they are confident that almost all of the project budget will be spent by the anticipated end date of September 2022. Indeed, according to the project partnership, the project has gone over budget, with actual costs of c.€5.3m, with additional funding coming from RSPB NI, Peatland Action and RSPB Scotland.

[42] Source: SEUPB's EMS 13th July 2022

4.4 Contribution to the Achievement of the Priority's Specific Objectives & Result Indicators

This section considers the CABB project's key achievements and the extent to which the CABB project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators.

The section also identifies any external factors that have impacted, positively or negatively, the project's ability to contribute to the achievement of the Specific Objective.

4.4.1 Key Activities Undertaken (to March 2022)

The Evaluation Team's review of the CABB project partners' progress reports indicates that key activities undertaken since the interim evaluation report (between April 2020 and March 2022) include the following:[43]

Table 4.3 Key Achievements

Period	Dates	Key Achievements/Points of Note
14	1st April 2020 – 30th June 2020	• During this period, the majority of staff began to work from home as a consequence of the pandemic-related restrictions on travel; • The first draft of the Montiaghs CAP was issued to NIEA.
15	1st July 2020 – 30th September 2020	• In Scotland, contractors were appointed to complete the Weatherhill peat restoration, and a peat depth survey was completed. • Birdwatch Ireland completed its breeding wader surveys. • Planning permission was secured for the Inch predator fence. • Contractors were secured for the Fiddandarry drain blocking. • However, due to severe financial difficulties, Birdwatch Ireland's Trustees halted all project activity at the end of September and staff were placed on furlough, apart from the Manager (who was retained for oversight).
16	1st October 2020 – 31st December 2020	• A draft final Montiaghs Moss CAP was developed. Fencing & scrub work was also completed at this site, with vegetation cleared from 10 pools. In doing so, over 200 volunteer hours were delivered. A planning application was submitted for carpark & boardwalk & procurement work. • A draft CAP was signed off by RSPB for the Garon Plateau site. This secured BBC Radio coverage in 2021. • In Scotland, the Weatherhill and Kylefarm Peatland Restoration works were completed. Also, the Tardoes Restoration project was shortlisted for the Nature Scotland Awards and the Muirkirk Uplands restoration project was showcased at the IUCN Conference. • Unfortunately, Birdwatch Ireland's planned activity continued to be suspended as a consequence of cashflow issues, exacerbated by the pandemic. • Butterfly Conservation had three capital projects delivered/signed off, two at Montiaghs and one in Co. Leitrim.

[43] Please note that the key achievements have been documented in respect to the most recent collated Project Progress reports that were available to the Evaluation Team at the time of writing (July 2022).

Table 4.3 Key Achievements		
Period	**Dates**	**Key Achievements/Points of Note**
17	1st January 2021 – 31st March 2021	• RSPB NI's Montiaghs (MM) & Pettigoe CAPs were issued to NIEA for sign-off. During this period, RSPB NI also contributed virtually to the NI Science Festival. • Birdwatch Ireland recommenced activity with repairs carried out to existing fences and its Breeding Wader fieldworker commenced early surveys and preparation for the main survey season. Drain blocking works at Fiddandarry were also completed. • Butterfly Conservation managed a capital works programme on a farm in west Co. Fermanagh for Marsh Fritillary, which was completed at the end of February 2021. It also organised and delivered a webinar on 'Marsh Fritillary, land management and agri-environment schemes' in March. • NI Water completed its planned capital works and peatland restoration works at Garron Plateau. NI Water and RSPB were continuing to work together on the 'Valuing our Peatlands' project.
18	1st April 2021 – 30th June 2021	• RSPB NI submitted the final Montiaghs CAP to NIEA for sign-off. It also published the 'Natural Solutions Report (Valuing Our Peatlands) for Garron and Montiaghs. A Species Action Plan for marsh saxifrage was also produced. • RSPB Scotland awarded the contract for sea wall works at Gruinart, with work commencing in June. • Birdwatch Ireland secured permission from the landowners to erect a second fence at Blanket Nook.
19	1st July 2021 – 30th September 2021	• RSPB Scotland completed Curlew productivity monitoring in July at Muirkirk Uplands. The project team also submitted a bid and was awarded £65,000 of funding from NatureScot's Nature Restoration Fund to clear invasive Sitka spruce from approximately 1,000ha of Muirkirk Uplands SSSI in partnership with the landowner Dumfries Estate. • The earth works on the sea wall at Gruinart were completed and the main sea gate was put in. The repairs and landscaping of the extraction sites and workings were started. • Butterfly Conservation completed its programme of capital works. In addition, it completed its plug planting project. • Birdwatch Ireland submitted several CAPs to NPWS for review.
20	1st October 2021 – 31st December 2021	• NIEA approved RSPB NI's Montiaghs CAP, c.20ha land grazed at Montiaghs. However, planning permission was refused at Montiaghs for a car park and boardwalk. NIEA's planners advised that there was insufficient information in the submission. Consequently, RSPB provided additional information/material, including a commitment to replant hedges and deliver newt mitigation works; • RSPB NI also formally submitted its Pettigoe CAP to NIEA and was awaiting formal sign-off. • RSPB Scotland completed the construction of the sea wall at Gruinart; • Contractors cut 85ha of vegetation across Airds Moss East and Airds Moss West in addition to completing fence audits. • NI Water completed a drone survey and water levels were monitored. • Birdwatch Ireland submitted its Meentygrannagh & Croaghonagh CAPs to NPWS. • Dunragh CAP was awaiting final sign-off.
21	1st January 2022 – 31st March 2022	• The CABB project presented an overview at the SEUPB evaluation event on the 22nd of March. • The CABB project was a finalist in the Nature and Biodiversity Project of the Year category at the EDIE Sustainability Leaders awards with NI Water on the 30th of March.

4.4.2 External Impact Factors

Discussion with the CABB Project Partners indicates that the project encountered a number of issues during its delivery. The issues and barriers encountered included:

Impact of the Pandemic

The Evaluation Team's discussions with the CABB Project Partnership during November 2020 as part of the Interim Evaluation report identified that the pandemic and the related restrictions on the movement of people meant that:

- Much of the onsite capital works had to be placed on hold, whilst during the periods of lockdown, several CABB project staff worked from their homes, where they were able to continue with some aspects of project activity such as data analysis, drafting CAPs, preparing specifications for capital works, some procurement activities, and attending (via online means) holding delivery, steering and Board meetings. However, several staff from across the project partners were also placed on furlough.[44]
- Fieldwork and quality assurance activities also had to be placed on hold, which had an impact on data collection activities (e.g. the project was unable to monitor breeding birds and butterflies) and also the project partners' ability to meet with landowners to discuss CAPs and check management prescriptions of the land;
- Aspects of the project's educational activities were reduced as they could not be carried out on a face-to-face basis.

Of note, during periods of lockdown, some RSPB staff became directly involved with the response to the pandemic as the organisation offered its employees the opportunity to take five 'volunteer days', which allowed them to take time off work to produce scrubs for care home staff.

Encouragingly, despite the delays caused by the pandemic, the project partners were confident (in November 2020) that the CABB project could still fully achieve its aims and objectives as set out in the project's LoO. As such, to help facilitate the project achieving its original aims and objectives agreement was reached with SEUPB to extend the project by 9 months to September 2022.

Impact of Brexit

A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Discussion with the Project Partnership indicates that the outworkings of Brexit led to some procurement exercises coming in over budget as prices increased (due to movements in exchange rates) and it was also considered to have led to delays in the receipt of some deliveries.

4.4.3 Variation to Planned Activities

Discussion with the project partnership indicates that a small number of activities that had been proposed originally were not implemented, or not implemented in the way or extent that was originally proposed. These included:

- The work with farmers had to be completed on a one-to-one basis instead of the original intention to do a series of group events with farmer, due to Covid-19 restrictions. Albeit the project partners consider that this may have been more beneficial in some cases, as the advice and guidance offered became more site-specific.

[44] Discussion with SEUPB at that time indicated that SEUPB was unable to pay any additional costs that might have augmented the furloughed staff's salaries so that it reached 100% of their standard salary. This was due to the fact that if staff were furloughed, then by definition they were not working on the project activities and therefore the costs were not eligible for reimbursement.

- The CABB project's anticipated work in schools did not take place as consequence of the pandemic-related restrictions was (albeit this was over and above the project's formal educational deliverables).

4.4.4 Progress Towards the Project Output Indicators

As of March 2022, the CABB Project Partnership was of the view that it had fully achieved its anticipated (approved) project outputs, with:

- All 8 of the project's anticipated conservation action plans were successfully developed and approved by the appropriate governmental bodies. [45]
- Over 3,000ha (against the project's original target of 2,228ha) of targeted nature and biodiversity habitat areas had been supported to attain a better conservation status.

Table 4.4 Project Output Indicators

Programme Output Code	Name of Output	Programme Target	CABB Project Target	Progress (as of March 2022)
CO23:	Nature and biodiversity Surface area of habitats supported to attain a better conservation status (hectares)	4,500 ha	2,228ha	3,006ha-
2.111	Conservation Action Plans	25	8	8

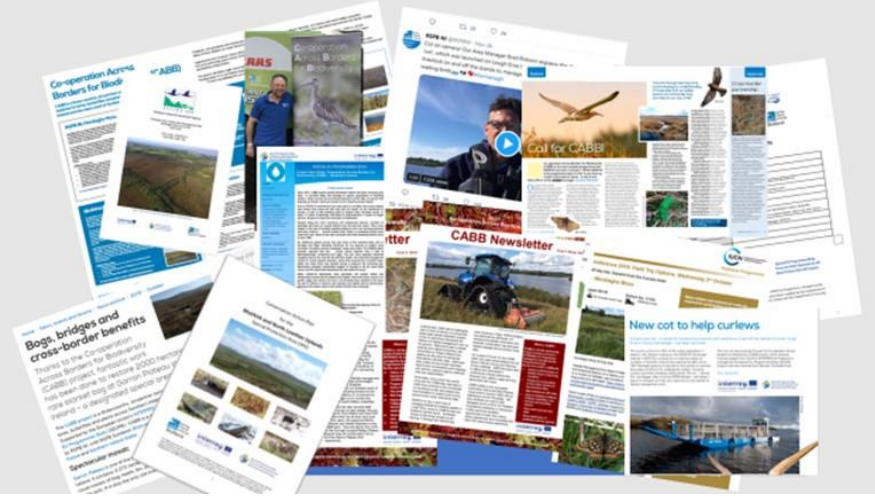
4.4.5 Key Achievements (to March 2022)

Despite the restrictions imposed by the COVID-19 pandemic, the CABB project partnership advises that the project partners liaised regularly to devise alternative methods of delivery which would ensure that social distancing guidelines could be adhered to whilst continuing to complete activities.

Discussion with the project partners indicates that they consider the following to be amongst the CABB project's key achievements (as of March/April 2022):

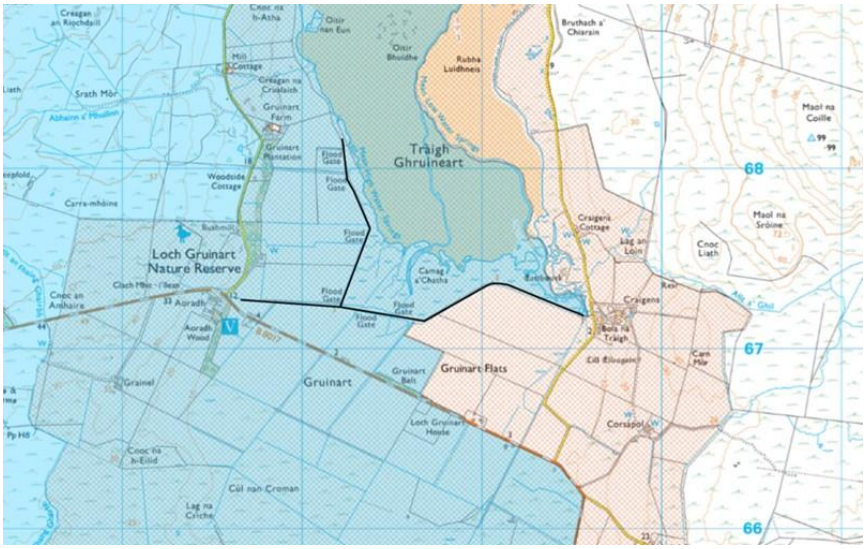
- Given the lack of funding that was available for such activity, the project promoted cross-border cooperation to facilitate the recovery of selected protected habitats and priority species in a way that would not have been possible in the absence of INTERREG VA funding. The CABB project notes that the project was of a considerable scale and complexity and had served to create new cross-border partnerships that had previously never worked together such as RSPB NI and NPWS. The project partners consider that the strong relationships that have been formed will provide the foundations for future work/projects.
- The project partnership considers that the CABB project has contributed to increased awareness of the potential threats of climate change to habitats and species through its implementation of a range of public engagement activities that sought to raise awareness and involve the wider community in CABB's conservation efforts. These included:
  - Information events for landowners and residents.
  - Production of CABB project newsletters, a special educational leaflet on the Marsh Fritillary and a short film on the Garron Plateau.
  - High profile coverage on radio and television, including the TV series 'Chronicles of Erne' (BBC NI) and 'Lough Neagh' (UTV).
  - Engaging volunteers in all aspects of CABB, from surveys, scrub removal and fence repairs in the field, to assisting with finance, media and administration in the office.
  - In addition, CABB's project lead advised that learnings drawn from the project have been incorporated into courses at UU.

[45] It should be noted that the CABB project lead advised that whilst NIEA/NPWS/Nature Scot had signed-off on the CAPs, the project was awaiting (in March 2022) SEUPB to sign off on them.



- Through the project, BirdWatch Ireland monitored breeding waders, with the results indicating an 11% decline across all sites. However, through the work of the project where predator-proof fences were introduced, it was found that breeding wader numbers had stabilised or were increasing at the fenced sites.
- At Loch Gruinart on Islay, 2km of the Gruinart seawall was upgraded (as reflected by the black line in Figure 4.1), which protects over 300ha of the adjacent Gruinart Flats SPA (including the RSPB reserve highlighted in blue in Figure 4.1). The SPA is designated for its wintering geese and also important breeding waders assemblage. The works involved raising the existing embankments and adding extra sections of the embankment as well as upgrading existing drainage features, the sea gates, sluices and pipework to protect against a 1 in 200 years flood event. The works were completed in autumn 2021, following delays with procurement.

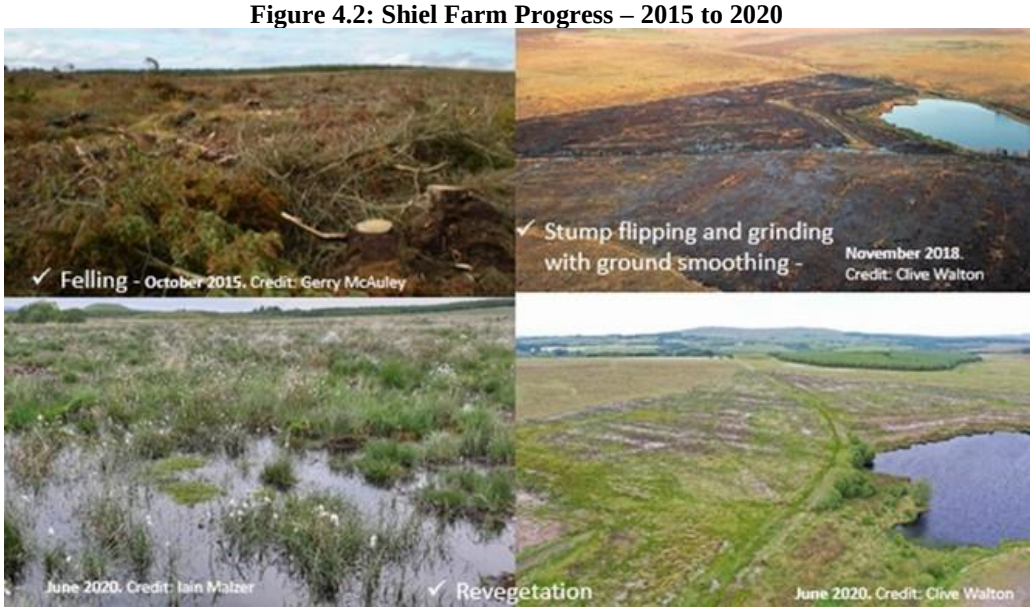
Figure 4.1: Gruinart Seawall Restoration



- The project undertook a variety of works to restore peatland at Muirkirk Uplands SSSI, including:
  - At Shiel Farm (aka Airds Moss West), 27ha of previously forested peatland was restored to peat bog through stump flipping and ditch blocking.
  - At Tardoes, peatland restoration (on 825ha of land) was completed over 2 winters (2 phases) which involved ditch blocking and reprofiling works. This work was funded by Peatland Action and managed by CABB Project Officer. This was the largest peatland restoration project in Scotland at the time.

- At Weatherhill and Kyle Farm (48ha and 77ha respectively) peatland was restored through ditch blocking and reprofiling works, which were funded through the CABB project with collaborative working with Peatland Action.

Figure 4.2: Shiel Farm Progress – 2015 to 2020



- The cot at Lough Erne was replaced and sites previously in unfavourable condition were restored for breeding waders. In November 2019, the project launched a new cot boat to help transport livestock and machinery, on and off, the islands of Lower Lough Erne. The vessel was named after Joe Magee, a former RSPB warden who was the first to notice an alarming decline in breeding wading birds in Fermanagh. It is anticipated that the boat will assist the project in managing endangered wildlife, including breeding wading birds and curlews, through the transportation of grazing cattle and sheep. Together, they create a sustainable structure of grass and vegetation to form an ideal habitat for breeding wading birds to nest and raise young.[46] In addition, as part of the project, rush cutting, scrub clearance and maintenance work to the predator fencing were undertaken to enhance conditions for breeding waders at Lough Erne.

Figure 4.3: New Lough Erne Cot

[46] Source: SEUPB Project Case Study: Cooperation Across-borders for Biodiversity (CABB) - Lower Lough Erne.

- Other capital works implemented to support breeding waders included:
  - At Airds Moss, CABB provided annual funding to manage vegetation for breeding Curlew which was implemented in coordination with the Curlew Trial Management Project. The CABB project also funded fencing which allowed the introduction of Highland Cattle in December 2021, something RSPB has been hoping to achieve for a considerable period.
  - CABB provided match-funding to the NatureScot Nature Restoration Fund to undertake a Sitka spruce clearance project during the 2021-2022 winter period. This benefitted ground-nesting birds such as Golden Plover and also blanket bog habitats. The CABB project partnership considered this to be reflective of a CAP in action, as the issue was initially highlighted in the CAP.
  - The removal of scrub and rank vegetation on Inisheher Island, Co Leitrim is now supporting breeding curlew.

- 900ha of NPWS land at Dunragh/Pettigo SAC was fenced, which has facilitated grazing.

Figure 4.4: New Fencing at Dunragh/Pettigo SAC

4.4.6 The Priority's Result Indicator Targets & Specific Objectives

Discussion with both SEUPB and the CABB project partnership indicates that both have found it difficult to monitor progress against Objective 2.1's Result Indicator for a number of reasons including:

- The specific means by which the Result Indicator would be measured was not identified at the outset, nor was the method by which the project's activity would be considered to contribute to the indicator;
- A further complication was the recognition that whilst considerable remedial works had been undertaken by the CABB project partnership at sites across the eligible region, it would take a long-time (possibly up to 10-15 years) in many cases to fully ascertain whether the works undertaken had facilitated the recovery of selected protected habitats and priority species or whether the habitats might be considered to be in or approaching a favourable condition.

Consequently, whilst the CABB project lead advised that project had undertaken works to facilitate the recovery of selected protected habitats and priority species, with 3,006ha of habitats supported to approach a favourable condition, the project was unable to comment on the extent to which this had contributed towards the 10% target.

Table 4.5: Specific Objectives, Result Indicators and Targets

Specific Objective 2.1	Result Indicator	Baseline	Target
To promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species	The percentage of selected protected habitats in or approaching a favourable condition	1%	10%

Nonetheless, the CABB project partnership is of the view that the extensive work undertaken through the project will support the sites moving to a favourable condition. In particular, it was suggested that the implementation of the CAPs that were developed for a variety of designated sites (e.g. Pettigo Plateau) will support those sites to move into favourable status over the coming years. However, The CABB partnership notes that as condition surveys are only completed every 6 years, it will be several years before it can be determined whether the sites have officially achieved or have progressed towards achieving favourable conditions.

4.5 Best Practice and Learning

This section considers whether the CABB project has resulted in any areas of best practice and learning.

One of the main opportunities to establish and share best practice from the CABB project has been the coordination and facilitation (by the project partnership) of site visits to various locations being considered as part of the project e.g. the Irish Peatlands Conservation Group visited the Garron SAC, which served to identify what works well and could possibly be replicated elsewhere. This facilitated the project to help achieve increased levels of cross-border integration in the planning and management of the environment across the region. In addition, the various project meetings (at Board, Steering Group and delivery group level) have served to bring the various partners together to share information and learn from one another. Examples of best practice sharing activities included:

- A variety of information-sharing events, including site visits conducted in partnership with the INTERREG VA-funded 'Collaborative Action for the Natura Network' (CANN) project;
- CABB's hosting of a Best Practice virtual event in autumn 2020 with an attendance of over 60 people.
- The project partners' attendance at the 2018 (Loch Lomond) and 2019 (Belfast) IUCN Peatlands conference and networking events.
- An exhibition of CABB's work to 560 delegates at the IUCN's UK Peatland Programme conference in December 2020.
- NI Water used learnings drawn from the CABB project to inform its other work under the INTERREG VA-funded 'Source to Tap' project at Tullychurry and Lough Bradan.

In addition, the project partnership outlined that the project has contributed to the development and/or implementation of new methodologies, including the following:

- The project had trialled various methods to block drains in the blanket bogs, that did not use plastic.
- The project learned that when installing predator fencing for birds breeding on the ground that a higher specification of material was required. The new materials specification is now being used on other projects by the project partners.

In terms of learning for SEUPB, the CABB project partners noted the following:

- The project partners felt that the claims process was overly cumbersome, and the timescale required to verify claims was not adequate (i.e. it took far too long). Linked to this, the project partners faced cash flow issues, and Birdwatch Ireland (as a small organisation) needed an advance in place, which was available from SEUPB.
- There were also delays with modifications being agreed and put on the system.
- That the eMS system is "very clunky", and ideally the individual partner reports would link through to the overall progress report.

4.6 Effectiveness of Cross-Border Working and Partnership Working

This section considers aspects of the CABB project's collaborative and partnership working including:

- The effectiveness and added value of the CABB project's cross border collaboration in relation to the specific objectives; and
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The CABB project partners note that partnership had been developed to address similar needs across countries and organisations and built on the pre-existing INTERREG IVA HELP partnership of RSPB NI, BWI and RSPB Scotland. The partnership reported that the cross-border and cross-organisational collaborative working that it had developed had been particularly effective and brought added value to the work of the individual partners through the following activities:

Joint development	The CABB project allowed effort to be focused on fewer species and habitats to enable a greater chance of success with buy-in from key partners.
Joint Implementation	The project partners suggest that the project's delivery on a cross-border basis resulted in better value for money, as there was less duplication of resources through joint staffing (4 cross-border posts), less duplication of processes (e.g. standardised mapping across all CAP sites) and sharing of best practice helped to ensure the most effective conservation methods were used. The project partners further consider that CABB's joint implementation will increase the chances of developing future projects as a result of having built good working relations and a track record of sound delivery.
Joint Financing	RSPB NI provided a one-stop-shop for strategic financial management, the submission of claims etc., which the project partners consider resulted in greater consistency, coherence and cost-effectiveness.
Joint Staffing and contracts	Four cross-border posts (Pettigo Project officer, Invertebrate Field Officer, Programme Manager and Admin & Finance Officer) were created and mapping had similarly been conducted on a cross-border basis, which the project partners consider resulted in greater cost-effectiveness and relationship-building with the potential for legacy to continue outside the project and greater conservation benefit as each staff member had an understanding of the systems and ecology of the project as a whole.

In addition to the above, discussion with the CABB project partnership suggests that the project partners engaged in 'information share days' with, for example, NPWS, NIEA, DAERA and the various project partners involved in the project. The purpose of this engagement was to discuss common issues and share pertinent information.

4.7 Contribution of the Project to Policy Objectives

This Section considers the contribution of the CABB project to key policy objectives in the eligible region. In doing so the section considers the project's contribution to:

- EU Cohesion Policy and EU 2020 objectives;
- The horizontal principles of equality and sustainable development; and
- Other key policies.

4.7.1 EU Cohesion Policy and EU2020 Objectives

The CABB project has helped to contribute towards delivering the Cohesion Policy with targeted investment in key priority areas including promoting climate change adaption, risk prevention and management, preserving and protecting the environment and promoting resource efficiency research and supporting the shift towards a low-carbon economy.

Whilst the CABB project was not overtly focused on economic growth, it encouraged stakeholders to engage in 'smart' and 'sustainable' growth through, for example, sharing knowledge with landowners on habitat management and peatland restoration techniques. The adoption of such techniques served to contribute to areas of the EU prospering in a low-carbon, resource-constrained world while **preventing environmental degradation, biodiversity loss and unsustainable use of resources**. In turn, this contributed to the EU2020 targets for climate change and energy (i.e. that the "20/20/20" climate/energy targets should be met, including an increase to 30% of emissions reduction if the conditions are right).

4.7.2 The Atlantic Strategy

The CABB project does not contribute to the aims and objectives of the 'Atlantic Strategy'.

4.7.3 The Horizontal Principles

The CABB project aimed to protect and improve the quality of the environment - a key component of sustainable development and as such it contributed (at least in part) to the EU's three Horizontal Principles, per the following discussion:

Sustainable development	All funded projects aligned and complied with the Sustainable Development Strategy, adopted by the European Council in June 2006; as well as the respective national Sustainable Development Strategy within each jurisdiction. Sustainable Development addresses three distinct impact areas: Social[47], Economic[48] and Environmental[49]. The CABB project was focused on improving habitat conditions, on both designated land to deliver against the stated Priority 2a habitat output target and on other designated land important for key species, including some of those listed in the Priority 2a species output targets. It, therefore, protected and improved the quality of the environment - a key component of sustainable development. Management of these activities was delivered by contractors who followed clear briefs regarding best practice conservation management. These briefs were shaped by research, shared knowledge and the project partners' years of experience delivering similar projects. The CABB project also involved close communication with local communities - in particular with landowners/farmers, in terms of offering advice and guidance on good practices such as habitat management and peatland restoration, and on the benefits of conservation management and the prospects to link into future funding from agri-environment schemes. More specifically, the principles of sustainable development were implemented in the project in the following ways: • The Project Officers promoted management to demonstrably improve habitat condition on key designated sites across the three countries. It was achieved by involving the local communities (landowners/farmers), communicating the environmental/biodiversity benefits of this management and providing advice on how these practices can lead to future financial sustainability for conservation measures through agri-environment payments • The purpose of the project was to improve the condition and fortunes of key habitats and species. Its design is underpinned by scientific research, collective knowledge and previous information exchange between partner organisations and respective environment agencies..

[47] Crime, Community Safety and Victims, Equality, Health, human Rights, Rural and Social Inclusion are recommended subcategories in NI guidance documentation.
[48] Economic Appraisal, Economic Assessment, Regulatory and State Aid are recommended subcategories in NI guidance documentation.
[49] Environmental and Strategic Environmental are recommended subcategories in NI guidance documentation

	• The majority of the habitat improvement work focused on blanket bog. Previous/similar blanket bog restoration projects are known to have: - Significantly decreased carbon being released into the atmosphere by reducing oxidation of dried/degraded peat; - Slowed water flows and reduced diffuse pollution in watercourses due to fast water runoff; and - Had a positive effect on biodiversity as wildlife, including breeding waders, return to the restored habitat. These actions contribute positively to the engrained principle of sustainability – that today's population maintains or enhances the condition of the environment for the benefit of future generations. • Environmental Awareness was considered during the procurement of contractors and completion of capital works was undertaken to best practice, under the guidance of Land Agency and Safety Staff. CABB, therefore, engaged in activity that promoted sustainable development and created sustainable communities by safeguarding and requiring the sustainable use of, existing resources to enhance the long-term management of, and investment in, human, social and environmental resources for future generations.
Equal opportunities and non-discrimination	The CABB project did not target beneficiaries as such but habitats and species. There was, therefore, limited opportunities for the project to apply the Equality Impact Assessment Screening. However, procurement and recruitment under the CABB project was undertaken in a manner to comply with relevant policies to ensure equality of opportunity and non-discrimination. More specifically: • Staff recruitment was undertaken in accordance with RSPB's and BirdWatch Ireland's equal opportunities policies to ensure that no applicant/employee receives less favourable treatment on grounds of gender, marital status, age, race, colour, nationality, ethnic/national origin, religion/belief, political opinion, disability, sexual orientation, past criminal convictions or type of contract, unless shown to be justified. • Applicants were asked to complete an equal opportunities monitoring form, to be used solely to monitor the Equal Opportunities Policy's effectiveness. Applicants for posts based in Northern Ireland have also been asked, in confidence, to declare their religious background to comply with the Fair Employment (NI) Act 1989 and Fair Employment and Treatment (NI) Order 1998. • Recruitment advertisements were placed through multiple channels to ensure they are visible to a wide and diverse external audience. Adverts stated that the RSPB/BWI are equal opportunities employers. • Contractor appointment was in accordance with the RSPB/BWI's procurement policies. Invitations to tender were also advertised widely and through public tender channels where appropriate. Tenders and quotes were judged on anticipated service delivery and price. • Project officers built relationships with landowners/farmers across the project sites as part of the project's objective to promote land management, which benefits targeted habitats/species. Advice on how to access future agri-environment funding was provided to all, with no prejudice on any facet of equality. • Training events for land managers/farmers were promoted widely to encourage participation from wide and diverse audiences across the three countries. They were fully inclusive and encouraged all participants to interact and build relationships based on land management experiences and learning.
Equality between men and women	Per the discussion above, the CABB project pursued the objective of equality between men and women and took appropriate steps to prevent any discrimination during the preparation and implementation of the project.

4.7.4 Contribution to Other Strategies

CABB contributed to delivering the EC Birds and Habitats Directives and Biodiversity Strategies in each of the three countries and also linked with strategies for climate change mitigation and adaptation and sustainable development in the three countries, as well as Programme for Government targets. This is discussed further below:

Strategy	How CABB links or contributes to
The EC Birds and Habitats Directives	Under the EC Birds and Habitats Directives, each member state is required to designate protected sites for priority birds (SPAs) and habitats (SACs), collectively known as Natura 2000 (N2K) sites. Each country's (UK, NI, Scotland, and Ireland) EU Prioritised Action Framework (PAF) for Natura 2000[50] identifies key priorities for managing N2K sites, the management of which helps to deliver the objectives of the EU Biodiversity Strategy 2020 and thus each country's Biodiversity Strategy[51]. Each member state is required to not just designate sites but to adopt conservation measures, involving if needed, management plans to ensure favourable conservation status for priority birds, other priority species and priority habitats. CABB was contributing to delivering targets in the three eligible countries of the EC Birds and Habitats Directives, the Prioritised Action Framework and Biodiversity Strategies by: • Mapping and developing conservation actions plans for 8 protected sites (SPAs and SACs) of cross-border relevance for blanket and lowland raised bog; • Carrying out works (fencing, scrub clearance, ditch blocking etc.) on a number of blanket and lowland raised bog protected sites. • Mapping and management for marsh fritillary. • Carrying out actions to improve the conservation status of breeding waders (UK and Ireland priority species) at key wet grassland and machair sites within and outside the network of the protected sites.
UK/Ireland Climate Change Acts	By delivering restoration of peatland habitat, CABB linked to mitigation measures under the UK and country (Scotland, Ireland) climate change acts[52]. Also, by restoring areas for priority habitats (blanket bog, lowland raised bog, lowland wet grassland) and species (marsh fritillary, breeding waders) the project enabled these to adapt to climate change, thus linking to climate change adaptation strategies for NI, Ireland and Scotland[53].
IUCN UK Peatland Programme	This Programme was set up in 2009 to promote peatland restoration in the UK. It advocates the multiple benefits of peatlands through partnerships, strong science, sound policy and effective practice. CABB linked to this programme, by restoring peatlands in partnership (RSPB /NI Water, National Parks and Wildlife Service, NatureScot) using best practice to deliver biodiversity benefits and ecosystem services (water and carbon storage etc.).
Programme for Government and Sustainable Development Strategies	By carrying out its intended actions, CABB linked to the Programme for Government[54] and Sustainable Development Strategies[55] in NI, Ireland and Scotland around measures to halt biodiversity loss, promote sustainable land management, reduce greenhouse gas emissions and adapt to the impact of climate change.

[50] EU Prioritised Action Framework for Natura 2000
[51] Valuing Nature – NI's Biodiversity Strategy to 2020, 2020 challenge for Scotland's Biodiversity, Actions for Biodiversity 2011 to 2016 (RoI).
[52] UK Climate Change Act, Climate Change Scotland Act, Climate Action and Low Carbon Development Act
[53] NI Climate Change Adaptation Programme 2014, Scotland's Climate Change Adaptation Framework, National Climate Change Adaptation Framework
[54] Northern Ireland Executive (2011) Programme for Government 2011-15, Programme for Government 2015-16 (Scotland), Government for National Recovery 2011-2016 (RoI)
[55] Northern Ireland Executive (2010) Sustainable Development Strategy, Our Sustainable Future – 2012 (Ireland)

4.8 Potential Legacy Impacts

The CABB Project Partnership consider that the project has the potential to achieve a variety of legacy impacts beyond the lifetime of the project, including:

- Its collation of important baseline information and subsequent monitoring activities, which the partnership considers will inform future policies and environmental strategies. For example:
  - With the support of DAERA funding, RSPB NI commissioned a report entitled 'Valuing our Peatlands: Natural capital assessment and investment appraisal of peatland restoration in Northern Ireland', which used two CABB projects, Garron Plateau and Montiaghs Moss as part of its research.
  - The project's peatland restoration work and methodologies have been showcased at CoP 26 and incorporated into courses at Ulster University.

- Montiaghs Moss will be retained as a new RSPB Reserve (on a long-term lease), which will serve to engage with a variety of audiences;
- NI Water has confirmed that the activities completed on their land will continue to be monitored and maintained.
- The predator fencing on NPWS land will be maintained by NPWS.
- Other equipment for landscape-scale management that was procured through the project funding will continue to be used in the target areas.
- The creation of new partnerships and relationships between the various project partners and also with statutory agencies (e.g. DAERA and NIEA)[56], which the CABB project partnership anticipates will provide the foundations for future work/projects. In addition, strong links were forged between the project partners and several local communities which will help facilitate further work in the future;
- The eight CAPs that have been developed will, if implemented, contain actions for delivery on 39,000 ha of Natura2000 (N2K) sites.
- The advocacy and advisory work, linked to the activities carried out, will fulfil a demonstration of best practice role, leading to the more efficient delivery of conservation management in general. Results achieved and lessons learned will be used to inform recommendations to support land managers' options under any current or successor agri-environment schemes and to advise land managers and policymakers with regard to sustainable conservation-driven management of the target and similar sites.
- Work was completed to help restore peatland on over 3,000ha of land which should have longer-term positive environmental impacts;
- Habitats have been conserved for several threatened species (700+ waders).
- In addition, CABB's project lead advised that learnings drawn from the project have been incorporated into courses at Ulster University.

[56] The CABB Project Partnership noted that these bodies have enquired about the specification and costs of work undertaken in Scotland, to assess whether it could be replicated in NI.

5. COMPASS - COLLABORATIVE OCEANOGRAPHY AND MONITORING

5.1 Introduction

This section of the report considers the Collaborative Oceanography and Monitoring for Protected Areas and Species (COMPASS) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 2 – Manage Marine Protected Areas and Species.

5.2 Project Overview

5.2.1 Rationale for the Project

Marine ecosystems are experiencing an unprecedented loss of biodiversity and species due to the large-scale and far-reaching effects of human activities, including commercial fishing, shipping, aquaculture, oil and gas exploration and a rapidly developing marine renewable energy sector. Marine habitats, fauna and flora, including those designated for protection, are determined by the oceanographic climate (e.g. salinity, temperature, currents, waves, nutrients etc.). Changes in this oceanographic climate are leading to changes in distributions, behaviours and habitats of protected species.

While Marine Protected Areas (MPAs) may be geographically isolated, the marine environment is fluid. Organisms, nutrients, and water bodies are transported on local, regional and oceanic scales. Understanding this, and defining the contribution of physical processes (e.g. current speed, turbulence, stratification, fronts etc.) to habitat type, is crucial to understanding the nature and interconnections between MPAs.

International conservation efforts are often hampered by a gap in exchange and communication across-borders, resulting in inefficiencies or duplication of effort, wasted resources and negative conservation results. Furthermore, the high financial cost of delivering oceanographic and marine environmental data restricts observational science.

In areas where ecologically functional regions span national boundaries, integrated monitoring, and the availability of data from different monitoring or assessment programmes are key to effective management. This is particularly important for the management and conservation of mobile species such as marine mammals (cetaceans and seals) and migratory fish (salmonids).

5.2.2 Project Partners

The COMPASS project partnership was led by the Agri-Food and Biosciences Institute (AFBI) and was made up of the Marine Institute (MI), Inland Fisheries Ireland (IFI), Marine Scotland Science (MSS) and the Scottish Association for Marine Science (SAMS). To support this, the Loughs Agency acted as a delivery agent for the cross-border elements of the project.

5.2.3 Project Overview, Objectives and Activities

The COMPASS project – involving the key stakeholders in marine environmental research and conservation across Scotland, Ireland and Northern Ireland – was developed to strengthen regional collaboration in the marine conservation sector, encompassing all stages of the marine conservation planning process, including long-term data collection and monitoring, cross-border data accessibility and improved communication.

It was anticipated that the COMPASS project would utilise both observational data and proven models to help understand complex environmental processes to address management challenges in the eligible region.

The COMPASS project partnership intended to:

- Scientifically design monitoring programmes to deliver baseline oceanographic and species data for the management of MPAs and key protected species.
- Develop data management infrastructures to ensure data quality, accessibility and flow between the regional institutions and international initiatives.
- Interface operational models to support assessments of the connectivity of MPAs in the eligible region.

The COMPASS project partnership also proposed to contribute to developing cross-border capacity for monitoring and managing MPAs and species by:

- Establishing a network of buoys for regional seas, delivering connected monitoring programmes for the statutory bodies of Northern Ireland, Ireland and Scotland – it was anticipated that new moored observation stations would be created at key locations (where the requirement had been identified), which would then be integrated with established monitoring stations already within the region;
- Linking regional data management processes to national and international initiatives for a sustainable legacy;
- Establishing the skills and infrastructure for sustained coordinated monitoring that would not be dependent on further financial intervention, and that could provide the infrastructure for future collaborative works and funding applications;
- Developing capacity for monitoring new parameters essential for EU policy compliance (e.g. noise, ocean acidification);
- Providing data and knowledge that directly contributes to the management plans being developed by both statutory and non-statutory bodies; and
- Contributing to peer-reviewed publications.

It was anticipated that a fully coherent network of monitoring buoys across the regional seas of Ireland, Northern Ireland, and Western Scotland, would support long-term monitoring strategies to be developed for highly mobile protected species such as marine mammals and salmonids, and provide infrastructure for baseline oceanographic and ambient noise monitoring.

To reflect the connected nature of the seas and to add value to the project, the COMPASS project partnership proposed (at an anticipated cost of circa €843k) to integrate two established monitoring locations outside the eligible area into the project, namely[57]:

Moored monitoring at Mace Head (Ireland)	It was anticipated that integrating marine observations with atmospheric time series at a World Meteorological Organisation Global Atmosphere Watch (GAW) station would contribute towards: • Knowledge exchange - implementing new parameters on platforms in Northern Ireland and Scottish waters. • Improvements to regional survey capacity.
Moored monitoring at Loch Ewe (Scotland)	Loch Ewe benefits from existing infrastructure and other (separately funded) monitoring activities. It was anticipated that by including this site, data would be representative of the west coast region where relevant MPAs and Special Areas of Conservation (SACs) are located. It was envisaged that this would: • Contribute towards knowledge exchange and implementation of in-situ observations in Scottish waters. • Support the development of an existing time series, benefitting from collaborative input.

[57] It is understood that these locations were identified by the project partnership on the basis of oceanographic relevance, added value and legacy, conservation status, logistics and cost effectiveness.

To deliver the project activities, the following seven work plans were developed:

Table 5.1: Summary of COMPASS Project Work Plans (Per Progress Reports)	
Work plan	**Work plan lead**
1. Management	AFBI
2. Oceanography	AFBI
3. Data Management Processes and Platforms	MI
4. Salmonids: tracking marine migration of salmon and sea trout	AFBI
5. Monitoring Cetaceans and Marine Protected Areas including Noise Assessment	SAMS
6. Modelling	SAMS
7. Communication	AFBI

5.2.4 Anticipated Outcomes and Results

On an overall basis, the COMPASS project partnership intended to contribute to the programme outputs by developing one network of buoys for regional seas and three models to support the conservation of marine habitats and species.

In addition, the COMPASS project partners envisaged that the project would have a positive contribution towards the results indicator of *"an increase in the cross-border capacity for the monitoring and management of marine protected areas and species"*

5.3 Project Budget to July 2022

The COMPASS project received an LoO (dated 12th June 2017) offering a grant of up to a maximum of €6,289,181 (ERDF + Government Match Funding) to be expended and claimed by 31st March 2022, towards total anticipated project costs of €7,726,441.

The COMPASS project received a revised LoO (dated 6th December 2019) whereby the SEUPB approved the reallocation of budget between categories. Furthermore, the project received a further revised LoO (dated 17th February 2021) wherein the SEUPB approved a further reallocation of the budget between categories.

Further to the above, the Evaluation Team's review of SEUPB's EMS indicates that there has since been a six-month extension to the project end date until 30th September 2022 and a further reallocation of the budget between categories, as reflected below. As of July 2022, the project had reported a total estimated expenditure of €6,198,880 equivalent to 80% of the total project budget.

Table 5.2: Project Costs – Anticipated and Estimated Actual July 2022 (€)

Summary Budget	Anticipated Total	Estimated Expenditure in July 2022[58]			
		Reported to JS by First Level Control (FLC)	Pipeline Expenditure (excluding items deemed ineligible by FLC)	Total Estimated Expenditure	% of total budget
Staff costs	3,474,003	2,660,009	445,154	**3,105,163**	89%
Office and administration	521,099	399,001	66,773	**465,774**	89%
Travel and Accommodation	162,080	82,380	3,996	**86,375**	53%
External expertise and services	1,561,165	732,355	103,913	**836,268**	54%
Equipment	2,008,094	1,620,751	84,549	**1,705,301**	85%
Total	**7,726,441**	**5,494,496**	**704,384**	**6,198,880**	**80%**

Discussion with the COMPASS project partnership in March/April 2022 indicates that they are confident that almost all of the project budget will be spent by the anticipated end date of September 2022.

[58] Source: SEUPB's EMS 13th July 2022.

5.4 Contribution to the Achievement of the Priority's Specific Objectives & Result Indicators

This section considers the COMPASS project's key achievements and the extent to which the COMPASS project has:

- Contributed to the achievement of the Priority's Specific Objectives; and
- Contributed to the achievement of the targets for the Result Indicators.

The section also identifies any external factors that have impacted, positively or negatively, the project's ability to contribute to the achievement of the Specific Objective.

5.4.1 Key Activities Undertaken (to December 2021)

The Evaluation Team's review of the CANN project partners' progress reports indicates that key activities undertaken since the interim evaluation report (between January 2020 and December 2021) as being: [59]

Table 5.3 Key Achievements

Period	Dates	Key Achievements/Points of Note
13	1st January 2020 – 31st March 2020	• Whilst AFBI made some vessel trips to Malin Shelf, there were fewer than anticipated trips due to the implementation of pandemic-related restrictions. • Several sampling trips were undertaken by the Marin Institute to Macehead in February and March. • Workshops were held in the National Oceanographic Centre (Liverpool) during February. • An acoustic array was deployed in March in the Irish Sea to monitor tagged salmon smolts. • Scotia and Corystes surveys were recovered, and arrays were redeployed in Scottish and Irish waters. • A crisis communications plan was developed.
14	1st April 2020 – 30th June 2020	• Marine Scotland Science and the Marine Institute continued water sampling for most parameters with some trips resuming after previous restrictions. • The Marine Institute attended the European Geosciences Union Conference and presented two posters. • The first journal publication, Northward Movement of Salmon Smolts in Irish Sea 2019, was published in May. • The spring ezine was published in June 2020 and a fish migration article was produced by the salmonid team.
15	1st July 2020 – 30th September 2020	• Vessel work recommenced this quarter. Due to servicing delays, the glider missions were moved to winter 20/21. • A 'Your EU!' article on fish migration was completed during this quarter and the COMPASS project was acknowledged on the Met Eireann website.

[59] Please note that the key achievements have been documented in respect to the most recent project progress reports that were available to the Evaluation Team at the time of writing (July 2022). The most recently available collated project progress report for the project was for period 19 (July - September 2021). Therefore, key achievements in period 20 have been taken from the latest available individual partner progress reports.

Table 5.3 Key Achievements		
Period	**Dates**	**Key Achievements/Points of Note**
16	1st October 2020 – 31st December 2020	• A COMPASS cruise took place this quarter. • A paper was drafted on the back of a previous COMPASS webinar. • Scaling imaging was made possible with the purchase of equipment allowing for ageing and growth analysis of fish. Temperature loggers were deployed in this quarter to assist with understanding environmental conditions. • A Marine Strategy Framework Directive and seal report were drafted in addition to two further papers. • The Hindcast production was finished, and a full release of data layers and habitats was uploaded. • The 4th e-zine was uploaded and a Joint INTERREG MPA webinar was held between the MarPAMM and SeaMonitor projects with over 80 people in attendance.
17	1st January 2021 – 31st March 2021	• A glider and Irish Sea receivers were deployed in March. A coastal array was retrieved, downloaded and redeployed. Satellite tagging on Salmon kelts was carried out in River Bush and additional temperature loggers were installed in Castletown to provide environmental data. • A passive acoustic monitor was deployed on the glider. Conference abstracts were submitted for the Marine Mammal conference due to take place later in 2021. • A data management case study was published on the SEUPB website. A paper was submitted on FAIR principles by the Marine Institute and project data was presented at The Royal Irish Society in March.
18	1st April 2021 – 30th June 2021	• The glider mission was recovered on the 1st of April. • AFBI and Inland Fisheries Ireland deployed receivers at Shimna, Castletown and Boyne with data downloaded for analysis. Tagging took place during April/May with assistance from angling clubs and new temperature tags were deployed. • The final report on Hindcasts of Hydrodynamic conditions was uploaded to the project website during this quarter.
19	1st July – 30th September 2021	• Two story maps were developed relating to salmonids and cetaceans. This explained some of the project data collection and methods used throughout the project.
20	1st October 2021 – 31st December 2021 (From Partner Progress Reports)	• The Project Management Team organised and facilitated the COMPASS Annual Webinar on the 2nd and 3rd of November. • Data receivers continued to be retrieved from Dundalk Bay, Shmina River, Co. Down, Boyne River and the Irish Sea and data were downloaded from said receivers. • Data from temperature loggers was also downloaded this quarter. This data was analysed to provide insights into fish movement in lower estuarine and marine areas. The temperature data provided information on factors influencing fish movement. • Detections were also shared between the SeaMonitor and MarPAMM projects and added to the data analysis. It was anticipated that this data would be used in outputs such as maps and final reports. • A joint SeaMonitor and COMPASS cruise also took place in this quarter, whilst data relating to porpoises was analysed jointly with staff from the MarPAMM project. • The Scottish Association for Marine Science successfully carried out the final glider mission of the project and continued sampling at the Creran mooring.

5.4.2 *External Impact Factors*

Discussion with the COMPASS Project Partners indicates that the project encountered a number of issues during its delivery. The issues and barriers encountered included:

Impact of the Pandemic

The Evaluation Team's discussions with the COMPASS Project Partnership during November 2020 as part of the Interim Evaluation report identified that the pandemic and the related restrictions on the movement of people meant that:

- Some project staff were furloughed, whilst other staff across the lead organisation, project partners and direct beneficiaries started working remotely;
- COMPASS adapted its project activities by rescheduling fieldwork and moving meetings online. At the time that the periods of lockdown started, the project had already accumulated a good volume of data to work on. Nonetheless, the following specific points were noted concerning work package activity:

Work Package	Key impacts of Pandemic Related Restrictions
Oceanography	There had been some reduced vessel work, but most were able to continue as planned. However, there was anticipated to be some impact on the timing of project deliverables. For example: • It was anticipated that there might be a break in the time series data from sensors that could not be maintained. It was considered likely that data would be lost as sensors would go out of calibration or the sensor data would not have corresponding lab validation. Unfortunately, this was anticipated to limit the data set available for the final report and Scientific Publication; • The 2020 Glider mission was anticipated to be substantially delayed as the autonomous vehicle was stuck in the USA awaiting service and repairs, but the companies were furloughed/locked down. • Other delays associated with the delivery of the equipment (to both SAMS and MSS) were anticipated to push full deployment of some moorings into the latter part of 2020.
Data Management	Some aspects of the anticipated data management activity experienced delays due to limited data collected/transferred from other tasks.
Salmonid Fish	There was a delay in the fieldwork activities, but these recommenced quickly after lockdown and were meeting the anticipated deliverables.
Modelling	Due to the nature of the modelling work, this task was not significantly affected by the COVID-19 restrictions. Management and communication tasks continued during lockdown with staff working from home and meetings held by teleconference were possible.

Whilst perhaps not specifically pandemic-related, the COMPASS partners note that the project experienced some staff turnover during the pandemic, and subsequently encountered delays when seeking to recruit specialised staff as a result of pandemic-related restrictions. In addition, the project encountered some supply issues (e.g. there was a reagent shortage). Furthermore, the project experienced delays when claiming and verifying ship time, as vessels were hired using a flat rate which SEUPB established included ineligible costs, which lengthened the time required to verify each claim.

Of note, during periods of lockdown, some of the AFBI staff became directly involved with the response to the pandemic to provide virus testing services.

Encouragingly, outside of some delays, the COMPASS project partnership advised the Evaluation Team in March 2022 that for the most part each of the specific activities that had been originally proposed was implemented as anticipated. Consequently, in recognition of the delays experienced, and as outlined in Section 1.3, to allow the COMPASS project further scope and time to both implement fieldwork (aspects

of which could only be undertaken on a seasonal basis) and gather and collate the monitoring data, the project received a six-month extension to the project to 30th September 2022.[60]

Impact of Brexit

A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Discussion with the COMPASS Project Partnership indicates that the outworkings of Brexit impacted the project in several ways, including:

- The project encountered issues setting up its website as the domain had to be '.eu'; and
- The price of some product and their related delivery increased (e.g. the Glider was purchased from an EU country that charged customs fees on the product).

Of concern to the project partnership was the potential for Brexit to lead to differing regulatory regimes and standards applying across the UK (Scotland and Northern Ireland) and the EU (Ireland), which the partnership suggested might affect future cross-border working.

5.4.3 Progress Towards the Project Output Indicators

Discussion with the COMPASS project partnership in March 2022 indicates that the project has achieved both of its project output indicators.

Table 5.4: Project Output Indicators

Programme Output Code	Name of Output	Programme Target	COMPASS Target	Progress at March 2022
2.211	A network of buoys for regional seas, including telemetry and oceanographic monitoring (e.g. for seals, cetaceans and salmonids)	1	1	1
2.212	Models developed to support the conversation of habitats and species	5	3	3

5.4.4 Key Achievements (to March 2022)

Discussion with the project partners indicates that they consider the following to be amongst the COMPASS project's key achievements (as of March/April 2022):

- The project partnership considers that the COMPASS project served to bring 'policy leads' from each of the three jurisdictions together for the first time to consider how the monitoring and management of marine protected species in the region could be best managed on a cross-border basis. In addition, the project has strengthened linkages between the NGOs, particularly concerning data sharing, analysis and interpretation.
- COMPASS considers that it has helped to achieve a more coherent ecological approach in cross-border Marine Protected Areas through the introduction of the network of buoys across the regional seas of Northern Ireland, Ireland and Western Scotland. This network includes telemetered oceanographic buoys which observe and relay data on over 15 key environmental parameters, forming part of an enhanced platform for monitoring environmental quality and change. The project partnership considers that the oceanographic and meteorological observations will support management, modelling, research and other operational activities such as weather forecasting and note that the data generated has been, and will continue to be, federated and made available to each

[60] To facilitate the completion of the Final Evaluation report within SEUPB's required timeframe, discussions with the project partnership were undertaken during March/April 2022, meaning that the project continued to have circa six months before it was anticipated to complete.

of the project partners as well as a wider audience to support the management of marine protected areas and marine resources.

- The project established a network of buoys for the regional seas, delivering connected monitoring programmes for the statutory bodies of Northern Ireland, Ireland and Scotland. Specifically, the project outlined the following:

  - A network of moored oceanographic buoys has been introduced that is delivering a connected monitoring programme in locations across the three jurisdictions.
  - A network of acoustic monitoring moorings, considering the impact of noise on cetaceans has been introduced across the three jurisdictions; and
  - A network of acoustic tracking moorings (focused on salmonid fish) has been introduced across the three jurisdictions.

- Concerning specific areas of the project's activity the project partners noted the following key achievements:

Oceanography:	• A network of new and enhanced existing oceanographic monitoring observatories was supported. • The development of platforms acting as a national resource. • Improved support and coordination between regional monitoring centres. • Long-term met-ocean datasets have been enhanced and expanded and new monitoring stations have been established and co-located at important locations. The project noted that these are delivering essential ocean climate information, and contemporary events such as a 2021 marine heatwave have been identified which are currently (at the time of consultation, April 2022) in the process of being reported.
Salmonid Fish:	• The first hard telemetry evidence supporting the migratory pathway was gathered. • For the first time, the northward migration route of young salmon from some of Ireland's east coast rivers has been identified. The project suggested that insights such as this will enable policy makers and managers to focus on actions aimed at the protection and conservation of Ireland's salmon stocks, which have suffered a considerable decline over the past decades. • COMPASS' sea trout studies delivered some of the first quantitative information on the species' life stage survival rates, which is of importance for fish conservation and cross-border stock management. The project partners noted that *"policy stakeholders have been very enthusiastic about this".* • Fish tagging targets were exceeded, with c.800 fish tagged and 100 receiver points picking up the signals. This work has served to identify new migration routes.
Marine Mammals:	• The first regional-scale structured acoustic monitoring programme was implemented. The project partners highlighted that policy/management stakeholders have been very positive about this aspect of the project. • Seasonal and diel patterns were described for several species. • Underwater noise assessments were undertaken; • Several rare species were detected.
Data Management:	• The project has successfully challenged the pre-existing culture/methods of data management, established new best-practice methods and promoted open data. • The project has introduced novel and innovative data products. • The project partners note that they have championed new parameters and technologies relating to ocean acidification and other Met-Ocean parameters. The project noted that additional requirements concerning analytical (lab-based) OA capacity were identified at national scales, as the laboratories cannot adequately support the required monitoring activities, which was summarised in a position paper for DAERA.

Data Modelling:	• Hindcasts with 3D gridded datasets of temperature, salinity, density and currents for each day from 2016-2020 were developed. • Physical data layers e.g. for habitat classification have been developed. • Connectivity models for *Nephrops norvegicus* and *modiolus have been developed.*

- New technologies to assess emerging pressures such as ocean acidification have been introduced through the project, and the broader benefits to the network have contributed new and improved capacity to:[61]

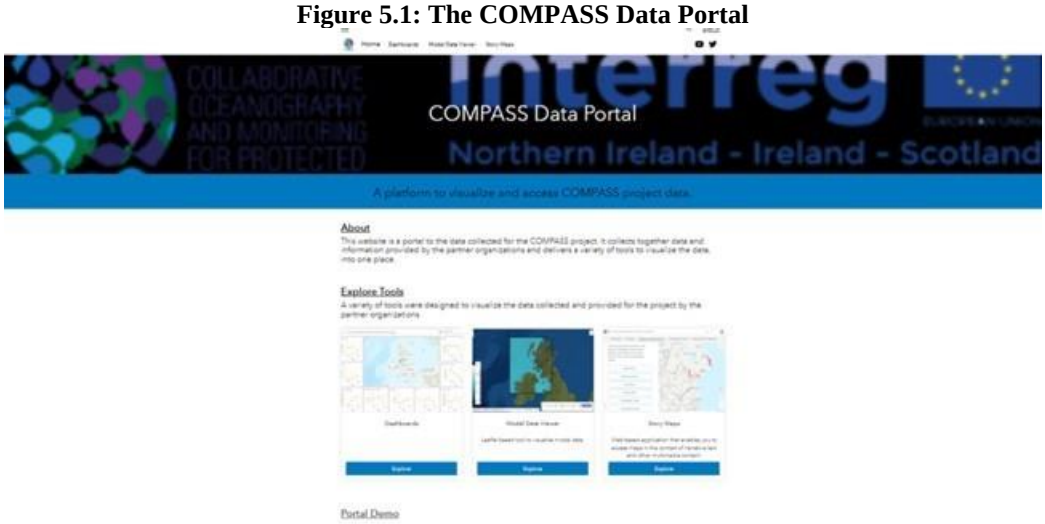
  - Northern Ireland's long-term marine monitoring programme;
  - Scottish Coastal Observation programme; and
  - The Irish marine monitoring network and Met Éireann observations.

- The COMPASS project partners consider that its work in bringing policy leads from each of the three jurisdictions (NI, ROI and Scotland) together has contributed to a greater understanding amongst the policy leads of the issues encountered, which should ensure greater compliance with the Marine Strategy Framework Directive (MSFD).
- In addition, the project partners note that its work to increase the number and range of monitoring stations that are observing the location and movement of species/marine resources in the region, and the subsequent cross-jurisdictional models that have been developed using the data produced have led to an increased understanding of the marine resources in the region which will serve to better predict changes going forward. The project partnership considers that this activity aligns with the aims and objectives of the EU Atlantic Strategy and Action Plan and will directly contribute to the management plans being developed by both statutory and non-statutory bodies in the three jurisdictions. The project notes the following examples:

  - The project has developed the approach to data management across the three jurisdictions and each partner's data infrastructure to facilitate consistent and interoperable data resources.
  - The COMPASS project has collected water temperature, salinity and pH data from several sites around Ireland, Northern Ireland and Scotland. It has also collected data about migratory routes of salmon and trout from tagged fish passing close to receiver buoys; and monitored acoustics in the sea, with a particular focus on whales and dolphins.
  - The project partners suggest that in many projects, such data as has been collected by the project would have been sent to a central database for aggregation. However, the COMPASS project adopted a different approach to enable each partner organisation to develop its own Data Management capability, particularly when it comes to making data available online. Each partner is responsible for managing their own data stores and making the appropriate information available via web services.
  - Through a centralised website (the COMPASS data portal[62]) the data collated by the project is then presented as a coherent whole to be used in a variety of ways including informing national policy and regulation and feeding into modelling that can inform stakeholders about the likely impacts of changes in marine protected areas. The data is also made available to other stakeholders through the Irish Spatial Data Exchange and MEDIN in the UK.
  - The data collected and collated by the COMPASS project has also been submitted to EMODnet where it feeds into European-level assessments of the ocean.
  - The Digital Portal includes dashboards directly linked to the Network of Buoys, glider missions and Cefas wave riders. The portal also has a Model Data Viewer in which various oceanographic parameters can be selected over time/date series and depths. Story maps can also be found on the portal with two currently available: the first concerns Salmonid tracking data and tagging, whilst the second relates to the acoustic receivers deployed which have assisted in locating and understanding the migration of whales and dolphins.

[61] Source: SEUPB Project Case Study: Collaborative Oceanography and Monitoring for Protected Areas and Species (COMPASS)
[62] https://compass-data-portal-marineinstitute.hub.arcgis.com/

Figure 5.1: The COMPASS Data Portal



- The project has sought to link its regional data management processes to national and international initiatives through the following activity:

  - The project attended workshops with EMODnet Physics/EuroGOOS and with the UK Marine Environmental Data and Information Network to ensure national/European best practice was followed. The project used the Marine Institute's Data Management Quality Management Framework (DM-QMF) approach to document data processes. The DM-QMF has been presented through the International Oceanographic Data and Information Exchange of UNESCO's Intergovernmental Oceanographic Commission (IOC-IODE) training courses to several National Oceanographic Data Centres and is accredited by IOC-IODE.
  - The Marine Institute and SAMS have used ISO19115 metadata and Erddap, and this approach has been encouraged at AFBI and MSS (although not yet adopted). The approach will facilitate the harvesting of metadata by MEDIN and EMODnet Physics and for data to be connected to the EMODnet physics portals.

- The COMPASS project partnership notes that it has publicised the availability of the data through a variety of means including at several high-profile workshops/conferences, including the following:

  - A Data Management workshop was held in February 2020 and was facilitated by Marine Institute and hosted by the British Oceanographic Data Centre (BODC) at their headquarters at the University of Liverpool's campus.
  - The COMPASS team was invited to present its approach to data management in a cross-border setting at the Euro Geoscience Union's virtual conference held in May 2020.

- The project has informed several publications and reports, including the following:

  - A report on data platform requirements (29/03/2020) of the COMPASS project was developed at the start of the project. This report addressed the platforms required for each task.
  - A report on Collaborative Oceanography and Monitoring for Protected Areas and Species (IVA5015), (31/03/2020) was developed by Inland Fisheries Ireland (IFI) and Agri-Food and Biosciences Institute (AFBI). This document outlined the COMPASS project's preliminary findings and initial observations from salmon and sea trout detection data in the marine environment and provides examples of mapped fish tracks.
  - A poster entitled 'Humpback Whale Song in the eastern North Atlantic' developed by AFBI contains an analysis of the migration routes of Humpback Whales and their population numbers.
  - A poster entitled 'Monitoring small cetaceans using passive acoustics to inform cross-border conservation efforts' was developed by Marine Scotland Science, AFBI and the Scottish Association for Marine Science. This poster was produced for the World Marine Mammal Conference held in Barcelona (2019).
  - A poster entitled 'Cultivating a mutually beneficial ocean science data management relationship with Brexit nations' was developed by Marine Institute Ireland and presented at the Euro Geoscience Union 2020 virtual conference.

- The project considers that it has supported the development of skills and infrastructure for sustained coordinated monitoring that will not be dependent on further financial intervention, and which will provide the infrastructure for future collaborative works and funding applications, noting, for example, that Oceanographic, Acoustic and Fish tracking monitoring programmes were initiated and delivered, which allowed for skills transfer, training and collaborative support to be established between each of the partners meaning legacy activities are likely, and a solid platform for future funding applications exists.

5.4.5 The Priority's Specific Objective & Result Indicator Target

Discussion with the COMPASS project partners indicates their view that each of its project workplan areas had collaborated closely with one another and not only had the project partners worked closely with one another, but the COMPASS project had also worked closely with the other projects that had been funded under Objective 2.2 of INTERREG VA Investment Priority Axis 2 (i.e. the MarPAMM and SeaMonitor 2 projects) through informal discussions to discuss planned activity, sharing information and hosting joint workshops. On that basis, COMPASS considers that it positively contributed to both Specific Objective 2.2 and its Result Indicator.

Table 5.5: Specific Objectives, Result Indicators and Targets

Specific Objective 2.2	Result Indicator	Baseline	Target
To develop cross-border capacity for the monitoring and management of marine protected species in the region.	Cross-border capacity for monitoring and management of marine protected areas and species	A little collaboration	A lot of collaboration

5.5 Best Practice and Learning

This section considers whether the COMPASS project has resulted in any areas of best practice and learning.

The COMPASS project benefits from having members of NGOs on its Advisory Group. One of the main achievements of, or lessons learnt from, this project has been the successful interaction with stakeholders and civil society (or 'citizen science'). For example, as part of the project's Salmonid research, fishermen have played an important supporting role in catching trout and salmon for tagging and deploying equipment. The COMPASS project partnership notes that this results in a number of direct benefits:

- Catching fish by fly appears to cause the least distress to the fish;
- Using fishermen at sea to deploy equipment brings additional knowledge and expertise to the project; and
- This method provides an important opportunity to involve and engage a broader stakeholder group.

As noted previously, the COMPASS project partners suggest that in many projects, such data as has been collected by the project[63] would have been sent to a central database for aggregation. However, the COMPASS project adopted a different approach to enable each partner organisation to develop its own Data Management capability, particularly when it comes to making data available online. Each partner is responsible for managing their own data stores and making the appropriate information available via web services. Through a centralised website (the COMPASS data portal[64]) the data collated by the project is then presented as a coherent whole to be used in a variety of ways including informing national policy and regulation and feeding into modelling that can inform stakeholders about the likely impacts of changes in marine protected areas. The data is also made available to other stakeholders through the Irish Spatial Data Exchange and MEDIN in the UK. The data collected and collated by the COMPASS

[63] For example. the COMPASS project has collected water temperature, salinity and pH data from several sites around Ireland, Northern Ireland and Scotland. It has also collected data about migratory routes of salmon and trout from tagged fish passing close to receiver buoys; and monitored acoustics in the sea, with a particular focus on whales and dolphins.
[64] https://compass-data-portal-marineinstitute.hub.arcgis.com/

project has also been submitted to EMODnet where it feeds into European-level assessments of the ocean.

5.6 Effectiveness of Cross-Border Working and Partnership Working

This section considers aspects of the COMPASS project's collaborative and partnership working including:

- The effectiveness and added value of the COMPASS project's cross border collaboration in relation to the specific objectives; and
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The COMPASS project partners recognised that there had been minimal coordination between the regions in relation to oceanographic monitoring. The COMPASS project partners considered that the project would co-develop programmes where trans-boundary monitoring had not previously been co-ordinated. It was anticipated that this cooperative approach would bring efficiencies and economies of scale with shared planning and resources. The partnership suggests that this was to be achieved through the following activities:

Joint development	The project partners suggested that the joint development of the COMPASS project utilised the strengths and expertise of leading scientists and organisations across the eligible region. The COMPASS partners jointly developed a detailed strategy throughout the application phase, defining how the project would be implemented in order to successfully deliver the output indicators.
Joint implementation	A Steering Group ensured that the joint implementation of the project was well balanced. The Project Manager coordinated and was supported by the work plan leads across the partner organisations to coordinate and manage activities ensuring cross-border integration.
Joint staffing	A consistent and coordinated approach to project delivery was supported by a joint staffing structure, which enabled ongoing collaboration, knowledge exchange and networking. Additionally, mobility within the work plans was designed for staff to work with each of the partner institutions, bringing significant added value to the work by supporting interaction and knowledge exchange. The project required close coordination of the team across regional borders.
Joint financing	A commitment to joint financing was demonstrated by the contribution of match funding supplied by central governments and the significant commitment of contributions in kind from partner organisations.

In addition to the above, the COMPASS project partnership adopted a collaborative and partnership working approach by being involved in 'synergy meetings' with other EU funded projects e.g. the MarPAMM and Sea Monitor 2 projects. As part of this, the various partnerships agreed to, amongst other things, prepare joint communication publications such as ezines.

5.7 Contribution of the Project to Policy Objectives

This Section considers the contribution of the COMPASS project to key policy objectives in the eligible region. In doing so the section considers the project's contribution to:

- EU Cohesion Policy and EU 2020 objectives;
- Atlantic Strategy
- The horizontal principles of equality and sustainable development; and
- Other key policies.

5.7.1 EU Cohesion Policy and EU2020 Objectives

The COMPASS project has helped to contribute towards delivering the Cohesion Policy with targeted investment in key priority areas including promoting climate change adaption, risk prevention and management and preserving and protecting the environment and promoting resource efficiency research.

Whilst the COMPASS project was not overtly focused on economic growth, it encouraged 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

5.7.2 The Atlantic Strategy

The 'Atlantic Strategy' was the EU's Maritime Strategy for the Atlantic Ocean area. It provided for a coherent and balanced approach that is consistent with the EU 2020 agenda. The Strategy was based around five themes (as set out Appendix I), with actions within each contributing to the overriding objective of creating sustainable jobs and growth.

Following the development of the Atlantic Strategy document, an Action Plan was developed, with the intention that it should be implemented through to 2020. The COMPASS project has contributed towards the following priority area and associated objectives identified in the Action Plan:

Priority	Specific Objectives
2: Protect, secure and develop the potential of the Atlantic marine and coastal environment	• Improving maritime safety and security • Exploring and protecting marine waters and coastal zones • Sustainable management of marine resources • The exploitation of the renewable energy potential of the Atlantic area's marine and coastal environment

The COMPASS project increased an understanding of, and an ability to capitalise on, the marine resources in the eligible region. The investment supported:

- An increase in the availability of comprehensive mapping programmes;
- The development and growth of a regional 'blue economy' based on the maritime resource; and
- The alignment of regional activities with the EU Atlantic Strategy.

5.7.3 The Horizontal Principles

The COMPASS project aimed to protect and improve the quality of the environment - a key component of sustainable development and as such it contributed (at least in part) to the EU's three Horizontal Principles, per the following discussion:

Sustainable Development	The COMPASS project partners considered that Sustainable Development was the achievement of a better quality of life through the efficient use of resources, which realise continued social progress and maintain stable economic growth and care for the environment. The COMPASS project developed sustainable monitoring programmes by working with the regulatory authorities in each jurisdiction to establish programmes that increased their capacity to manage the marine and protect the marine environment, but that were in line with the economic climate, did not pose a legacy risk and still facilitated economic growth. These programmes were delivered in line with the principles of the EU Sustainable Development Strategy and related strategies for each jurisdiction. The balance of observational measures and derived (modelled) products reflected the balance of effort identified within the scientific community as required for effective marine management. The COMPASS project developed established and tested models to improve and expand their application, enabling the dynamics of regional systems to be understood across appropriate domains and at appropriate scales.

	The primary long-term goals of the COMPASS project were aligned to the three pillars of sustainable development as follows: **<u>Environmental Benefits</u>** • Improved understanding of selected priority environmental attributes (oceanography, seals, salmonids and cetaceans); • Reduced pollution from operational efficiencies and a reduction in duplication due to a collaborative approach across jurisdictions; • Improved management plans resulting from a better understanding of MPA connectivity across the region; • Better protection, management and conservation of key sentinel species; and • Enhancement and protection. **<u>Social Benefits</u>** • Safer waterways resulting from access to operationalised data (wind and met-ocean conditions); • Improved opportunity for leisure and amenity use; • Greater stakeholder involvement in the management of the marine environment; • Improved access to information; and • Information about marine environment and protection. **<u>Economic Benefits</u>** • Fostering better environmental protection and delivering better environmental data supports sustainable economic development; • Provides a cost and scientifically effective collaborative approach to the design of marine management strategies at regional scales; • Potential opportunities for eco-tourism could be provided; • Sustainable solutions resulting in reduced carbon emissions; • Benefits to fisheries through improved environmental management; and • Jobs created and/or safeguarded. The COMPASS project incorporated the use of sustainable practices as part of its project design, in accordance with the current best practice of each organisation. Sustainability of operations and activities were also considered alongside and in addition to, the environmental policies of each partner organisation. The partner organisations assessed each aspect of any proposed activity in an environmental impact register which was managed by the Project Management Team and reviewed by the Advisory Group.
Equal opportunities and non-discrimination **Equality between men and women**	Each of the COMPASS project partners was committed to delivering the project in full accordance with the principles detailed in the relevant legislation in each jurisdiction, namely: **<u>Northern Ireland</u>** • Equality Act 2010. • Section 75 of the Northern Ireland Act 1998 (NI). • Section 49A of the Disability Discrimination Act 1995. **<u>Ireland</u>** • Employment Equality Act 1998. • National Disability Authority Act 1999. • Equal Status Act 2000. **<u>Scotland</u>** • Equality Act 2010 (with Specific provisions for Scotland) Each COMPASS project partners promoted equality of opportunity and good relations in all areas of the project, with all individuals being treated in a fair and

	equal manner and in accordance with the law regardless of gender, marital status, race, religious belief, political opinion, ethnic origin, age, disability or sexual orientation. Good practice was promoted through Equality Screening and the provision of an Equality Impact Assessment. The COMPASS project partners identified a number of specific measures to promote equality and encourage cross-border, cross-community and all-inclusive involvement in the design and execution of monitoring programmes in the eligible area. This included: • Extensive stakeholder engagement and targeted consultation prior to activities. • Working with local schools and educational programmes in all three jurisdictions. In addition, AFBI (as Lead Partner) is committed to equality of opportunity and to creating and sustaining a working environment where everyone is treated with respect and dignity, free from any form of inappropriate behaviour, and one in which all employees can give of their best. This is embodied in the AFBI Value 'Respecting People' and its Associated Behaviours, and in its Dignity at Work Policy. AFBI's commitment to equality of opportunity is embedded in the equality awareness training for all staff.

5.7.4 Contribution to Other Strategies

The COMPASS project was designed to enhance the existing marine monitoring capacity within the eligible region and to create a legacy of marine observation infrastructure, data interoperability and accessibility. In doing so, it was closely aligned with a number of key EU directives and regional strategies, such as:

- Marine Strategy Framework Directive (MSFD);
- Biodiversity and Habitats Directives;
- Marine Knowledge 2020;
- 'Harnessing Our Ocean Wealth', the Integrated Marine Plan for Ireland – specifically Goal 2 'achieve healthy ecosystems that provide monetary and non-monetary goods and services (e.g. food, climate, health and well-being)';
- UK Marine Science Strategy 2010-2025; and
- Galway Statement Atlantic Ocean Cooperation.

The MSFD required EU Member States to cooperate in the management of regional seas with the objective of meeting Good Environmental Status (GES) by 2020. With the marine environment coming under increasing pressure from human activity, the network of buoys created by the COMPASS project helped to ensure that biodiversity was safeguarded, and policy targets could be achieved.

5.8 Potential Legacy Impacts

The last Annual COMPASS Webinar (November 2021) focused on Impact & Legacy. The event included presentations and panel discussions and was attended by a wide range of stakeholders. The topics covered reflected the achievements of the research teams across the project with a focus on oceanography, data management, model development and specific protected animals such as cetaceans and salmonids. One of the key issues discussed at the event was the legacy of COMPASS and how it can encourage support and continuity for both the observational programmes and the outputs of the project.

The COMPASS project partners advised that they intend to use the information that has been subsequently gathered to inform and develop a project Legacy report towards the end of the project (i.e. September 2022) but note that the project's key legacy impacts are likely to include the following:

- The COMPASS project partners have developed partnerships and collaborations between institutes within and outside of the partnership to support legacy activity.
- The project has successfully challenged the pre-existing data management culture and has instilled new methods across the three jurisdictions and encouraged advancement in monitoring technology which is continuing to be applied on a cross-border basis.
- The project was deliberately designed to have a 'low cost' legacy which has developed robust monitoring programmes that will be handed over to the appropriate regional agencies. The project partners note that enhanced oceanographic programmes are being adopted in core monitoring activity by relevant organisations in Scotland, Ireland and Northern Ireland, and the hardware that was deployed during the project will continue to be used following the project's completion;
- Acoustic Marine Mammal monitoring has been adopted as a mainstream core monitoring activity across the region.
- Modelling outputs are now being accessed and used by both the modelling and non-modelling community.

6. MARPAMM - MARINE PROTECTED AREAS MANAGEMENT AND MONITORING

6.1 Introduction

This section of the report considers the Marine Protected Areas Management and Monitoring (MarPAMM) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 2 – Manage Marine Protected Areas and Species.

6.2 Project Overview

6.2.1 Rationale for the Project

Marine ecosystems are experiencing an unprecedented loss of biodiversity and species due to the large-scale and far-reaching effects of human activities, including commercial fishing, shipping, aquaculture, oil and gas exploration and a rapidly developing marine renewable energy sector. For example:[65]

- 38% of the UK's marine habitats protected by SACs are in unfavourable (or 'bad') condition;
- 75% of marine invertebrate species have declined over the long-term; and
- Seabird populations in the eligible area have declined over the last 30 years e.g. 12 species of breeding seabirds in Scotland declined by 50% between 1986 and 2015. These declines have been attributed to invasive non-native species colonisation of breeding colonies, reduction in prey availability and climate change.

Due to jurisdictional boundaries, the waters adjacent to Northern Ireland, Scotland and Ireland (and the MPAs that they contain) are often viewed as separate stretches of water adjacent to the individual countries rather than as an interconnected sea area. This presents a challenge in managing sites effectively, where pressures from waters within adjacent jurisdictions (e.g. changing water temperature, ocean acidification, sea-level rise etc.) can have an impact on MPAs.

While MPAs may be geographically isolated, the marine environment is fluid. Organisms, nutrients and water bodies are transported on local, regional and oceanic scales. Furthermore, many protected species are either mobile (e.g. marine birds, marine mammals) or have pelagic life stages which leave them vulnerable to pressures outside of protected areas.

The challenges outlined above need to be understood and managed strategically to ensure the adaptation and resilience of the MPA network. All jurisdictions in the eligible region are committed to developing a well-managed, ecologically coherent network of MPAs. Whilst much progress has been made concerning site designations and in the setting of conservation objectives, many sites have no management plans or have one which is out of date. This means that they may not reflect current pressures and risks.

There is little resource available within the cross-border region to update existing plans or produce new plans, which consequently means that the timescales associated with implementing management plans are uncertain. At the time that the MarPAMM project was introduced, there was also no mechanism for the production of cross-border MPA plans, and there was no process for collaborating on management plans for the many MPAs that were ecologically related. Resource limitations meant MPA management was reactive, often focusing on localised issues, which might not lead to the best MPA management outcomes. In this context, locations can suffer damage before formal, and sudden, action is taken, which can also alienate users of MPAs.

Given that all the MPAs in the programme's eligible area were connected by the wide habitat use of mobile species (e.g. seabirds, cetaceans and seals) and pelagic life stages of benthic species (e.g. horse mussels), effective management requires knowledge of such connectivity and the cumulative pressures from a regional and cross-border context.

[65] Source: Stage 2 Application Form/Business Plan.

6.2.2 *Project Partners*

The MarPAMM project partnership was led by the Agri-Food and Biosciences Institute (AFBI) and was made up of Marine Scotland Science (MSS), NatureScot (previously Scottish Natural Heritage (SNH)), the Scottish Association for Marine Science (SAMS), BirdWatch Ireland (BWI), Ulster University (UU) and University College Cork (UCC).

6.2.3 *Project Overview, Objectives and Activities*

To this end, the MarPAMM project aimed to address the need for cross-border MPA management plans across the eligible region, through a focus on both the information requirements for plan development (which was anticipated to be fulfilled by the development of models for species and habitats of conservation importance) and on plan preparation and implementation through collaboration with stakeholders.

The overarching objective of the MarPAMM project was to increase cross-border capacity for the monitoring and management of marine protected areas and species.

The MarPAMM project partnership intended to deliver four models designed to support the conservation of habitats and species that underpin MPA designations within the eligible region. Details of the four models are outlined below:

1. **Seabird monitoring and modelling:** It was anticipated that this would provide information on how protected marine bird species or populations within the INTERREG VA eligible region might be impacted by key pressures, including the interaction with fisheries. It was anticipated that the impact of future climate change scenarios on key seabird species would also be modelled.
2. **Benthic (seabed-dwelling) habitat mapping and modelling:** It was envisaged that this would seek to understand the distribution and connectivity of key habitats and species of conservation value throughout the INTERREG VA eligible region, improving methods for habitat extent and condition monitoring, and identifying key habitats and areas for species of conservation importance. It was considered that this model would provide vital baseline data required for the development of marine management plans by improving the information available on the eligible area's subtidal MPA network.
3. **Marine mammals modelling:** It was envisaged that this would provide information on the foraging areas of harbour seals for improved regional management of MPAs with seals as designated features.
4. **Coastal processes modelling:** This aspect sought to understand the coastal processes operating along the County Down and County Louth coasts to enable long-term planning decisions to underpin the development of cross-border Marine Management Plans for the MPAs.

These models (alongside existing datasets and the models anticipated to be produced as part of the COMPASS project) were anticipated to provide the sound scientific evidence base required for marine management plan development for MPAs.

It was anticipated that six MPA marine management plans (MMP) (2 site-specific and 4 regional) would be delivered by the project, using a cross-border, collaborative focus and extensive stakeholder engagement:

Site-Specific MMP	1. Murlough Special Area of Conservation (SAC), County Down, Northern Ireland 2. Carlingford Lough Special Protection Areas (2 adjacent cross-border sites – Ireland and Northern Ireland)
Regional MMP	3. Outer Hebrides region, Scotland 4. Argyll region, Scotland 5. North Coast Ireland – North Channel (cross-border – Ireland and Northern Ireland) 6. County Down – County Louth (cross-border – Ireland and Northern Ireland)

The MarPAMM project partnership proposed that all MPA MMPs would follow the most up-to-date recommended best practice for the management of MPAs, including, for example, the Convention for the Protection of the Marine Environment of the NE Atlantic (OSPAR) Guidelines for Management of Marine Protected Areas.

It was anticipated that targeted stakeholder engagement would play a crucial role in the development of the MMPs and the promotion of their adoption. It was proposed that the following groups would benefit from the production of MPA management plans:

- **Key stakeholders (e.g. coastal communities, fishing industry, recreational interests etc.)** who would have the opportunity to feed into and shape the management of MPAs. It was anticipated that they would also have the opportunity to communicate their aspirations during the process to produce a collective vision and identify benefits from the MPAs.
- **Government advisers and decision-makers** who would be able to use the MPA management plans to support wider discussions on marine management e.g. through marine spatial planning. It was anticipated that the plans would make it easier to integrate MPAs with other key marine policy areas.
- **Conservation/MPA practitioners** who would learn lessons from the regional MPA management plans, which would help inform future conservation practice.

The MarPAMM project's outputs were anticipated to be delivered through a series of co-designed work packages, with a separate work package for each model, and a further work package for the development and implementation of the MPA management plans. Work package leads were distributed across the partnership, based on partner expertise, and each work package had several partners contributing to it from across the eligible region.

The following seven work packages were developed:

Table 6.1: Summary of MarPAMM Project Work Package (Per Progress Reports)
1. Management
2. Seabird modelling
3. Benthic habitat mapping and modelling
4. Marine Mammal modelling
5. Coastal Processes
6. MPA management plans
7. Communication

6.2.4 Anticipated Outcomes and Results

The MarPAMM project partners envisaged that the project would have a positive contribution towards the results indicator of *"an increase in the cross-border capacity for the monitoring and management of marine protected areas and species"* as the project would collaboratively deliver four new, coherent and cross-disciplinary models to support the conservation of marine habitats and species, and six marine management plans - based on a sound scientific evidence base provided by the four new models developed by MarPAMM (alongside existing data and models anticipated to be prepared as part of the COMPASS project).

6.3 Project Budget to July 2022

The MarPAMM project received a Letter of Offer (dated 5th July 2018) offering a grant of up to a maximum of €5,993,174 (ERDF + Government Match Funding) to be expended and claimed by 31st March 2022, towards total anticipated project costs of €6,361,317. However, in July 2020, SEUPB approved a reallocation of the budget between categories. Further to this, the MarPAMM project received a revised LoO (dated 7th May 2021) whereby the SEUPB approved a further reallocation of budget between categories.

Further to the above, the project received a revised LoO (dated 27th October 2021) offering a grant of up to a maximum of €5,989,216 (ERDF + Government Match Funding) to be expended and claimed by 30th September 2022, towards total anticipated project costs of €6,360,857. This revised LoO in addition to offering a 6-month extension and a reduction in the overall budget also approved a further reallocation of the budgets, outlined in the following table.

The Evaluation Team's review of SEUPB's EMS indicates that as of July 2022, the project had reported a total estimated expenditure of €5,213,149 equivalent to 82% of the total project budget.

Table 6.2: Project Costs – Anticipated and Estimated Actual July 2022 (€)

Summary Budget	Anticipated Total	Total Estimated Expenditure in July 2022			
		Reported to JS by First Level Control (FLC)	Pipeline Expenditure (excluding items deemed ineligible by FLC)	Expenditure in July 2022[66]	% of total budget
Staff Costs	3,635,899	1,833,676	1,214,890	**3,048,566**	84%
Office and Administration Costs	545,383	275,775	182,233	**458,008**	84%
Travel and Accommodation Costs	267,157	103,379	41,635	**145,014**	54%
External Expertise and Services	1,561,690	418,895	812,476	**1,231,371**	79%
Equipment Costs	350,727	262,444	67,746	**330,190**	94%
Total	**6,360,857**	**2,894,169**	**2,318,980**	**5,213,149**	**82%**

Discussion with the MarPAMM project partnership in March/April 2022 indicates that they are confident that almost all of the project budget will be spent by the anticipated end date of September 2022.

[66] Source: SEUPB's EMS 13th July 2022.

6.4 Contribution to the Achievement of the Priority's Specific Objectives & Result Indicators

This section considers the MarPAMM project's key achievements and the extent to which the MarPAMM project has:

- Contributed to the achievement of the Priority's Specific Objectives; and
- Contributed to the achievement of the targets for the Result Indicators.

The section also identifies any external factors that have impacted, positively or negatively, the project's ability to contribute to the achievement of the Specific Objective.

6.4.1 Key Activities Undertaken (to March 2022)

The MarPAMM project partners cite, within their progress reports, the project's key activities (between July 2020 and March 2022) as being:[67]

Table 6.3: Key Activities

Period	Dates	Key Activities/Points of Note
11	1st July 2020 -30th September 2020	• The majority of work continued to be undertaken remotely, with some small-scale cruises and fieldwork taking place in this period. • Ulster University (UU) and the Scottish Association for Marine Science deployed baited remote underwater vehicles in Oban. • Monthly surveys in Dundrum Bay resumed after a temporary pause in March due to Covid restrictions. • Due to cashflow difficulties, BirdWatch Ireland took a temporary withdrawal from the project on the 28th of September intending to return after six months i.e., April 2021.
12	1st October 2020 – 31st December 2020	• The final report on seabird fisheries interactions was completed by University College Cork (UCC). • A data sharing request to utilise complex noise propagation model outputs between MarPAMM and the Joint Framework for Ocean Noise in the Atlantic Seas (Interreg Atlantic) was agreed upon.
13	1st January 2021 – 31st March 2021	• The "Modiolus modiolus" predictive distribution models were completed. • Work began on baited remote underwater vehicles and autonomous underwater vehicle cruises. • A new version of the GEMS database was published. • A timelapse camera was installed at Murlough Bay; • An MPA story map on the Argyll region was published.
14	1st April 2021 – 30th June 2021	• MarPAMM survey cruises (RV Corystes, Queen of Ulster, Laconia) were carried out. • The project-funded PhD student at UCC presented their thesis findings at the virtual GeoHab conference and their work was published in the Remote Sensing journal. • The digital map outputs for the project were completed, as was the Argyll film.

[67] Please note that the key activities have been documented in respect to the most recent collated Project Progress reports that were available to the Evaluation Team at the time of writing. (July 2022)

Table 6.3: Key Activities		
Period	**Dates**	**Key Activities/Points of Note**
15	1st July 2021 – 30th September 2021	• BirdWatch Ireland re-commenced activity during this period. • The spring/summer seabird fieldwork season which included NI/RoI playback and tagging work was completed. This work was featured on the BBC Spring Watch series. • Several cruises took place and a report on modelling the spatiotemporal distribution of the common skate complex was written up and submitted to Biological Conservation. • The analysis of the long-term forcing parameters affecting the shoreline evolution of Dundrum Bay in the last two centuries was completed. Data collected was analysed and a scientific paper was accepted for publication. • The Argyll benefits map infographic was published. • A series of podcasts with Tommy Outdoors began.
16	1st October 2021 – 31st December 2021	• The "Arctica Islandica" model was completed by AFBI. • The "Modiolus modiolus" outputs were further refined and Maerl modelling was in its final stages. • Work continued on data processing for the Strangford Lough and Donegal surveys. • Work was completed on long-term factors relating to shoreline evolution, and was presented at the 8th Irish Geomorphology workshop. • A best practice management planning workshop was delivered in addition to three knowledge exchange seminars on Fisheries management, Coastal processes and MPA connectivity. • BirdWatch Ireland hosted a fisheries seminar in December.
17	1st January 2022 – 31st March 2022	• Work was ongoing for the joint MarPAMM/COMPASS closure event. • AFBI's subcontracted bird survey work was completed. • A literature review was underway on baited underwater vehicles and fish population monitoring, with a paper being drafted on new technology and marine protected area monitoring. • The project-funded PhD student won GeoHab's Ron McDowell Student Support Award, which includes funding for travel and enables them to present at the GeoHab Conference 2022. • The Scottish Association for Marine Science was working on a photo mosaic of Mulroy Bay, Strangford Loch and Malin Bay ship wreck sites.

6.4.2 External Impact Factors

Discussion with the MarPAMM Project Partners indicates that the project encountered a number of issues during its delivery. The issues and barriers encountered included:

Impact of the Pandemic

The Evaluation Team's discussions with the MarPAMM Project Partnership during November 2020 as part of the Interim Evaluation report identified that as a result of the pandemic and the related restrictions on the movement of people meant that:

- During the periods of lockdown, MarPAMM staff across the lead organisation, project partners and direct beneficiaries had to work from their homes, although it is noted that no MarPAMM staff were furloughed.

- Consequently, it was not possible to undertake some face-to-face stakeholder engagement activities and also many aspects of fieldwork such as the monitoring of seabirds and data collection during these periods and also due to the necessary seasonality of these activities, with the following noted:

Work Package	Impact of Restrictions
Seabird Modelling	Fieldwork for 2020 was cancelled. Some small-scale terrestrial work was able to be carried out in Donegal but at a limited capacity.
Benthic Habitat Mapping & Modelling	Several cruises planned for 2020 were cancelled. These were rescheduled to 2021. The inability to conduct lab work during lockdown impacted eDNA molecular and grab sampling analyses.
Marine Mammal Modelling	Cruises relating to the deployment of acoustic devices, collating and analysing underwater noise recordings, and production of seal distribution map concerning underwater noise (subcontracted to SMRU institute) was rescheduled from spring/summer 2020 to 2021.
MPA Management Plans	Delays in other work packages as a result of COVID impeded the progression of MPA plans which were the major deliverables of this Work Package. The MPA plans required input from models and data analysis from the other work packages, and could not be created until work on these had been completed. This necessitated a project extension.

- Instead, during the period of restrictions, the project partners focused on data analyses and model development activities. Some stakeholder engagement activities were undertaken on an online basis;
- The annual meeting that had been planned for the end of November 2020 was replaced by a series of webinars.

Ultimately, the MarPAMM project Partners advised (in April 2022) that as a result of the pandemic-related restrictions, the project had secured less data than originally planned (for example, there were two years of counts planned for the seabird monitoring but only one year's monitoring took place). In addition, the project lead noted that due to the delays faced in undertaking surveys the models were not finalised before going out to consultation.

Whilst not directly pandemic related, the project lead noted that one of the project partners experienced cash flow issues during the project and had to temporarily withdraw from the project for 9 months. However, the other project partners were able to take over their workload and ultimately the project was able to get the partner on board again.

As outlined in Section 1.3, to allow the MarPAMM project further scope and time to both implement fieldwork (which could only be undertaken on a seasonal basis) and gather and collate the monitoring data, the project received a six-month extension to the project to 30th September 2022.[68]

Impact of Brexit

A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Discussion with the Project Partnership indicates that the project encountered some small increases in costs as a result of Brexit, however, there were no issues on the ground. However, the MarPAMM project partners consider that Brexit has created some concern about the availability of future funding in the area of cross-border marine environment management.

[68] To facilitate the completion of the Final Evaluation report within SEUPB's required timeframe, discussions with the project partnership were undertaken during March/April 2022, meaning that the project continued to have circa 6 months before it was anticipated to complete.

6.4.3 *Variation to Planned Activities*

Discussion with the project partnership indicates that a small number of activities that had been proposed originally were not implemented, or not implemented in the way or extent that was originally proposed. These included:

- The project had secured less data than originally planned (for example, there were two years of counts planned for the seabird monitoring but only one year's monitoring took place). In addition, the project lead noted that due to the delays faced in undertaking surveys the models were not finalised before going out to consultation.
- In response to the Covid-19 Pandemic the MarPAMM project team had to alter how they were going to inform, communicate, and engage with key stakeholders. This involved the transfer of in person workshops and events to online technical workshops and engagement.
- As the MP consultation period coincided with the NI election, the project was unable to receive NI Minister input for press releases.
- Due to differing regulations in the eligible region, the project was unable to offer prizes as part of its communications deliverable. Instead the project used 'Show us your favourite…' type posts on social media.

6.4.4 *Progress Towards the Project Output Indicators*

Discussion with the MarPAMM project partnership in March 2022 indicates that the project has not yet fully achieved its project output indicators, but it had developed (at that time):

- 3 (of the anticipated 4) models to support the conservation of marine habitats had been completed (with the final one requiring some further data verification); and
- 6 draft marine management plans for designated protected areas, were due to go out for consultation but had not yet been finalised. The project was also developing StoryMaps for the MPAs, with four available at the time of consultation:[69]

  - Marine Protected Areas of the North Coast-North Channel and Co. Down- Co. Louth Regions[70];
  - Seas of the Outer Hebrides[71]; and
  - Argyll's Marine Treasures[72]

Table 6.4: Project Output Indicators

Programme Output Code	Name of Output	Programme Target	MarPAMM Target	Status (as of March 2022)
2.212	Models developed to support the conversation of habitats and species	5	4	3
2.213	Marine management plans for designated protected areas complete	6	6	0

[69] A story map is a web map that has been thoughtfully created, given context, and provided with supporting information so it becomes a stand-alone resource. It integrates maps, legends, text, photos, and video and provides functionality, such as swipe, pop-ups, and time sliders, that helps users explore the content.
[70] Source: https://storymaps.arcgis.com/stories/e32db16f15504e1db04c68443e418df1
[71] Source: https://storymaps.arcgis.com/stories/c10f5c28962e40888c99f43f232efdfa
[72] Source: https://experience.arcgis.com/experience/2255d1a769254f709c5996223da01481

6.4.5 Key Achievements (to March 2022)

Discussion with the MarPAMM project partnership indicates its view that the project's key achievements include the following:

- The project promoted cross-border cooperation to facilitate the recovery of selected protected habitats and priority species in a way that would not have been possible in the absence of INTERREG VA funding, through the development of novel stakeholder groups and the Carlingford Lough Management Plan output, which is a cross-border management plan that identifies information gaps for both statutory agencies.
- The project partners consider that the project has helped to achieve a more coherent ecological approach in cross-border Marine Protected Areas the sharing of knowledge, methodologies and learnings. Further, the MarPAMM project partners note that 3 of the project's anticipated 6 MPA management plans have been developed on a cross-border basis and have been in partnership with local community representatives, stakeholder groups, academic researchers and statutory agencies.
- Furthermore, the project lead advised that the project has identified, through the collation of habitat mapping data, information gaps to inform understanding of the distribution and connectivity of key habitats and species of conservation value throughout the INTERREG VA eligible region. The project has subsequently secured this information which was required for the marine management plans'.
- In specific relation to the four models that the MarPAMM project proposed to design to support the conservation of habitats and species that underpin MPA designations within the eligible region, the project partners noted the following:

Seabird Modelling	The project successfully undertook seabird monitoring and modelling. Some of the monitoring fieldwork was part of the Joint Nature Conservation Committee (JNCC) Seabirds Count, which aimed to census all breeding seabird colonies throughout the United Kingdom and Ireland during 2018-2020. Specifically, as part of the MarPAMM project, the project partners completed population viability analysis to understand the current and predict future changes in population, including monitoring to understand where species were breeding and the impact of climate change on the population. The project team produced factsheets for 19 seabird species which summarise the key findings on each species in the context of the MarPAMM region. Importantly, the project lead highlighted that the data and management plans will enable regulators to make appropriate decisions concerning how to conserve important seabird populations. As part of the project, three publications relating to seabirds were published.
Benthic Habitat Mapping & Modelling	To aid with the development of the seven species and habitat models, a species distribution modelling (SDM) workshop was hosted by MarPAMM at the main AFBI site in Belfast on 26-27th March 2019. This workshop brought together participants from academia, policy, NGOs and government bodies to help identify the barriers to the use of SDMs, how SDM outputs might be presented in a more meaningful way to end users and the identification of best practice methods to overcome more technical issues with producing such models. The MarPAMM project partners note that as of March 2022, one species SDM was finished, two were validated and four were ongoing. As part of this work package, the project team trialled novel MPA monitoring technologies using autonomous underwater vehicles (AUVs) that were pre-programmed to collect reliable consistent data.

Marine Mammal Modelling	MarPAMM researchers from University College Cork teamed up with the Sea Mammal Research Unit at the University of St Andrews to produce maps of the distribution of both grey and harbour seals in the project area. The maps are based on an extensive seal-tracking dataset that followed seals at sea exploring their foraging behaviour and habitat use. The maps were used to compare the distribution and habitat use of seals with a range of human activities and impacts including shipping and associated underwater noise. The MarPAMM project partners note that as grey and harbour seals are both Annex II listed species under the EU Habitats Directive that their habitats must be managed per the ecological needs of the species. The project considers that it has served to address critical gaps in knowledge on seal ecology that is needed for effective management.
Coastal processes modelling	The MarPAMM project partners advised that they had undertaken coastal processes modelling activities. In 2019, the project team began conducting regular surveys of the beach and dune system to find out how, and why, our coastline changes. For example, the Murlough Bay beach study explored how climate-related processes including sea-level rise and storms, may alter the physical environment that supports protected species and habitats on our coasts. However, whilst the project partners consider the coastal processes modelling to be complete, they note that at the time of consultation (March/April 2022) there was data that still required verification. As part of this work package, members of the project team participated in a podcast by 'Tommy's Outdoors' to discuss the work undertaken under the coastal processes modelling.

- The MarPAMM project partners consider that the project has contributed to greater compliance with the Marine Strategy Framework Directive (MSFD) through increased awareness of its requirements. The project identified through surveys, community events and steering group meetings that many people are aware that MPAs exist, but that they have very limited understanding of where these areas are, what they protect, how they work, and who they benefit. In response to this, the MarPAMM project has developed 'fact-filled resources' which allow users to explore each MPA with supporting documents and links. It also provides information on codes of practice, how to submit data and outlined the various reporting mechanisms.[73] Awareness was also raised through webinars and videos created as part of the project, whilst the project has also placed QR codes on posts at Murlough that visitors can scan using their mobile that provides further information on the MPA. In addition, each of the management plans that have been developed makes a specific reference to the MSFD. Other creative stakeholder and community engagement activities included the following:

  - Trialling the use of Storymaps and Experience Builders.
  - Using online surveys to gather views.
  - Using online tools such as Concept boards.
  - Regular updating of project website at www.mpa-management.eu;
  - Bi-annual MPA e-zine - with/for Compass & SeaMonitor;
  - 7 films produced;
  - Corporate materials (flyer, banners, posters);
  - Infographics and posters were developed;
  - Use of a project Twitter account;
  - 2 Podcast programmes on Tommy's Outdoors;
  - Legacy display: Ocean Explorer Centre, Oban;
  - Six school workshops/school visits; and
  - Media releases.

[73] For example, see link to the MPAs of the Argyll Marine Region https://experience.arcgis.com/experience/2255d1a769254f709c5996223da01481

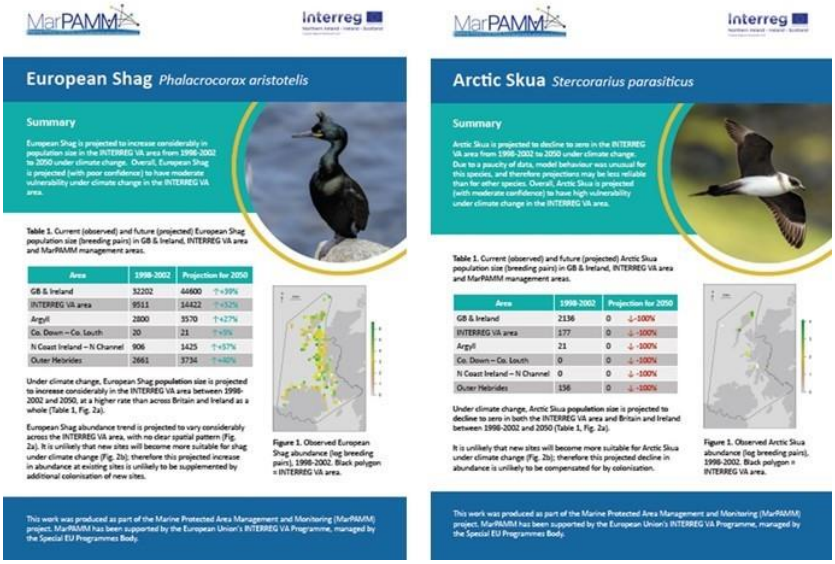
- The MarPAMM project partners suggest that the data collated by the project will lead to an increased understanding of, and ability to, capitalise on the marine resources in the region, particularly as a consequence of the MPA awareness-raising activities undertaken in the eligible region.
- Concerning its cross-border data capture and mapping activities to inform joint marine management and development activities, the project notes the following key achievements:

  - The project tagged and tracked a number of seabird species to understand how the species move across the regions and utilise habitats. The project team utilised a new computer modelling approach to explore how vulnerable 19 breeding seabird species were to future climate change, as understanding this vulnerability is essential to determine how best to conserve them. Whilst changes in prey availability and increases in extreme weather events are projected to affect most seabirds, variation in their diet, and how and where they feed, make different species more or less vulnerable to climate change.
  - As noted, the project was able to successfully engage a wide range of stakeholders across the project area in discussions on MPA management.
  - On a practical level, MarPAMM and COMPASS moorings picked up salmonids tagged by SeaMonitor in the North Sea. The project partners consider that this was a positive outworking of the collaboration between the three projects as all three projects had benefitted from each other's data collection activities.

- Concerning its implementation of joint marine management and development activities, the project notes the following key achievements:

  - The project team produced factsheets for 19 seabird species which summarise the key findings on each species in the context of the MarPAMM region.

Figure 6.1: Illustration of the Seabird Factsheets



  - As part of the management plans, if species and habitats were identified as being located outside the MPA area, the management plan recommended that the MPA should be expanded. In addition, the data and management plans are anticipated to enable regulators to make appropriate decisions concerning how to conserve important seabird populations.
  - The project has developed 'fact-filled resources' which allow users to explore each MPA with supporting documents and links. It also provides information on codes of practice, how to submit data and outlines the various reporting mechanisms. [74]

[74] For example, see link to the MPAs of the Argyll Marine Region https://experience.arcgis.com/experience/2255d1a769254f709c5996223da01481

- The project team worked closely with each region's relevant statutory body to understand their requirements. This concluded that NI and ROI bodies required MMP documentation, whilst the Scottish body preferred the use of StoryMaps.

- The project partners note that the project has utilised the most advanced technology available, including for example:

  - New tags which captured data on how often species dive, temperatures etc.;
  - Autonomous underwater vehicles (AUVs) that were pre-programmed were used to collect reliable consistent data; and
  - Innovate technology was used to count species e.g. drones and scent dogs.

- The project produced several publications including:

  - Predicting seabird distributions in response to climate change using habitat modelling (28 October 2021) – A report by RSPB and British Trust for Ornithology Scotland. The modelling work presented in the report represents one of the first attempts to model changes in seabird population abundance as a function of both terrestrial climate and oceanographic variables and to link such changes in population demography with habitat usage to predict seabird distributions.
  - Projected future vulnerability of seabirds within the INTERREG VA area to climate change (28 October 2021). A report by British Trust for Ornithology Scotland. This study projected seabird abundance in 2050 under climate change in western Scotland, Northern Ireland and the border counties of the Republic of Ireland (the INTERREG VA area). This was carried out to inform analysis of the vulnerability of each species to climate change.
  - Review of climate change mechanisms affecting seabirds within the INTERREG VA area. (28 October 2021). A report by British Trust for Ornithology Scotland. This review identified substantial evidence for climate change impacts on seabird populations with relevance to the study region.
  - Species and habitat climate change adaptation options for seabirds within the INTERREG VA area (28 October 2021). A report by British Trust for Ornithology Scotland. This document summarises the potential climate change impacts and adaptation options for seabirds within the INTERREG VA region as part of the MarPAMM project. It is intended to help those wanting to use the modelling results from the MarPAMM project, informed by the literature review of mechanisms by which climate change affects seabirds, to develop policies and management plans for seabirds that consider how best to adapt our conservation of seabirds to climate change.

6.4.6 The Priority's Specific Objective & Result Indicator Target

Similar to other projects supported under this objective, discussion with the MarPAMM project partners indicates they consider that their project was delivered in a very collaborative fashion on a cross-border and interregional basis (including active partner participation in all research activities, joint events etc.). On that basis, MarPAMM considers that it positively contributed to both Specific Objective 2.2 and its Result Indicator.

Table 6.5: Specific Objectives, Result Indicators and Targets

Specific Objective 2.2	Result Indicator	Baseline	Target
To develop cross-border capacity for the monitoring and management of marine protected species in the region.	Cross-border capacity for monitoring and management of marine protected areas and species	A little collaboration	A lot of collaboration

6.5 Best Practice and Learning

This section considers whether the MarPAMM project has resulted in any areas of best practice and learning.

As noted previously, the project identified through surveys, community events and steering group meetings that many people are aware that MPAs exist, but that they have very limited understanding of where these areas are, what they protect, how they work, and who they benefit. In response to this, the MarPAMM project has developed 'fact-filled resources' which allow users to explore each MPA with

supporting documents and links. It also provides information on codes of practice, how to submit data and outlined the various reporting mechanisms.[75]

6.6 Effectiveness of Cross-Border Working and Partnership Working

This section considers aspects of the MarPAMM project's collaborative and partnership working including:

- The effectiveness and added value of the MarPAMM project's cross border collaboration in relation to the specific objectives; and
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The MarPAMM project partners note that cross-border collaboration, at a number of levels, delivered enhanced cross-border capacity for monitoring and management of marine protected areas and species. These included:

- **Operational**: daily operational contact between staff from the 3 jurisdictions.
- **Institutional**: cooperation between the project partners across the three jurisdictions.
- **Research**: development of shared modelling approaches and research of common management challenges. Deliverables will include co-developed research translation for policy toolkits, joint peer-reviewed publications and postgraduate doctoral degree (PhD) supervision.
- **Data and information**: facilitation of cross-border data sharing and joint data collection.

It was anticipated that this cooperative approach would bring efficiencies and economies of scale by supporting shared planning, resources and assessments.

As discussed, the MarPAMM project was to deliver a number of cross-border MMPs for MPAs, which was to be facilitated by the development of four regional models across the eligible area. The partnership reported that this was achieved through the following activities:

Joint development and implementation	The MarPAMM project partnership had taken an integrated approach to developing the project, which comprised defined contribution and task management from each partner, which was coordinated by the lead partner. This was considered by the partnership to be crucial to the success of the project, as it was where the 'groundwork was laid' for partnership pathways and it was also essential for a positive project legacy of enhanced cooperation. The MarPAMM project partnership notes that the benefits and advantages of the cross-border approach for the project were based on the fact that the partnership retained a vast repository of knowledge and skills in different areas. The added value and primary benefit of the partnership were that knowledge and skills between partners, and between jurisdictions, could be leveraged. The partners also collaborated successfully on previous INTERREG projects. The project Steering Group ensured that the implementation of the MarPAMM project was well balanced and jointly executed - this was monitored by parties both internal and external to the project partnership. The lead partner Project Manager, supported by the work package leads and administrative teams in the partner organisations, coordinated and managed all activities to ensure full cross-border integration. The MarPAMM project partnership notes that each of the work packages involved multiple partners. In those instances when new surveys were required within modelling work packages, personnel from different partner organisations were placed for periods onboard partner vessels to maximise knowledge exchange and

[75] For example, see link to the MPAs of the Argyll Marine Region https://experience.arcgis.com/experience/2255d1a769254f709c5996223da01481

	ensure a common standard and quality of final deliverables. Partner survey vessels were not constrained by maritime boundaries so that cross-border data collection could be undertaken. In addition, work shadowing and the use of technical workshops were embedded within all work packages to ensure cross-border collaboration and knowledge exchange. The project aimed to upskill partners in: • The use and implementation of new and evolving technologies e.g. the use of Autonomous Underwater Vehicles (AUV) for habitat mapping; • Best practice in species distribution modelling; and • The preparation and collaborative development of marine management plans etc.
Joint staffing	The day-to-day management and leadership of the project was undertaken by the Project Management Team at AFBI and all project communications were overseen and managed by a project communications officer within SAMS. Each work package had a lead from the partnership, who was responsible for delivery of that work package (with support from relevant project partners). Furthermore, for the technical work packages (models and management plan preparation), staff spent time with partner institutions training, being trained, coordinating and supporting the implementation of deliverables.
Joint financing	The MarPAMM project partnership notes that all seven work packages were jointly financed across the partnership, which demonstrated a commitment from each partner to deliver outputs that would deliver benefit throughout the region and ensure responsibility for delivery was shared. Each partner was allocated a budget and had control over their internal administration and accounting. AFBI, as Lead Partner, however, had overall responsibility for the administration and reimbursement of spend to each partner.

Given that many of the project partners (e.g. AFBI, MSS and SAMS) were involved in other INTERREG VA funded projects (such as COMPASS), there was, wherever possible, shared learning between projects and no duplication of resources.

In addition to the above, the MarPAMM project partnership adopted a collaborative and partnership working approach by being involved in 'synergy meetings' with other EU funded projects e.g. the COMPASS and Sea Monitor 2 projects. As part of this, the various partnerships agreed to, amongst other things, prepare joint communication publications such as ezines.

6.7 Contribution of the Project to Policy Objectives

This Section considers the contribution of the MarPAMM project to key policy objectives in the eligible region. In doing so the section considers the project's contribution to:

- EU Cohesion Policy and EU 2020 objectives;
- Atlantic Strategy
- The horizontal principles of equality and sustainable development; and
- Other key policies.

6.7.1 EU Cohesion Policy and EU2020 Objectives

The MarPAMM project has helped to contribute towards delivering the Cohesion Policy with targeted investment in key priority areas including promoting climate change adaption, risk prevention and management and preserving and protecting the environment and promoting resource efficiency research.

Whilst the MarPAMM project was not overtly focused on economic growth, it encouraged 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

6.7.2 The Atlantic Strategy

Whilst a well-managed network of MPAs would likely meet the objectives established in the Biodiversity Strategies developed in Ireland, Northern Ireland and Scotland, the MarPAMM project partnership notes that the project also supported the development of a sustainable 'Blue Economy' by fostering the ecosystem services provided by MPAs, such as the provision of nursery grounds for commercial fish/shellfish species, enhancing water quality or playing a role in climate change adaptation and resilience. Many of these activities contribute towards the five themes of the EU's Maritime Strategy for the Atlantic Ocean area i.e. the 'Atlantic Strategy', as per Appendix I.

6.7.3 The Horizontal Principles

The MarPAMM project aimed to protect and improve the quality of the environment - a key component of sustainable development and as such it contributed (at least in part) to the EU's three Horizontal Principles, per the following discussion:

Sustainable Development	The MarPAMM project partnership noted that the project outputs (4 models to support the conservation of marine habitats and species and 6 marine management plans) derive both public and environmental benefits and align to a number of key EU directives and regional strategies, such as: • EU Sustainable Development Strategy (SDS); • Scottish 'Choosing Our Future' SDS (2005); • Northern Ireland's 'Everyone's Involved' SDS (2010); and • 'Our Sustainable Future: A Framework for Sustainable Development for Ireland' (2012). The models developed by MarPAMM (alongside those anticipated to be developed as part of the COMPASS project) form a solid evidence base for sustainable management plan development, in line with the SDS principle of ensuring policy is developed and implemented on the basis of strong scientific evidence (whilst taking into account scientific uncertainty through the precautionary principle) as well as public attitudes and values (highlighting the key role of effective stakeholder engagement). The primary long-term goals of the MarPAMM project were aligned to the three pillars of sustainable development as follows: **<u>Environmental Benefits</u>** • Improved understanding of marine habitats and species, tailored to underpin development and implementation of MPA management plans and fostered by practical examples of good practice; • An increase in the area of MPAs under effective management resulting in the better protection and conservation of MPA features; • Improved and safeguarded ecosystem services from MPA features e.g. to sustain good water quality or commercial species nursery grounds; • Improved resilience of MPAs to climate change through understanding how management can promote climate change adaptation or mitigation; and • Providing the Irish Marine Habitat Map with new data (as per the 'Our Sustainable Future' target). **<u>Social Benefits</u>** • Potential identification of emerging sustainable industries that are compatible with MPA management, such as marine recreation and tourism, suitably scaled aquaculture, low-impact fishing techniques etc.; • Greater stakeholder involvement in environmental management and local community cohesion over shared MPA stewardship; • Opportunities for volunteering (e.g. seabird surveys); • Improved access to information about the marine environment;

	• Enhanced education and employability through marine skills initiatives e.g. incorporating MarPAMM research in undergraduate and postgraduate degree courses, and potential for numerous student projects using MarPAMM data and outputs. **<u>Economic Benefits</u>** • Fostering a better understanding of the relative importance of pressures on protected species and habitats, enabling better assessment of the likely consequences of marine development (more targeted and realistic impact assessments) and better design of conservation measures. Safeguarding of ecosystem services provided by better managed MPAs will ensure natural resources (water quality, fish/shellfish nursery grounds) are available to support the growth of sustainable industries; • Providing a cost and scientifically effective collaborative approach to the design of marine management strategies at regional scales; • Providing ecotourism opportunities; • Benefits to fisheries through improved environmental management, including opportunities to improve integration of fisheries interests (e.g. through initiatives similar to the Irish National Inshore Fisheries Forum); • Jobs created and/or safeguarded through the improved ecosystem services resulting from well managed MPAs. The MarPAMM project incorporated sustainable practices throughout its project design and execution.
Equal opportunity and non-discrimination	Each of the MarPAMM project partners was committed to delivering the project in full accordance with the principles detailed in the relevant legislation in each jurisdiction, namely: **<u>Northern Ireland</u>** • Equality Act 2010. • Section 75 of the Northern Ireland Act 1998 (NI). • Section 49A of the Disability Discrimination Act 1995. **<u>Ireland</u>** • Employment Equality Act 1998. • National Disability Authority Act 1999. • Equal Status Act 2000. **<u>Scotland</u>** • Equality Act 2010 (with Specific provisions for Scotland) Each MarPAMM project partner promoted equality of opportunity and good relations in all areas of the project, with all individuals being treated in a fair and equal manner and in accordance with the law regardless of gender, marital status, race, religious belief, political opinion, ethnic origin, age, disability or sexual orientation. Good practice was promoted through Equality Screening and the provision of an Equality Impact Assessment. The MarPAMM project partners identified a number of specific measures to promote equality and encourage cross-border, cross-community and all-inclusive involvement in the design and execution of monitoring programmes in the eligible area. This include: • Extensive stakeholder engagement and targeted consultation prior to activities. • Working with local schools and educational programmes in all three jurisdictions. In addition, AFBI (as Lead Partner) is committed to equality of opportunity and to creating and sustaining a working environment where everyone is treated with respect and dignity, free from any form of inappropriate behaviour, and one in which all employees can give of their best. This is embodied in the AFBI Value 'Respecting

	People' and its Associated Behaviours, and in the Dignity at Work Policy. AFBI's commitment to equality of opportunity is embedded in the equality awareness training for all staff.
Equality between men and women	Each of the project partners has clear policies on equality between men and women. Indeed, it is noted that several of the project partners have developed their equality policies through engagement with Athena SWAN[76] (e.g. UU and UCC have obtained bronze Athena Swan awards in recognition of the innovative equality policies that they have in place). The project partnership committed to ensuring that there were equal recruitment opportunities for both women and men. Whilst females were generally underrepresented within leadership roles in science, the MarPAMM project partnership noted that the Project Coordinator was female. Furthermore, the project partners strived for gender equality across the partnership structure, including within the Advisory Committee. The project partnership was committed to increasing the gender balance in European Research and Technological Development (RTD) and promoted substantial involvement of senior female staff members across the whole project. Gender was an integral part of the hiring and organisational policies of the MarPAMM project partners, and in project management and operation - all partner institutions were committed to equal opportunity policies and encourage applications from women.

6.7.4 Contribution to Other Strategies

The MarPAMM project was designed to increase capacity for monitoring and management of MPAs and to enhance the eligible region's ability to address such challenges. In doing so, it was closely aligned with a number of key EU directives and regional strategies, such as:

- Marine Strategy Framework Directive (MSFD);
- Biodiversity and Habitats Directives (including the Natura 2000 network of SPAs and SACs[77]);
- UN Convention on Biological Diversity;
- OSPAR Convention;
- EU Sustainable Development Strategy;
- EU Adaptation Strategy;
- 'Harnessing Our Ocean Wealth', the Integrated Marine Plan for Ireland;
- Irish National Biodiversity Plan 2017-2021; and
- Northern Ireland Biodiversity Strategy – which cites that, by 2020, at least 10% of coastal and marine areas should be conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other area-based conservation measures.

In addition, the Galway Statement, the Marine Knowledge 2020 Strategy and the Atlantic Strategy all called for an increase in communication –the data management and communication strategies established as part of the MarPAMM project contributed towards these policy objectives and associated initiatives e.g. European Marine Observation and Data Network (EMODnet).

[76] Athena SWAN is a charter established and managed by the UK Equality Challenge Unit. It recognises and celebrates good practices in higher education and research institutions towards the advancement of gender equality: representation, progression and success for all.
[77] Natura 2000 is a network of nature protection areas in the EU. It is made up of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated respectively under the Habitats Directive and Birds Directive.

6.8 Potential Legacy Impacts

The MarPAMM Project Partnership consider that the project has the potential to achieve a variety of legacy impacts beyond the lifetime of the project, including:

- The MMPs that have been developed, which the project partners consider will inform statutory bodies for the next ten years.
- The models developed will be retained in public ownership, which will provide an opportunity to maintain and develop the models beyond the project lifetime.
- The maps generated by the project will continue to be available and accessible to others. In addition, the maps identify gaps in data that others can build on.
- The seabird survey counts have been fed into a database for the seabird monitoring programme which holds data on the key species in the region. Several stakeholders (e.g. governments and charities) have access to and use this database.
- The videos and podcasts produced throughout the project will continue to be available online.

7. SEAMONITOR 2

7.1 Introduction

This section of the report considers the SeaMonitor 2 project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 2 – Manage Marine Protected Areas and Species.

7.2 Project Overview

7.2.1 Rationale for the Project

New and existing commercial activities are rapidly developing around the coasts of the programme's eligible area e.g. sub-sea marine renewables, fish farming, offshore wind farms, dredging, harbour development, oil and gas exploration and extraction, and commercial fishing. A key strategic objective across the programme's eligible area is, therefore, *"to manage human impact on the marine environment"*[78].

There is, however, a recognition that the current level of knowledge and information on such activities limits how the guiding principle of sustainable development can be translated into definitive planning policy[79]. This paucity of information directly affects the rate of development and success of strategically important marine businesses and conservation activities.

To mitigate potentially adverse environmental impacts of such activities, and to ensure they are developed sustainably, there is a requirement for high-quality evidence to allow the development of balanced national and cross-jurisdictional management plans. In this context, highly mobile marine species are particularly difficult to manage, as a multi-jurisdictional approach is often required.

Furthermore, several key EU directives (e.g. the Habitats Directive and the MSFD) require specific monitoring and information to evaluate implementation outcomes. There are, however, notable gaps in the information retained, particularly concerning Marine Protected Areas (MPAs), with the information particularly weak for large mobile marine species.

7.2.2 Project Partners

The SeaMonitor 2 project partnership was led by the Loughs Agency (LA) and was made up of the Marine Institute (MI), the University of Glasgow (UoG), Queen's University, Belfast (QUB), the Agri-Food and Biosciences Institute (AFBI), University College, Cork (UCC) and Galway-Mayo Institute of Technology (GMIT) as funded partners. There were also two non-funded partners, namely: Ocean Tracking Network, Dalhousie University (Canada) and the University of California, Davis (USA)[80].

7.2.3 Project Overview, Objectives and Activities

To this end, the SeaMonitor 2 project – involving key stakeholders in marine environmental research and conservation across Scotland, Ireland and Northern Ireland – was developed to address this knowledge gap. It was anticipated that the project would bring together and interpret existing information in the context of the conservation and management needs of important species and habitats in marine management plans.

[78] As cited in the Scottish Government's National Marine Plan and the Irish Government's 'Harnessing Our Ocean Wealth' - the Integrated Marine Plan for Ireland.
[79] As referenced in the Scottish Government's National Marine Plan, Section 3.3.
[80] NB: Per the Letter of Offer (19th November 2018), the Canadian and USA partners were not allocated funding but brought additional expertise to the project. For example, the University of California Davis (as partners to QUB) is contributing 40+ additional acoustic receivers (equivalent to €80,000) to aid the animal tracking components (skate, basking shark, seals and salmonids).

Considerable evidence gaps exist for several species and habitats. It was anticipated that the SeaMonitor 2 project would address some of these gaps by utilising modelling techniques (built upon existing data) to identify management options and alternative management outcomes. Where empirical data did not exist but was considered important to deliver successful management outcomes, the SeaMonitor 2 project partnership proposed to undertake studies to collect additional data.

A key objective of the project was, therefore, to further develop cross-border capacity for the monitoring and management of marine protected areas and species.

The SeaMonitor 2 project partnership intended to:

- Develop 5 models to support the conservation of marine habitats and species. These were:
  - Spatial distribution of harbour seals;
  - Common skate spatial movement along with North Antrim coast (including population structuring and Loch Sunart to Jura MPA);
  - Cetacean spatial usage of the area;
  - Salmonid marine migration pathway model for the Foyle, Bush and Clyde rivers; and
  - Basking shark spatial usage of Malin/Islay area.

- Develop 3 Marine Management Plans (for designated protected areas). These were:
  - Loch Sunart to Jura MPA for Common skate;
  - Foyle area Marine Management Plan for Atlantic salmon; and
  - Clyde area Marine Management Plan for Atlantic salmon.

- Extend the network of buoys proposed as part of the COMPASS project (as per Section 5), from the east coast of the island of Ireland to the north, thereby establishing a physical connection of acoustic receivers between the island of Ireland and Scotland. It was anticipated that this would include a line from Malin to Islay and the use of Autonomous Underwater Vehicles (AUVs) to monitor movements of acoustically tagged mobile marine species of high economic and conservation value throughout the region. It was anticipated that these would provide data to develop models and management plans e.g. common skate, salmonids, basking sharks etc.

To deliver the project activities, three work plans were developed, as follows:

Table 7.1: Summary of SeaMonitor 2 Project Work Plans (Per Progress Reports)
1. Management (M)
2. Implementation (T1), including: • Spatial model for Common skate on North Antrim coast and North Channel (T1.1) • Spatial distribution of harbour seals (T1.2) • Cetacean spatial usage model Malin/Islay (T1.3) • Salmonid migration pathway model for Foyle, River Bush and Clyde (T1.4) • Spatial usage model for basking shark Malin/Islay (T1.5) • Loch Sunart to Sound of Jura Management Plan (T1.11) • Foyle Area Atlantic Salmon Management Plan (T1.12) • Clyde Estuary Marine Management Plan for Atlantic salmon (T1.14) • Data and Technical Support from MI - Ocean Science Services (OSIS), Fisheries Ecosystems Advisory Services (FEAS) and INFOMAR[81] (T1.13) • SeaMonitor 2 Project Scientific Staff (T1.14)
3. Communication (C)

[81] The Integrated Mapping for the Sustainable Development of Ireland's Marine Resource Programme, which creates integrated mapping products of the physical, chemical and biological features of the seabed in the near-shore area.

7.2.4 Anticipated Outcomes and Results

The SeaMonitor 2 project partners envisaged that the project would have a positive contribution towards the results indicator of *"an increase in the cross-border capacity for the monitoring and management of marine protected areas and species"*

7.3 Project Budget to July 2022

The SeaMonitor 2 project received a Letter of Offer (dated 19th November 2018) offering a grant of up to a maximum of €4,641,437 (ERDF + Government Match Funding) to be expended and claimed by 31st March 2022, towards total anticipated project costs of €4,722,671.

In April 2019, the SEUPB issued a revised Letter of Offer approving a 9-month project extension to 31st December 2022 and reallocation of budget between categories.

Further to the above, the Evaluation Team's review of SEUPB's EMS indicates that the project received a further three-month extension until 31st March 2023 along with a further reallocation of the budget between categories, as reflected below. As of July 2022, the project had reported a total estimated expenditure of €3,876,815 equivalent to 82% of the total project budget.

Table 7.2: Project Costs – Anticipated and Estimated Actual July 2022 (€)

Summary Budget	Anticipated Total	Total Estimated Expenditure in July 2022[82]			
		Reported to JS by First Level Control (FLC)	Pipeline Expenditure (excluding items deemed ineligible by FLC)	Total Estimated Expenditure	% of total budget
Staff Costs	2,089,277	1,058,243	567,327	**1,625,570**	78%
Office and Administration Costs	313,391	158,736	85,099	**243,835**	78%
Travel and Accommodation Costs	102,403	38,763	22,035	**60,798**	59%
External Expertise and Services	720,306	164,913	382,920	**547,833**	76%
Equipment Costs	1,497,295	1,225,394	173,385	**1,398,779**	93%
Total	**4,722,671**	**2,646,050**	**1,230,765**	**3,876,815**	**82%**

Discussion with the SeaMonitor 2 project partnership in March/April 2022 indicates that they are confident that almost all of the project budget will be spent by the anticipated end date of March 2023.

[82] Source: SEUPB's EMS 13th July 2022.

7.4 Contribution to the Achievement of the Priority's Specific Objectives & Result Indicators

This section considers the SeaMonitor 2 project's key achievements and the extent to which the SeaMonitor 2 project has:

- Contributed to the achievement of the Priority's Specific Objectives; and
- Contributed to the achievement of the targets for the Result Indicators.

The section also identifies any external factors that have impacted, positively or negatively, the project's ability to contribute to the achievement of the Specific Objective.

7.4.1 Key Activities Undertaken (to April 2022)

The Evaluation Team's review of the SeaMonitor 2 project partners' progress reports indicates that key activities implemented since the interim evaluation report (between May 2020 and April 2022) include the following:[83]

Table 7.3: Key Activities

Period	Dates	Key Activities/Points of Note
12	1st May 2020 – 31st July 2020	• Despite Covid restrictions, some fieldwork involving salmon tagging, which commenced in period 11, was completed by AFBI, the University of Glasgow and the Marine Institute. • The project's first glider mission was carried out with successful deployment and retrieval by the Marine Institute.
13	1st August 2020 – 31st October 2020	• Project scientists from the Loughs Agency and the Galway Mayo Institute of Technology (GMIT) successfully collected and redeployed receivers and cetacean monitors from the Marine Institute's RV Celtic Voyager mission to the middle of the North Channel.
14	1st November 2020 – 31st January 2021	• Salmon scientists across the partnership undertook work to produce a year 1 tagging report. • A joint webinar was held with the COMPASS and MarPAMM projects and received positive feedback from participants. • On the back of the webinar, the project agreed to work more collaboratively on a variety of activities including data sharing, resources and stakeholder engagement. • QUB published the first peer-reviewed paper on the project based on recommendations from the Skate Conference held in 2019.
15	1st February 2021 - 31st April 2021	• This was a busy period in terms of fieldwork with all arrays deployed across the North Channel as originally planned as well as all of the various coastal/estuary arrays (i.e., Burrishole /Clew Bay, Foyle, Bush and the Clyde). • Salmon smolt tagging also commenced with all the salmon partners i.e., AFBI, Loughs Agency, the Marine Institute and the University of Glasgow. • Arrays for basking shark detections were also deployed by QUB along the west coast of Ireland and Malin Head. • Coverage of the main array story was broadcast by BBC NI.

[83] Please note that the key achievements have been documented in respect to the most recent project progress reports that were available to the Evaluation Team at the time of writing (July 2022). The most recently available collated project progress report for the project was for period 17 (August - October 2021). Therefore, key achievements from period 18 onwards have been taken from the latest available individual partner progress reports.

Table 7.3: Key Activities		
Period	**Dates**	**Key Activities/Points of Note**
16	1st May 2021 – 31st July 2021	• Salmon tagging that began in the previous period was successfully concluded. • The first basking sharks were successfully tagged through cooperation between the Marine Institute and QUB. Eleven individual sharks were tagged off Achill Island in Co Mayo. • The autonomous underwater vehicle (glider) was successfully recovered in mid-June after a two-month mission to the shelf edge off the west coast of the Outer Hebrides. • Four unique salmon smolt detections were recorded, which was a first in European waters. • The seal research work was featured on BBC's Springwatch. • The project was also successful in securing a grant worth €2,000 from the Marine Institute as part of a network and communications funding call. It was envisaged that this would be used to hire Swimming Head Productions to film and produce an extended 10-minute short film on seal rehabilitation and the tracking work of SeaMonitor.
17	1st August – 31st October 2021	• The main North Channel array and all inshore arrays were retrieved, and data was downloaded with less than 10% of receivers lost. Initial findings were better than expected with 278 unique detections of salmon, skate and basking sharks. • A further 17 basking sharks were tagged, and genetic samples were taken. • C-pods for cetacean monitoring were redeployed after the data download from them was complete. • The University of Glasgow published its first peer-reviewed publication on smolt migration through a standing body of water. • The production of a 10-minute film on seal rehabilitation and the tracking work of SeaMonitor was completed and a public screening of the film was envisaged for early November 2021. • Two public display boards, outlining the work and findings of SeaMonitor's tracking work, were created for insertion at Exploris' Seal Sanctuary.
18	1st November 2021 – 31st January 2022 (from Partner Progress Reports)	• Analysis of 2021 data was underway, with secure shared folders set up by the Loughs Agency for the exchange of data with the project partners. • Initial findings indicated that there were over 300 unique detections as well as further detections from other external projects. Preparations for the 2022 salmon tagging season were also underway. • QUB deployed acoustic receivers at all of their proposed field sites i.e., Achill Head, Tory Island, Malin Head and the Maidens. • The SeaMonitor array continued to detect skate tagged in Loch Sunart, whilst genetic samples collection was ongoing. • Online screening of the 10-minute short film on seal rehabilitation and the tracking work of SeaMonitor took place, in addition to a 15-minute presentation on the seal tracking work that was given as part of the podcast series 'Join the Pod'.
19	1st February 2022 – 30th April 2022 (From Partner Progress Reports)	• AFBI undertook preparatory work before the smolt tagging season including the setup, rigging and deployment of agreed inshore and river acoustic arrays, tabulating tag resources and the preparation of a trapping and sampling kit. • The Bushmills smolt trap was also overhauled with new electric lifting gear installed to improve functionality. • This was a busy period of field work for the Loughs Agency with the final season of tagging undertaken as well as the deployment of inshore arrays and the remaining sections of the main array across the North Channel. • Tagging of salmon smolts and sea trout commenced at the River Faughan and River Roe. There was a total of 90 tags. • Two presentations were given at the event: 'Salmon in Shared Seas: Recent Research on Marine Migration Pathways,' hosted by SCENE, the University of Glasgow and the Atlantic Salmon Trust. • The SeaMonitor partners gave presentations to DAERA and the Department of Housing, Local Government and Heritage, Ireland.

Table 7.3: Key Activities		
Period	**Dates**	**Key Activities/Points of Note**
		• The Marine Institute tagged 12 basking sharks with either acoustic and/or satellite technologies to meet QUB's quota for 2022. • In April 2022 smolts were captured on the River Bush at the salmon station smolt trap and 100 fish were tagged. • SeaMonitor funds supported the tagging of an additional 30 seatrout on the Glenarm River in County Antrim. • A presentation relating to SeaMonitor's first cetaceans glider mission was given during the biennial European Cetacean Society Conference.

7.4.2 External Impact Factors

Discussion with the SeaMonitor 2 Project Partners indicates that the project encountered a number of issues during its delivery. The issues and barriers encountered included:

Impact of the Pandemic

The Evaluation Team's discussions with the SeaMonitor 2 Project Partnership during November 2020 as part of the Interim Evaluation report identified that as a result of the pandemic and the related restrictions on the movement of people meant that:

- Staff across the lead organisation and project partners began to work from their homes, but no staff were furloughed;
- Consequently, it had not been possible to carry out fieldwork and data collection, and the deployment of some equipment had to be postponed until 2021. In effect, at that time, a year's worth of marine research had been lost. A key impact was on salmon smolt tagging and tracking activity, which was of concern as species tracking is seasonal and there are only certain windows of the year where capturing, tagging, and tracking is possible. The project partners considered that three years' data was required for a sufficiently robust model to be developed;
- Whilst the spatial models were continuing as planned, the marine management plans were at that time at risk due to the loss of a season's tracking data for salmon smolts. However, the other species (e.g. seals, cetaceans and skate) that were anticipated to be tracked by the project were at reduced risk due to the tracking methodology employed or the species having later migration seasons.

Beyond issues associated with the pandemic-related restrictions, the project partners advised (in March 2022) that the project had also experienced some complications and delays associated with licensing requirements to legally deploy research equipment in the waters across the jurisdictions. The project also faced delays deploying equipment due to Ministry of Defence training being undertaken in the waters. Furthermore, the project experienced delays when claiming and verifying ship time, as vessels were hired using a flat rate which SEUPB established included ineligible costs, which lengthened the time required to verify each claim.

Ultimately, as outlined in Section 1.4, to allow the SeaMonitor 2 project further scope and time to both implement fieldwork (which could only be undertaken on a seasonal basis) and gather and collate the monitoring data, the project received a one-year extension to the project to 31st March 2023.[84]

Discussion with the SeaMonitor 2 project partnership indicates that the extension means that the project is on track to deliver all aspects of the project that had been originally proposed.

[84] To facilitate the completion of the Final Evaluation report within SEUPB's required timeframe, discussions with the project partnership were undertaken during March/April 2022, meaning that the project continued to have circa 1 year before it was anticipated to complete.

Impact of Brexit

A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Discussion with the Project Partnership indicates that the project encountered some small complications as a result of Brexit, including:

- There was an increase in paperwork associated with procurement exercises;
- The project encountered shipping issues, noting for example that an item of equipment that was sent from the Loughs Agency in Northern Ireland to Galway in the Republic of Ireland, arrived in Birmingham in England and custom charges were then expected to be paid.

7.4.3 Variation to Planned Activities

Discussion with the SeaMonitor 2 project partnership indicates that the one-year extension to the project to 31st March 2023[85] means that the project is on track to deliver all aspects of the project that had been originally proposed.

7.4.4 Progress Towards the Project Output Indicators

Discussion with the SeaMonitor 2 project partnership in March 2022 indicates that the project had not yet achieved its anticipated project output indicators, but the work was ongoing, and the project anticipates that both targets will be achieved by March 2023.

Table 7.4: Project Output Indicators

Programme Output Code	Name of Output	Programme Target	SeaMonitor 2 Target	Progress at March 2022
2.212	Models developed to support the conversation of habitats and species	5	5	0 (ongoing)
2.213	Marine management plans for designated protected areas complete	6	3	0 (ongoing)

Specifically, the project partners note that they were continuing (at March 2022) to develop the originally anticipated five models to support the conservation of marine habitats and species and anticipate that each will be completed by March 2023 (the proposed end date of the project) i.e.:

- The spatial distribution of harbour seals;
- Common skate spatial movement along the North Antrim Coast (including population structuring and Loch Sunart to Jura MPA);
- Cetacean spatial usage of the area;
- Salmonid marine migration pathway model for the Foyle, Bush and Clyde rivers; and
- Basking shark spatial usage of Malin/Islay area.

In addition, work was ongoing to develop the following three Marine Management Plans (for designated protected areas):

- Loch Sunart to Jura MPA for Common skate;
- Foyle area Marine Management Plan for Atlantic salmon; and
- Clyde area Marine Management Plan for Atlantic salmon.

[85] To facilitate the completion of the Final Evaluation report within SEUPB's required timeframe, discussions with the project partnership were undertaken during March/April 2022, meaning that the project continued to have circa 1 year before it was anticipated to complete.

7.4.5 Key Achievements (to March 2022)

Discussion with the SeaMonitor 2 project partnership indicates its view that the project's key achievements include the following:

- The project partners consider that the SeaMonitor 2 project has served to promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species in a manner that would not have been possible in the absence of INTERREG VA funding noting that the funding provided the necessary resource to address financial constraints faced both at an institutional and state government level. Related to this, the project partners advised that a key strength (and success) of the project was the composition of its partner consortium in that it was not only cross-border/interregional within NI, ROI and Scotland but was also international with associate partners from Canada and the USA. The project partners note that the following key evidence and knowledge have been developed through the project that would not exist otherwise:

  - Concerning Atlantic salmon, the project has started to answer questions about marine migration and where the species are facing pressures in their lifecycle. This will enable the species to be better managed going forward.
  - Concerning seals, the project has identified the effectiveness of government-funded rehabilitation programmes for seal pups at Portaferry in NI.
  - Concerning Skate, research has shown that they are much more mobile than previously thought.

  It is anticipated that the data and knowledge developed as part of the project will be used by other projects and policy makers to better manage various species going forward.

  In addition, the project partnership notes that the project has proven the effectiveness of some novel equipment (e.g. the remote-operated "ocean glider"), and has provided a strong case for future funding in the area.

- The project considers that it has helped achieve a more coherent ecological approach in cross-border Marine Protected Areas noting that the shared areas and movement of species meant that it was necessary to adopt a multi-jurisdictional approach to managing and protecting MPAs.
- The project partners consider that the project has contributed to ensuring greater compliance with the Marine Strategy Framework Directive (MSFD) noting that the technologies and methodologies implemented by SeaMonitor have provided a useful framework to start measuring and addressing several stressors so that the environment and its vulnerable species can be better managed and protected. The project notes that the recent performance review of the MSFD found that non-indigenous species, fishing, eutrophication, permanent hydrological change, contamination, litter, and anthropogenic noise were major stressors affecting marine life and hindering progress towards the ambition of the MSFD in European waters such as the North Channel and Celtic Seas where the SeaMonitor project operates.
- The project partners consider that the project has contributed to an increased understanding of, and ability to, capitalise on the marine resources in the region through the sharing of knowledge and resources (e.g. vessels) and the development of data management structures to enable more efficient sharing of data.
- The project partners note that over half of its scientific officers were female, which they consider was an achievement as the sector has traditionally been male dominated.
- The project believes that its use of advanced technology has been a considerable achievement and has advanced knowledge in the area. For example, the project tested a remote-operated "ocean glider", equipped with an acoustic tag detector along the steeply sloping area of the shelf edge approximately 130km northwest of the Scottish Hebrides. The project partnership notes that whilst active tracking technology allowing the detection of marine species is constantly evolving and while the techniques applied have also been used in Canada and the USA, their use as part of the SeaMonitor 2 project represented the first time it has been applied to Atlantic salmon in Europe.

The glider is part of the SeaMonitor's integrated cross-jurisdiction major network of acoustic receivers, robotic underwater vehicles, satellite tracking and passive acoustic receivers and its use was extended to track cetaceans, basking sharks and skates as well as to collect physical oceanographic data. When combined, the data enables a holistic view of the region's mobile marine species. The project anticipates that it will continue to provide invaluable information, as well as having established an integrated network of marine receivers for future applications and extended monitoring.

The SeaMonitor 2 project partners note that as the first mission was a success, autonomous remote-operated platforms will likely become a key method by which spatial data on cetacean occurrence will be acquired, as it is less expensive than chartering a research vessel and its crew. It is also more sustainable as autonomous remote-operated platforms do not require fuel, and emit less noise so are better suited to acoustic data collection, and the impact on the environment and disturbance to animals is likely reduced too.

- The project partners advise that the project has developed Europe's largest fish counter, noting that before this project, the technology had only been used in one jurisdiction. A key benefit of the main array is considered to be its potential role to become a key regional asset;
- A basking shark tagging study completed by the SeaMonitor 2 project confirmed that they travel across the North Atlantic Ocean. Researchers at Queen's University Belfast and Western University, Canada recorded only the second ever known transatlantic movement for this species. The study, published in the Journal of Fish Biology, comprises images of a female basking shark captured by an underwater photographer off the coast of Cape Cod, 993 days after it was fitted with a satellite transmitter at Malin Head, the most northern point of Ireland. This international collaboration produced the first evidence in more than a decade of basking sharks crossing the Atlantic Ocean. The last recorded evidence for the transatlantic movement was gathered in 2008 when another female basking shark tagged with a tracking device moved from the Irish Sea to continental waters off the coast of Newfoundland.[86]
- Concerning cetaceans, the project's static array has provided baseline data on their presence at the outer mouth of the north channel, where information had previously not existed. As a standard approach was used, the data was comparable to that of COMPASS and MarPAMM which means that there is now an extensive dataset around Ireland and Scotland to support the designation of MPAs and to inform impact assessments.
- Concerning its seal pup tracking activity, the project partners noted that before their release in November 2019, Ariel and Merida were the first rehabilitated seal pups in Northern Ireland to be equipped with trackers. This equipment allowed scientists to closely monitor their behaviour after rehabilitation, as well as their diving and feeding habits in the wild. Since their release, the trackers have indicated a much longer range of travel than had been predicted, extending across the Irish Sea to England and Wales. In early March 2020 Ariel ended up on the shores of North Wales having made the journey from Northern Ireland to the coast of Scotland, then the Isle of Man and onto the coast of North Wales[87].

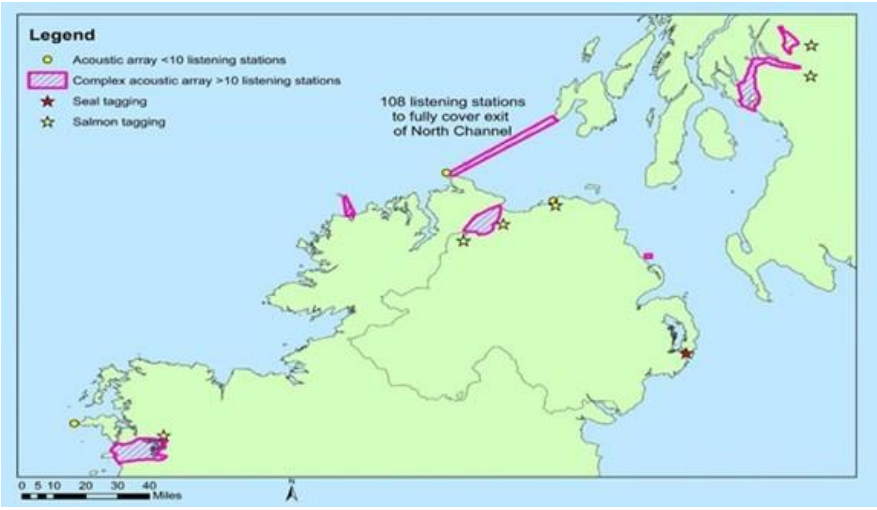
[86] Source: SEUPB Project Case Study: Tagging Basking Sharks with the SeaMonitor Project
[87] Source: SEUPB Project Case Study: SeaMonitor: Seals Pups

Fig 7.1: The tracker attached to the seal

Fig 7.2: Ariel and Merida tracking Data

- Concerning flapper skate, the project identified connectivity between the Scottish MPA and Northern Ireland using a multidisciplinary combination of acoustic tagging, satellite tracking, next-generation sequencing and citizen science engagement, with the Skate Working group subsequently acting to coordinate conservation and research efforts throughout the INTERREG area and beyond. It is anticipated that the project partners will continue to develop this activity after the completion of the SeaMonitor 2 project, with additional and ongoing dropdown and towed camera surveys as well as eDNA assay development in Scotland, Northern Ireland, and Ireland. The project partners note that the SeaMonitor project has developed a framework that can readily support and inform environmental managers cost-effectively and rapidly, and the approach has the potential to be expanded to other species such as white skate, angel shark and tope.
- The SeaMonitor 2 project has extended the network of buoys proposed as part of the COMPASS project (see Section 4), albeit COMPASS was looking at different species, from the east coast of the island of Ireland to the north, thereby establishing a physical connection of acoustic receivers between the island of Ireland and Scotland.

Figure 7.3: The Network of Acoustic Receivers



7.4.6 *The Priority's Specific Objective & Result Indicator Target*

Discussion with the SeaMonitor 2 project partners indicates their view that each of its project workplan areas had collaborated closely with one another and not only had the project partners worked closely with one another, but the project had also worked closely with the other projects that had been funded under Objective 2.2 of INTERREG VA Investment Priority Axis 2 (i.e. the MarPAMM and COMPASS projects) through informal discussions to discuss planned activity, sharing information and hosting joint workshops.

Of note, the SeaMonitor 2 project partners advised that no one institution involved in the project could have completed the work on their own, and there was a requirement for collaboration and work on a multi-jurisdictional level.

On that basis, SeaMonitor 2 considers that it positively contributed to both Specific Objective 2.2 and its Result Indicator.

Table 7.5: Specific Objectives, Result Indicators and Targets

Specific Objective 2.2	Result Indicator	Baseline	Target
To develop cross-border capacity for the monitoring and management of marine protected species in the region.	Cross-border capacity for monitoring and management of marine protected areas and species	A little collaboration	A lot of collaboration

7.5 Best Practice and Learning

This section considers whether the SeaMonitor 2 project has resulted in any areas of best practice and learning.

As noted previously, the project tested a remote-operated "ocean glider", and their use as part of the SeaMonitor 2 project represented the first time it has been applied to Atlantic salmon in Europe. The SeaMonitor 2 project partners note that as the first mission was a success, autonomous remote-operated platforms will likely become a key method by which spatial data on cetacean occurrence will be acquired, as it is less expensive than chartering a research vessel and its crew. It is also more sustainable as autonomous remote-operated platforms do not require fuel, and emit less noise so are better suited to acoustic data collection, and the impact on the environment and disturbance to animals is likely reduced too.

7.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the Sea Monitor 2 project's collaborative and partnership working including:

- The effectiveness and added value of the Sea Monitor 2 project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The Sea Monitor 2 project partners note that there were previous projects that involved tagging, tracking and migration studies, as these were identified as critical areas and species for which there was insufficient knowledge to inform management and allocate resources or protect sensitive habitats or species. The project partnership, therefore, designed the Sea Monitor 2 project to:

- Address the gaps identified from such projects;
- Continue to utilise systems and infrastructure developed as part of such projects; and/or
- Take forward systems and techniques into new areas or applications.

The partnership report that this was achieved through the following activities:

Joint development	The Sea Monitor 2 project was jointly developed by a collaborative partnership that represents the key stakeholders in policy development, marine management protection and research within the programme's eligible area. The formation of the project partnership was specifically designed to ensure that the scope of the project reflects scientific monitoring, academic research and management needs in all jurisdictions. Collectively the project partners have previously worked together on large scale projects and have planned the work packages and strategic elements of this project based on identified needs arising from such previous collaborations e.g. IBIS[88], SALSEA-Merge[89], OBSERVE[90] etc. On a smaller scale, individual project partners had previously collaborated on multiple bilateral projects. This integrated approach reflected the unique skill sets of each partner. These are detailed below: • LA – research and management of Foyle living resources, fish stock assessment, salmonid tracking, and tagging. • MI – undertake, coordinate, promote and assist in marine research and development (including oceanography, marine mapping, fish stock assessment, research vessels, marine monitoring equipment deployment and database specialists). • AFBI – salmon monitoring and research, tagging, tracking, hydro-dynamic modelling. • QUB - marine vertebrates (e.g. tracking, spatial and trophic ecology, population genetics, restoration, and conservation biology). Terrestrial ecology (e.g. dune systems, terrestrial vertebrates, GIS, environmental policy and economics, habitat mapping). • UoG – avian and fish biological research. • UCC – sea mammal expertise, tracking, spatial ecology etc. • GMIT – cetacean biology and research, tracking and tagging and marine surveys. • The University of California, Davis (USA) - world-leading animal biotelemetry (tracking) expertise. It will also contribute significant time (e.g. visiting research fellows and joint projects) and infrastructure to the project. • Dalhousie University (Canada) - ocean Tracking Network bringing world-leading expertise on large-scale acoustic tracking programs and technical support. The project partnership recognised that the flow of information and data sharing between partners (or work plan partner groupings) was key to the successful delivery of the project.
Joint implementation	Each of the project partners had clearly defined roles and responsibilities. The overall management was exercised by the Project Board, which advised and directed the project and monitored and audited progress throughout. A Project Steering Group, which included representation from each partner organisation, sat beneath the Board and met on a monthly basis to monitor progress at an activity level.

[88] An £8m cross-border project (funded through the INTERREG IVA Programme) to help protect aquatic resources across Northern Ireland, the Border Region of Ireland and Western Scotland.
[89] A three-year €5.5 million scientific project (funded through the 7th Framework Programme for Research and Technological development) to investigate the migration and distribution of salmon in the North-East Atlantic.
[90] A project initiated by the DCCAE, in partnership with the Department of Culture, Heritage and the Gaeltacht (DCHG), to provide robust data with which to inform conservation and management by assessing the importance of habitats for whales and dolphins.

Joint staffing	The LA took responsibility for the overall management and delivery of the project. A project team was appointed by the LA, which was led by a Principal Investigator (or Project Officer) who had overall responsibility for the delivery of the science and administration functions. This individual was supported by a Programme Administrator, a Finance Officer and a Clerical Officer (who had collective responsibility for the day-to-day administration and financial control/probity of the project). In terms of joint staffing, each of the activities were led by a partner with a particular area of expertise (e.g. GMIT led on the cetacean spatial modelling, UCC on the seal spatial usage modelling and MI led on data and technical support providing a lot of the baseline information for the development of the models and management plans with habitat mapping, and data handling etc.).

In addition to the above, the Sea Monitor 2 project partnership adopted a collaborative and partnership working approach by being involved in 'synergy meetings' with other EU funded projects e.g. the COMPASS and MarPAMM projects. As part of this, the various partnerships agreed to, amongst other things, prepare joint communication publications such as ezines.

7.7 Contribution of the Project to Policy Objectives

This Section considers the contribution of the SeaMonitor 2 project to key policy objectives in the eligible region. In doing so the section considers the project's contribution to:

- EU Cohesion Policy and EU 2020 objectives;
- Atlantic Strategy
- The horizontal principles of equality and sustainable development; and
- Other key policies.

7.7.1 EU Cohesion Policy and EU2020 Objectives

The SeaMonitor2 project has helped to contribute towards delivering the Cohesion Policy with targeted investment in key priority areas including promoting climate change adaption, risk prevention and management and preserving and protecting the environment and promoting resource efficiency research.

Whilst the Sea Monitor 2 project was not overtly focused on economic growth, it encouraged 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

7.7.2 The Atlantic Strategy

The Sea Monitor 2 project aimed to support the develop of the 'blue economy' by addressing important gaps in the understanding and knowledge of marine systems e.g. in relation to the sustainability of commercial marine developments, as identified in the Scottish Government's National Marine Plan and the Irish Government's 'Harnessing Our Ocean Wealth' - the Integrated Marine Plan for Ireland.

The Sea Monitor 2 project, therefore, contributed towards the following priority area and associated objectives identified in the Atlantic Strategy Action Plan[91]:

Priority	Specific Objectives
2: Protect, secure and develop the potential of the Atlantic marine and coastal environment	• Improving maritime safety and security • Exploring and protecting marine waters and coastal zones • **Sustainable management of marine resources** • The exploitation of the renewable energy potential of the Atlantic area's marine and coastal environment

[91] As set out in Appendix I.

7.7.3 The Horizontal Principles

The Sea Monitor 2 project aimed to protect and improve the quality of the environment - a key component of sustainable development and as such it contributed (at least in part) to the EU's three Horizontal Principles, per the following discussion:

Sustainable Development	The Sea Monitor 2 project was founded upon the need for sustainable solutions to environmental issues. The Sea Monitor 2 project partnership noted that the outputs align to a key objective of the EU's Sustainable Development Strategy, namely *"to improve management and avoid overexploitation of natural resources, recognising the value of ecosystem services".* Specifically, the Sea Monitor 2 project contributed towards the following operational objectives of the EU's Sustainable Development Strategy: • Improving the management and avoiding overexploitation of renewable natural resources such as fisheries, biodiversity and restoring degraded marine ecosystems. • Halting and contributing to a significant reduction in the worldwide rate of biodiversity loss. In meeting these objectives, the Sea Monitor 2 project provided information to policymakers and managers to evaluate the potential impacts of natural and manmade factors on mobile marine species of commercial or special conservation interest. It was anticipated that the marine management plans and modelling outputs from the Sea Monitor 2 project will improve the understanding of sustainability and will, therefore, support informed management interventions on a range of species of high conservation interest. As part of the project, the Sea Monitor 2 project partnership utilised Sustainable Development Indicators (SDIs) to measure project performance and knowledge exchange activity. For example, as part of the project monitoring process, the partnership adopted an SDI Conceptual Framework model, developing indicators that aligned with EU, UK and Irish Sustainable Development Strategies. Furthermore, a set of indicators were used to measure communication and awareness-raising with stakeholders. The project partnership also reviewed the processes that were used in the delivery of the Sea Monitor 2 project against the relevant articles in Directive 85/337/EEC (as amended by 97/11/EEC). It concluded that the processes used to deliver the Sea Monitor 2 project had no significant negative effects, either alone or in combination, on the environment by virtue of their nature, size or location. The project partnership notes that the processes utilised had 'neutral' to 'minor' environmental impacts, whilst the outputs had very significant positive environmental benefits.
Equal opportunity and non-discrimination	Each of the project partners has robust non-discrimination policies as a component part of their operational policy. Equality of opportunity was, therefore, systematically considered in all aspects of the project definition, design and delivery process (including management, monitoring and communication). The project partnership adhered to its legal obligation in accordance with Article 16 of the EU General Regulation (1083/2006) and Section 75 of the Northern Ireland Act 1998.

Equality between men and women	Each of the project partners has clear policies on equality between men and women. Indeed, it is noted that several of the project partners have developed their equality policies through engagement with Athena SWAN[92] (e.g. UoG and QUB have obtained silver Athena Swan awards in recognition of the innovative equality policies that they have in place). The project partnership committed to ensuring that there were equal recruitment opportunities for both women and men.

7.7.4 Contribution to Other Strategies

The Sea Monitor 2 project was designed to address the knowledge gap that existed in the information retained in relation to MPAs (the information was particularly weak for large mobile marine species). In doing so, it was closely aligned with a number of key EU directives and regional strategies, such as:

- Marine Strategy Framework Directive (MSFD);
- Biodiversity and Habitats Directives;
- UN Convention on Biological Diversity and Strategic plan 2011–2020 - Strategic Goals C and E i.e. 'Improving the status of biodiversity by safeguarding ecosystems, species and genetic diversity' and 'Enhancing biodiversity implementation through participatory planning, knowledge management and capacity building' respectively;
- OSPAR Convention; and
- EU Biodiversity Strategy 2011.

7.8 Potential Legacy Impacts

The SeaMonitor 2 Project Partnership consider that the project has the potential to achieve a variety of legacy impacts beyond the lifetime of the project, including:

- The legacy that will be available through the Management Plans developed, as the plans developed as part of the project will have long term influence on future management, policy and legal issues relating to these species and their environment.
- The project has proven that scaled-up technology is scientifically viable and value for money.
- The project partners have deployed acoustic and satellite transmitters to identify seasonal movements and assess the connectivity of known hotspots throughout the INTERREG VA region. The acoustic tags will run for 10 years allowing project partners to monitor the times of arrival and departure at key locations, but it will also provide a baseline for long-term monitoring to assess the numbers and fidelity of basking sharks in the region.
- In addition, the long-term acoustic monitoring programme will dovetail with the predictive model of surfacing behaviour. This model will allow the project partners to draw down real-time meteorological data and make instantaneous predictions of whether basking sharks will be present at the surface or at greater depths at any given time to identify and mitigate collision/encounter risk. It is anticipated that this information will be relayed to stakeholders (such as boat owners or ecotourism operators) via a range of online tools and radio updates issued by the respective coastguard agencies. The project partners suggest that the predictive model could be integrated easily into future marine protected areas or other effective area-based conservation measures (OECMs).
- It is considered that the juvenile seal dataset will have a further application to help inform policy and MPA placement, particularly when information on inshore fishing efforts becomes available.

[92] Athena SWAN is a charter established and managed by the UK Equality Challenge Unit. It recognises and celebrates good practices in higher education and research institutions towards the advancement of gender equality: representation, progression and success for all.

8. SWIM - SYSTEM FOR BATHING WATER QUALITY MONITORING

8.1 Introduction

This section of the report considers the System for bathing Water quality Modelling (SWIM) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 2 – Manage Marine Protected Areas and Species.

8.2 Project Overview

8.2.1 Rationale for the Project

Achieving and maintaining high-quality marine water standards is required under stringent EU environmental legislation such as the Bathing Water Directive (2006/7/EC), Shellfish Waters Directive (2006/113/EC) and Water Framework Directive (2000/60/EC). Relevant authorities in Ireland and Northern Ireland (before Brexit), were charged with implementing the Bathing Water Directive (2006/7/EC).

To ensure effective and efficient implementation of these directives, water resource managers need to know the water quality to take appropriate mitigating actions for social and ecological benefits in the event of pollution. This is particularly so for the Bathing Water Directive, where water quality is defined in terms of Escherichia coli and intestinal enterococci (IE) concentrations as percentile limit values.

Furthermore, the health authorities in both jurisdictions have introduced regulations requiring a public warning against bathing to be issued for bathing water when microbial levels exceed certain values. These regulations are reactive and do not need prediction, but communication with the public is central to their implementation.

8.2.2 Project Partners

The SWIM project was led by University College Dublin (UCD) and involved the Agri-Food and Biosciences Institute (AFBI) and Keep Northern Ireland Beautiful (KNIB) as funded partners.

In addition to the above, there were also several non-funded partners[93] in the SWIM project, namely: Louth County Council, Sligo County Council, Donegal County Council, Ards and North Down Borough Council, Causeway Coast and Glens Borough Council, Newry, Mourne and Down District Council and Northern Ireland Water. It was understood that the local authorities would be responsible for installing and maintaining beach infrastructure relating to prediction modelling.

8.2.3 Project Overview, Objectives and Activities

To this end, the SWIM project aimed to enable short-term pollution to be predicted through the development of a bathing water quality prediction model. The central 'predict and protect' concept of the SWIM project was established to reflect bathing water regulations throughout the EU.

The SWIM project partnership intended to:

- Acquire all pre-existing available bathing water microbial water quality.
- Determine sources of, and acquire, all available retrospective relevant environmental data.
- Determine which bathing waters had less than 'Excellent' classifications (category 1).
- Determine which had one or more sample results that exceeded 'Sufficient' standard values (category 2).
- Operate the Discard Model for categories 1 and 2.[94]
- Validate successful model performance.
- Develop multivariate and other models where the Discard Model has not been successfully validated.

[93] Per the project's Stage 2 Assessment Report.
[94] Which is an Excel model that was already operational in Ireland.

- Investigate short-term pollution sources using microbial source tracking.
- Obtain additional information relevant to model failure from beach profiles and local sources.
- Implement the necessary software to reliably collect, conflate and route and store disparate data within the spatiotemporal domain from a variety of data streams.
- Design and produce electronic signage and associated software to deliver message alerts and set up text alerts, social media and web page information systems.
- Set up a sustained public awareness campaign and solicit citizen engagement.

The SWIM project partnership intended to test and monitor nine bathing waters, six in Northern Ireland and three in Ireland.

It was proposed that the public would then be informed about water quality through a series of media channels, including:

- Automatic localised text alerts.
- Social media channels e.g. Facebook and Twitter.
- Real-time alert services using electronic signage installed strategically at beach entrance points. As part of the project, it was proposed that electronic signage would be installed at beaches where effective predictive modelling had been achieved. Each sign would then be uniquely addressable via the internet (IPv6), enabling individual, real-time text messages to be sent to individual sign(s). It was anticipated that each sign would be solar-powered, avoiding the necessity for costly electricity supply and wired telecommunications networks.
- Web page updates - A SWIM project webpage was anticipated to be added to UCD's website, which would update visitors on the progress of the project. It was also envisaged that the other project partners would develop web pages, which would link to UCD's website to provide the latest project updates. It was proposed that a dedicated beach information website would be developed and hosted by KNIB, which would provide detailed information on Northern Ireland's bathing waters including daily alerts on, for example, whether bathing is advised. Information on any beach awards e.g. Blue Flags were also anticipated to be included. For beaches in Ireland, it was envisaged that daily alerts on whether bathing is advised would be added to the relevant Council website.

In addition, it was anticipated that text alerts and social media channels would use geofencing to alert citizens using GPS when they move within a certain proximity of a given beach, advising them of bathing water quality.

The project objectives were to achieve:

- The development of bathing water quality prediction models. These would tie directly into software infrastructure to support the collection of data and delivery of information to the public.
- Water sampling and microbial source tracking. The methods and technology would be adapted and refined to uniquely suit the chosen sampling sites.
- Public engagement campaigns and local programmes for bathing waters aimed at promoting good management, environmental standards and sustainability for beaches.
- Installation and maintenance of beachfront real-time signage and infrastructure related to prediction modelling.

The following seven work packages were developed:

Table 8.1: Summary of SWIM Project Work Packages (Per Progress Reports)
1. Management
2. Establishment of Data Inventory
3. Develop Bathing Water Quality Prediction Models
4. Equipment Infrastructure Deployment
5. Software Infrastructure
6. Validation of the Bathing Water Quality Prediction Model
7. Communication

8.2.4 Anticipated Outcomes and Results

The SWIM project partnership anticipated that the predictive capability and public communication outcomes of the project would help to serve the needs of both local authorities and public health agencies in both jurisdictions, as benefits would be delivered to local and visiting bathing water users. In doing so, it was anticipated that this would improve communication to members of the public and would help to:

- Protect public health by ensuring that bathers are warned and protected from adverse health effects;
- Contribute to promoting tourism;
- Mitigate against economic losses incurred by a reduction in amenity attractiveness (e.g. loss of Blue Flag status).

8.3 Project Budget to July 2022

The SWIM project received a Letter of Offer (dated 14th June 2017) offering a grant of up to a maximum of €1,048,907 (ERDF + Government Match Funding) to be expended and claimed by 30th June 2020, towards total anticipated project costs of €1,108,358.

In April 2020, the SEUPB issued a revised Letter of Offer approving a 6-month project extension and additional funding, offering a grant of up to a maximum of €1,318,152 (ERDF + Government Match Funding) to be expended and claimed by 31st December 2020, towards total anticipated project costs of €1,393,075.

Whilst the project ended in December 2020, discussion with SEUPB (in November 2022) indicates that it is continuing to liaise with project representatives to ensure that the project is fully implemented as originally envisaged including the full installation and continuing operation of the purchased signs. SEUPB advised that (as of November 2022) not all of electronic signage had been installed, and some has not been maintained as originally planned. As of July 2022, it is understood that the total actual project expenditure was €1,354,517, equivalent to 97% of the total project budget, reflecting a small underspend for this project.

Table 8.2: Project Costs –Anticipated and Actual July 2022 (€)

Summary Budget	Anticipated Total	Total Actual Expenditure[95]	% of total budget
Staff Costs	847,340	**848,164**	100%
Office and Administration Costs	127,101	**125,339**	99%
Travel and Accommodation Costs	41,869	**40,044**	96%
External Expertise and Services	53,109	**46,145**	87%
Equipment Costs	323,656	**294,824**	91%
Total	**1,393,075**	**1,354,517**	**97%**

[95] Source: SEUPB's EMS 13th July 2022.

8.4 Contribution to the Achievement of the Priority's Specific Objectives & Result Indicators

This section considers the SWIM project's key achievements and the extent to which the SWIM project has:

- Contributed to the achievement of the Priority's Specific Objectives; and
- Contributed to the achievement of the targets for the Result Indicators.

The section also identifies any external factors that have impacted, positively or negatively, the project's ability to contribute to the achievement of the Specific Objective.

8.4.1 Key Activities Undertaken (to December 2020)

The SWIM project partners cite, within their progress reports, the project's key activities (between April 2020 and December 2020) as being:[96]

Table 8.3 Key Activities

Period	Dates	Key Activities/Points of Note
14	1st April 2020 - 30th June 2020	• The SWIM promotional video was completed and launched in April 2020. • SWIM's project manager worked closely with the appointed contractor to ensure that all of the 22 new signs were built, tested and delivered to each of the councils by the end of May 2020.
15	1st July 2020 – 30th September 2020	• The University College Dublin (UCD) team carried out a full bathing season of sampling despite Covid restrictions during this period. Successful sampling was carried out at the three SWIM beaches in ROI: Enniscrone, Lady's Bay and Clogherhead. • Keep Northern Ireland Beautiful worked with an external company to produce the first animation. • The UCD modelling team produced a paper titled "Optimising Water Quality Predictions for the SWIM Bathing Waters," and this was circulated to the EPA and DAERA in August for their consideration.
16	1st October 2020 – 1st December 2020	• In this final phase of the project, meetings were held between the UCD modelling group and AFBI to discuss the transfer of the SWIM models at the project's end. UCD prepared several documents to explain how SWIM data reader, signs, API and prediction models operate, and how everything was automated on the SWIM server in UCD. • Several presentations were given on the Bathing Water Quality Prediction Models produced throughout the project. • The 'SWIM Modelling Framework' was presented at the project's closing event on the 3rd of December 2020. So too was a comprehensive presentation on sampling, entitled "Bathing Water Sampling in the Republic of Ireland".

[96]Please note that the key activities have been documented in respect to the most recent collated Project Progress reports that were available to the Evaluation Team at the time of writing. (July 2022)

8.4.2 External Impact Factors

Discussion with the SWIM Project Partners indicates that the project encountered a number of issues during its delivery. The issues and barriers encountered included:

Impact of the Pandemic

The Evaluation Team's discussions with the SWIM Project Partnership during November 2020 as part of the Interim Evaluation report identified that despite the restrictions associated with COVID-19 (leading to project staff working remotely), the project partnership was of the view that their project was on track with no substantial risk to the project fully achieving its aims and objectives. Indeed, the project lead suggested that the project had faced very little delay as a result of COVID-19 and that it continued to be feasible to deliver all of their project's planned activities within the original timeframe (i.e. by December 2020). Of note:

- Onsite sampling was conducted successfully towards the end of summer 2020 in both Sligo and Donegal with sufficient levels of rain to provide poor weather samples. It was considered by the project partners that this would be sufficient to develop the model up to an appropriate standard.
- The other beaches had been successfully sampled on an ongoing basis as they were close enough to partners' bases to avoid having to book accommodation for some time;
- There was some delays concerning the installation of electronic signs at some beaches, as there was a shortage of concrete pillar and also some council staff had been furloughed during the summer of 2020.

Discussion with SEUPB (in November 2022) indicates that whilst the SWIM project completed in December 2020, it is continuing to liaise with project representatives to ensure that the project is fully implemented as originally envisaged including the full installation and continuing operation of the purchased signs. SEUPB advised that (as of November 2022) not all of electronic signage had been installed, and some has not been maintained as originally planned. It is understood that SEUPB has sought assurances from UCD that both it and its partner councils will adhere to the commitments made to both erect and maintain SWIM signage.

Impact of Brexit

A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Discussion with the Project Partnership indicates that the outworkings of Brexit had no substantive impact on the project; nor did they anticipate that it would have the potential to affect similar cross-border workings going forward.

Other Factors

The SWIM Project Partnership also highlighted the following challenges:

- Finalising the Data Sharing Agreement between the project partners delayed the implementation of certain work projects at the start of the project;
- It was difficult to build up that initial trust as a new partnership only meeting every 3 months in-person;
- The recruitment of staff in UCD was a slow process, whilst the Project Officer at KNIB changed several times over the course of the project;
- Outside of the minor delays to sampling as a result of Covid-19, there was occasionally difficulty undertaking sampling at the beaches as there was a preference for the sampling to be completed when it was raining; and
- The project faced objections to the erection of electronic signage at the beaches by some locals.

The Project Partnership engaged with open water swimming groups to help promote the project, and also highlighted the growth in popularity of open water swimming as an activity during COVID-19, which in their view increases the need for similar 'SWIM' projects throughout the island of Ireland.

8.4.3 Variation to Planned Activities

Discussion with the project partnership indicates that a small number of activities that had been proposed originally were not implemented, or not implemented in the way or extent that was originally proposed. These included:

- KNIB sought amendment to alter its on-beach engagement activities. Animated videos were produced instead of going out to seafronts to promote the signage network and app (with associated purchase of banners and promotional flyers etc.).
- AFBI extended staff contracts to December to cover displaced activities.
- The SWIM closing event had to be hosted online.

8.4.4 Progress Towards the Project Output Indicators

The SWIM project partnership advised (in April 2022) that the project had successfully developed a system for the prediction of bathing water quality and installed real-time signage.

Table 8.4 Project Output Indicators

Programme Output Code	Name of Output	Programme Target	SWIM Target	Status (as of April 2022)
2.214	System for the prediction of bathing water quality and install real-time signage	1	1	1

8.4.5 Key Achievements (to March 2022)

Discussion with the SWIM project partnership indicates its view that the project's key achievements include the following:

- The project served to create new relationships and partnerships between the three partners involved (UCD, AFBI and KNIB) and brought together various skills which then promoted cross-border cooperation to develop a shared bathing water quality (BWQ) prediction model.
- At a high level, the project lead noted that individual partners had been responsible for the following integrated tasks:
  - UCD developed the BWQ software and models to communicate the information on the quality of bathing water and carried out bathing water sampling at three ROI beaches. The software serves to reliably collect, conflate and route and store disparate data within the spatiotemporal domain from a variety of data streams on a specific server was purchased as part of the project in UCD to store the project data.
  - AFBI carried out bathing water sampling at 6 NI beaches and provided data to feed into the BWQ prediction model.
  - KNIB was responsible for all communication activity including developing the website, app content, social media, e-newsletters and infographics. In addition, KNIB organised the project opening and closing events.

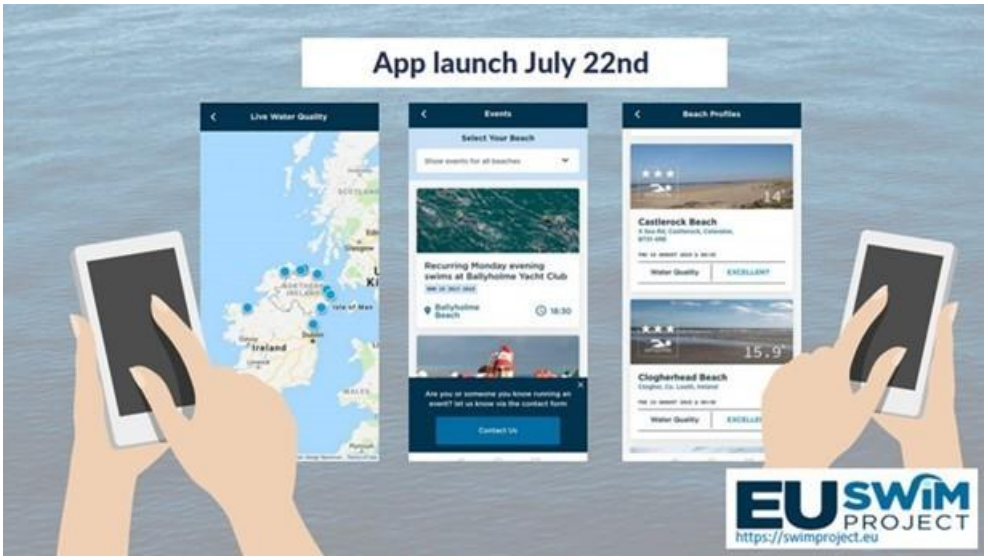
- In addition, the SWIM project partners note that there was collaboration with other stakeholders to gather as much data to inform the predictive model as possible. Those stakeholders included: Northern Ireland Water, EPA, OPW, Met Eireann and Acclimatize (another UCD INTERREG-funded project).

- The project lead indicated that whilst some work on BWQ prediction models had previously (before the SWIM project) been completed in ROI, the SWIM project represented the first time that a BWQ prediction model had been developed in NI. The project produced BWQ prediction models for 9 beaches on the Island of Ireland, 6 in NI and 3 in ROI which utilised the same approach/model.

Figure 8.1: Overview of the 9 SWIM beaches

- The project designed and produced electronic signage and associated software to deliver the information. However, the project did not use, as had originally been envisaged, a text alert system as it was identified as being too expensive to implement. Instead, an email system was implemented.
- In addition, the project developed a smartphone app which was launched in July 2019.

Figure 8.2: SWIM Smartphone App



- The project partners sought to raise the profile of the project through the implementation of a public awareness campaign, which used ongoing social media content, an animated video series[97] and posts to promote the closing event. Several monthly newsletters were also produced and circulated. The project also produced press releases with a human interest focus on Sea Swimming which was picked up by the Sunday Life newspaper in Northern Ireland.
- In addition, as part of the project two weather stations were deployed close to two of the SWIM beaches at Scoil Chríost Rí, Enniscrone, County Sligo and St Patrick's Primary School near Waterfoot beach in Glenariff, County Antrim. This approach facilitated a cross-border aspect, as both schools were able to link up and share data coming from their SWIM weather stations and compare their results. During beach visits in October 2018, the SWIM team had the opportunity to spend time looking at the instalment at St Patrick's and talking to the children about how the data works.
- The project also engaged with local sea swimmer groups through a series of beach workshops. The last event was held on 11th March 2020 in Portrush.

Figure 8.3: SWIM engagement With Local Swimming Groups

- In the final phase of the project, meetings were held between the UCD modelling group and AFBI to discuss the transfer of the SWIM model. UCD prepared several documents to explain how the SWIM data reader, signs, application programme interface (API) and prediction models operate, and how everything was automated on the SWIM server in UCD.
- Upon completion of the project in January 2021, UCD transferred all six NI-based bathing water quality prediction models to AFBI, however AFBI could not make use of the models until well into 2022 as there was a missing data key.
- The initiative has successfully enabled bathers to check bathing water quality before they visit the beaches, with a free downloadable app available for smartphones, whilst on-beach electronic signage boards also deliver up-to-date data including water quality and weather reports.
- The project has been commented upon positively by Ministers in both NI and ROI, with:

  - The then NI Environment Minister for Northern Ireland, Edwin Poots MLA stated: *"The SWIM pilot project is a fantastic example of how we can embrace the digital age and the use of smartphone technology. The system for live bathing water quality prediction for six beaches in Northern Ireland and three in the ROI has been developed through the expertise of University College Dublin, Agri-Food and Biosciences Institute and Keep Northern Ireland Beautiful. My Department plans to continue to work in partnership with local coastal beach operators and others to ensure that many more of our wonderful beaches can utilize this technology; enabling day trippers and tourists alike to plan with up-to-date information on water quality at their fingertips."*

[97] Available to view at https://www.youtube.com/channel/UCDsrWTQRjFEoCzsVl04TVUA

- The then ROI Minister for Housing, Local Government and Heritage, Darragh O'Brien stated: *"This innovative cross-border project is providing invaluable, real-time information on bathing water quality for the public on both sides of the border. The app and electronic signage are a fantastic asset for the swimming community and this project is making an important contribution towards keeping our bathing waters clean; in recent times this has renewed importance as we all limit travel, and explore what our local environment has to offer in greater numbers than we ever did before."*

8.4.6 The Priority's Specific Objectives & Result Indicator Target

Discussion with the SWIM project partners indicates their view that the project had collaborated closely with stakeholders on a cross-border basis throughout its implementation, albeit hampered to some extent by the Covid-19-related restrictions on movement. On that basis, the SWIM project considered that it positively contributed to both Specific Objective 2.2 and its Result Indicator.

Table 8.5: Specific Objectives, Result Indicators and Targets

Specific Objective	Result Indicator	Baseline	Target
To develop cross-border capacity for the monitoring and management of marine protected species in the region	Cross-border capacity for monitoring and management of marine protected areas and species	A little collaboration	A lot of collaboration

8.5 Best Practice and Learning

This section considers whether the SWIM project has resulted in any areas of best practice and learning.

The project partnership highlighted that a key learning for future projects is to ensure that sufficient engagement (and collaboration where appropriate) with the public is undertaken at the outset of a project to explain why the project is undertaking the work, which should help to minimise and/or mitigate any potential objections to the project's work.

8.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the SWIM project's collaborative and partnership working including:

- The effectiveness and added value of the SWIM project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The partnership report that each partner and stakeholders, in complementary ways, input to the project aims and objectives namely, to develop predictive modelling for short-term pollution and to devise information techniques to warn the public when this is predicted.

In relation to the modelling, AFBI compiled and supplied the required Northern Ireland datasets to UCD, whilst UCD sourced the Ireland datasets. Also, AFBI and UCD interacted in their own territories with the relevant local authority/Council staff to devise strategies for indicator organism and microbial source tracking sampling and sensor placement. The models and software infrastructure were developed at UCD and at the end of the project period, were housed at AFBI and UCD.

The partnership considers that the SWIM project's cross-border collaborative approach offered the following benefits:

- **Social**: by protecting public health and providing public outreach and engagement for the cross-border area.
- **Economic**: by enhancing amenity appeal through improved bathing water classifications.
- **Environmental**: by instituting systematic regulatory capability and informing future remediation of short-term pollution.
- **Cooperation**: by supporting staff in public institutions and administrations in the cross-border area to working jointly and by forming new relationships, with each partner bringing different knowledge and experience. At times, this results in solutions and approaches the individuals alone would not have identified. By sharing new insights and enhancing expertise and achieving improved regulatory competence and consistency in applying bathing water regulations.

8.7 Contribution of the Project to Policy Objectives

This Section considers the contribution of the SWIM project to key policy objectives in the eligible region. In doing so the section considers the project's contribution to:

- EU Cohesion Policy and EU 2020 objectives;
- Atlantic Strategy
- The horizontal principles of equality and sustainable development; and
- Other key policies.

8.7.1 EU Cohesion Policy and EU2020 Objectives

The SWIM project has helped to contribute towards delivering the Cohesion Policy with targeted investment in key priority areas including promoting climate change adaption, risk prevention and management and preserving and protecting the environment and promoting resource efficiency research.

Whilst the SWIM project was not overtly focused on economic growth, it encouraged 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

8.7.2 The Atlantic Strategy

The 'Atlantic Strategy' was the EU's Maritime Strategy for the Atlantic Ocean area. It provided for a coherent and balanced approach that was consistent with the EU 2020 agenda. It was largely focused on helping communities living and working on the Atlantic coast deal with new economic realities, but also recognised that the EU shares responsibility for stewardship of the world's oceans. The SWIM project contributed to the following Atlantic Strategy priorities and objectives:

Priority	Specific Objectives
1: Promote entrepreneurship and innovation	• Sharing knowledge between higher education organisations, companies and research centres; • Enhancement of competitiveness and innovation capacities in the maritime economy of the Atlantic area; • Fostering adaptation and diversification of economic activities by promoting the potential of the Atlantic area.
2: Protect, secure and develop the potential of the Atlantic marine and coastal environment	• Sustainable management of marine resources

8.7.3 The Horizontal Principles

The SWIM project aimed to protect and improve the quality of the environment - a key component of sustainable development and as such it contributed (at least in part) to the EU's three Horizontal Principles, per the following discussion:

Sustainable Development	The SWIM proposal aligned and complied with the Sustainable Development Strategy adopted by the European Council in June 2006, as well as the respective national sustainable development strategies within each jurisdiction. The SWIM project partnership considered that Sustainable Development sought to deliver on the vision of continuous improvement of the quality of life on earth of both current and future generations and that the SWIM project addressed the guiding principles as follows: • **Protection** – By identifying pollution pressures in bathing waters in the coastal waters of Ireland and Northern Ireland, the SWIM project, therefore, promoted quality of life in urban and rural communities and enhanced the local economy, by contributing to safe and clean coastal waters. • **Open and democratic society** – The SWIM project informed and empowered the public of bathing water quality. This was central to a citizen's right to know and provided much-needed information that pertained to citizen lifestyle and public health. The knowledge generated via the SWIM project served to inform policymakers as to potential future remediation measures by which to address poor bathing water quality and inform where to prioritise investment. • **Involvement of citizens** - Many stakeholder groups were involved in the SWIM project. The citizen was, therefore, made central and more aware of environmental issues pertaining to bathing water and coastal assets generally. • **Use best available knowledge** – The SWIM project involved a wide range of stakeholders, including local communities, local authorities and both government agencies and a leading research-intensive University. This spectrum of stakeholders contributed to the policy guiding principles of 'Policy Integration' and 'Using the best available knowledge'. During its implementation, the SWIM project partnership adhered to the sustainable development requirements of the relevant governments. In doing so, the SWIM project: • Where appropriate, developed and promoted effective local supply chains that had a track record of environmental performance. • Adopted solar power for electronic signage. • Adopted a travel plan to promote car sharing and other ways of reducing the impact of travel in relation to conducting the research. Both UCD and AFBI implemented sustainable development strategies and actively encouraged and facilitated the use of public transport, electric cars and bicycles. UCD has changing and shower facilities for cyclists.
Equal opportunity and non-discrimination **Equality between men and women**	The SWIM project complied with the legal requirements set out in legal instruments such as: • Section 75 of the Northern Ireland Act 1998 (NI); • The Employment Equality Act (1998) (NI); and • The Equal Status Act (2000), as amended by the Equality Act (2004) (Ireland). The SWIM project partnership took appropriate measures to ensure no discrimination occurred based on sex, racial or ethnic origin, religion or belief, disability, age or sexual orientation during its preparation, set up and implementation. In particular: • Recruitment to research positions were exclusively on merit and suitability against the job descriptions provided.

	• The SWIM project partnership ensured there was an appropriate gender balance when establishing research teams, boards and committees. Vacancies were advertised using a range of methods, including national, local and specialist press and other websites where appropriate and affordable. • Engagement and consultation with communities were indiscriminate, occurring on both sides of the border, across different socio-economic groups, in areas with different and contrasting religious, demographic, ethnic and race profiles. • Most public engagement was through social media, which, was agnostic to gender, sexual orientation, religion, race or ethnic origin. • SWIM referred to National Council for the Blind of Ireland and RNIB Northern Ireland and BSI Web accessibility 'code of practice' to establish good practice for accessibility with respect of publications.

8.7.4 Contribution to Other Strategies

The SWIM project was closely aligned with a number of key EU directives and regional strategies, such as:

- The Water Framework Directive (WFD), which was established to protect and prevent further deterioration of inland surface waters, estuaries and coastal waters and implement a framework to enhance and return these aquatic ecosystems to at least "Good Status" or better by 2020.
- Bathing Water Directive (2006/7/EC) and associated national bathing water-quality regulations (defining public-administration responsibilities).
- European Commission's Blueprint to Safeguard Europe's Water Resources (2012).
- Nitrates Directive (91/676/EEC).
- Urban Waste Water Treatment Directive (91/271/EEC).
- Nitrates Action Programme 2014-2017.

In addition, the 23 designated bathing waters in Northern Ireland are managed by four of the 11 Northern Ireland Councils, the National Trust and Northern Ireland Environment Agency (NIEA), whilst the 31 in the border counties of Ireland are managed by the Local Authorities with oversight by the EPA. Bathing waters are recognised as important environmental and tourism assets and each Agency/Council (in Northern Ireland and Ireland) has their development, promotion and management in a responsible and sustainable manner part of their strategic plans. The SWIM project partnership considered that the outputs delivered as part of the project, therefore, ultimately contributed towards these strategies, by protecting the health of bathers who visit the beaches.

8.8 Potential Legacy Impacts

As reflected above, the SWIM project partnership has advised that all six NI-based bathing water quality prediction models have been transferred to AFBI.. In addition, it is understood that AFBI has secured funding from DAERA to expand the project to other NI beaches.

Unfortunately, however, the SWIM project partners advise that the system has not been continued in the ROI as no additional funding could be sourced, albeit the system could be rolled-out in the future if funded was secured. The project partners note that there is no central body in the ROI responsible for the beaches, as the responsibility lies with individual councils, which makes it more difficult to influence policy due to the disparate structures in place.

Nonetheless, the project partners consider that the SWIM project has served to increase the public's understanding and awareness of bathing water quality, and importantly, has provided a legacy scientific model that will provide invaluable information for future development.

9. SWELL - SHARED WATERS ENHANCEMENT AND LOUGHS LEGACY

9.1 Introduction

This section of the report considers the Shared Waters Enhancement & Loughs Legacy (SWELL) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 3 – Improve Water Quality in Transitional Waters.

9.2 Project Overview

9.2.1 Rationale for the Project

Environmental pressures do not recognise international boundaries and borders. The only mechanism therefore for delivering improved water quality in shared waters such as in Carlingford Lough and Lough Foyle, is to consider each Lough catchment as a single ecosystem impacted by polluters on both sides of the border.

The Water Framework Directive (WFD) was established to protect and prevent further deterioration of inland surface waters, estuaries and coastal waters and implement a framework to enhance and return these aquatic ecosystems to at least "Good Status"[98]. Compliance with the WFD requires an integrated approach to the sustainable management and protection of water resources across multiple sectors and national boundaries.

Given that the Foyle and Carlingford river catchments extended across both sides of the border, a cross-border management approach was essential to ensure the maximum environmental benefit and provide the necessary water quality improvements. For the project, the term shared water bodies was defined as shared transitional and coastal water bodies in the Carlingford and Lough Foyle catchments i.e.:

1. Lough Foyle Coastal Water;
2. Foyle Harbour and Faughan Transitional HMWB;
3. Upper Foyle Transitional Water;
4. Carlingford Lough Coastal Water; and
5. Newry Estuary Transitional HMWB.

Whilst (in advance of the SWELL project) there had been significant investment to improve wastewater infrastructure on both sides of the border, it was considered that the shift in emphasis to a catchment-wide approach under the WFD would require substantial further investment to deliver the WFD's classification targets and associated environmental benefits. Indeed, at that time, the status of the shared transitional and coastal waters fell short of the required "Good Status".

[98] The WFD is implemented on the basis of hydrologically discrete River Basin Districts, which have been identified and classified according to their physical and biological characteristics, by the Regulating Authority of each EU Member State. These classifications are used to identify waterbodies within the District that are 'at risk' of failing to meet the environmental objective of "Good Status". A Programme of Measures is then developed, as part of a River Basin Management Plan (RBMP), to identify and reduce pollutants and ensure the waterbody achieves "Good Status". The WFD requires Member States to review RBMPs on a six-yearly cycle, across three cycles (2009-2015, 2016-2021 and 2022-2027) during which management measures must be implemented to achieve the target "Good Status" in all waters. Northern Ireland and Ireland share three International River Basin Districts with many river systems flowing across the border. The drainage catchments of Carlingford Lough and Lough Foyle fall within the Neagh Bann and North Western International River Basin Districts respectively. The Regulating Agencies (NIEA & EPA respectively) commenced working together during the first planning cycle to develop common environmental targets for the cross-border basins to ensure that activities in one jurisdiction complemented water quality improvement activities in the neighbouring area.

9.2.2 Project Partners

The SWELL project partnership brought together for the first time, key state-owned regulated water companies with sole responsibility for wastewater services on both sides of the border – Northern Ireland Water (as Lead Partner) and Irish Water. It was anticipated that the project would provide an opportunity for the two companies to prioritise and align works in a coordinated way to make an impact on the shared water bodies on the island of Ireland.

In addition, the project partners included the following organisations: Agri-Food & Biosciences Institute (AFBI), the Loughs Agency and East Border Region (EBR). By adopting a cross-border management approach, the Partnership aimed to ensure maximum environmental benefit and provision of the necessary water quality improvements within the shared waters.

9.2.3 Project Overview, Objectives and Activities

In line with the principles of the WFD, SWELL sought to undertake a holistic approach to sustainable water use within the catchments of Carlingford and Foyle, balancing social and economic factors with the need to protect and improve the water environment.

SWELL comprised two separate projects within the Carlingford and Foyle catchments. Each of the two projects had distinct work packages to upgrade the existing Water Company capital assets and included several key activities including catchment studies and ecosystem modelling.

The SWELL project sought to build on the work carried out by the Regulating Authorities in both jurisdictions, by developing ecosystem models to simulate various sources of pollution and their impact on water quality. It was anticipated that this unique modelling approach would facilitate the validation of optimised solutions to meet the required programme outputs and results indicators.

The project execution strategy was split up into four key stages, each with component work packages that were intrinsically linked to delivering the project outcomes, as follows:

1. Catchment Investigation	It was anticipated that a desktop analysis of existing monitoring data would be compiled to inform a risk-assessed baseline sampling study. The data gathered would then be used to calibrate existing models and enable focus on areas where anthropogenic pollution was having an impact. It was envisaged that this analysis will inform proposals for capital investment.
2. Ecosystem Modelling	It was considered that an ecosystem model would be used to simulate the effects of the catchment in response to the hydrological cycle. Models would then be integrated to link various sources of pollution and simulate their effect on water quality. Modelling would then facilitate validation of construction proposals to derive the necessary level of "Asset Discharge Improvements".
3. Capital Delivery (outputs)	Business Case development would then be undertaken in parallel with the modelling programme to ensure sustainable solutions were delivered. It was envisaged that optioneering and economic appraisal would be refined on completion of the modelling programme. Upgrade of wastewater assets would consider any necessary constraints and would promote sustainable, innovative technologies to reduce operating costs and drive carbon efficiency.
4. Project Closure & Legacy	Finally, it was anticipated that the project would undertake modelling calibration and validation post improvements to demonstrate achievement of the output indicators and contribution towards the results indicator.

In order to deliver the project's activities, seven work plans were developed, as follows:

Table 9.1: Summary of SWELL Project Work Plans (per Progress Reports)
1. Management
2. Catchment Investigation & Modelling (implementation)
3. Delivery of Business Cases and Construction Planning (implementation)
4. Project Evaluation (implementation)
5. Construction of Assets (NIW – investment)
6. Construction of Assets (IW – investment)
7. Communication

Of note, NI Water and Irish Water committed to taking ownership of any constructed assets delivered by the project and all responsibilities relating to their operation and maintenance beyond the lifetime of the project.

Furthermore, it was anticipated that the legacy ecosystem model developed as an output from the project would be held under the custody of Loughs Agency, as the cross-border body with responsibility for water quality within Carlingford Lough and Lough Foyle.

9.2.4 Anticipated Outcomes and Results

The SWELL Partnership aimed to utilise best practice and tap into their individual areas of expertise to effectively achieve its anticipated outputs and results. Through strategic catchment investigation and modelling, SWELL aimed to deliver optimised, sustainable capital upgrades to wastewater assets with added value through innovation and knowledge sharing to benefit the entire region.

9.3 Project Budget to July 2022

The SWELL project received a Letter of Offer (dated 31st January 2017) offering a grant of up to a maximum of €3,282,787 (ERDF + Government Match Funding) to be expended and claimed by 30th April 2018, towards total anticipated project costs of €3,282,787. However, the LoO noted that it was anticipated that the project would be implemented in two phases. The 31st of January 2017 LoO addressed the funding required to achieve Phase 1. Phase 1 of the project was considered to be necessary to establish the detailed works required to achieve the Programme Outputs which it was anticipated would be addressed by the work undertaken during Phase 2.

It was anticipated that the successful completion of Phase 1 would result in a further application for grant funding for Phase 2 of not more than €32,011,331. The SWELL project achieved the approved project outputs in late 2018. Subsequently, it is understood that the suggested Phase 2 was subject to a further project assessment and funding decision, which ultimately was successful. Given this, SEUPB issued a second Letter of Offer (dated 21 January 2019), inclusive of Phases 1 and 2,) offering a grant of up to a maximum of €35,047,604 (ERDF + Government Match Funding) to be expended and claimed by 31st December 2022, towards total anticipated project costs of €35,047,604.

Further to the above, the Evaluation Team's review of SEUPB's EMS indicates that the project received a four-month extension to 30th April 2023 along with a further reallocation of the budget between categories, as reflected below. As of July 2022, the project had reported a total estimated expenditure of €31,774,240 equivalent to 91% of the total project budget.

Table 9.2: Project Costs – Anticipated and Estimated Actual July 2022 (€)

Summary Budget	Anticipated Total	Total Estimated Expenditure in July 2022[99]			
		Reported to JS by First Level Control (FLC)	Pipeline Expenditure (excluding items deemed ineligible by FLC)	Total Estimated Expenditure	% of total budget
Staff Costs	3,186,404	1,892,858	628,154	**2,521,012**	79%
Office and Administration Costs	477,961	283,823	94,220	**378,043**	79%
Travel and Accommodation Costs	132,211	79,723	8,813	**88,537**	67%
External Expertise and Services	6,241,403	4,217,953	593,797	**4,811,750**	77%
Equipment Costs	613,968	594,005	18,119	**612,124**	100%
Infrastructure and works	24,395,657	17,473,565	5,889,209	**23,362,774**	96%
Total	**35,047,604**	**24,541,928**	**7,232,312**	**31,774,240**	**91%**

Discussion with the SWELL project partnership in March/April 2022 indicates that they are confident that almost all of the project budget will be spent by the anticipated end date of April 2023.

[99] Source: SEUPB's EMS 13th July 2022

9.4 Contribution to the Achievement of the Priority's Specific Objectives & Result Indicators

This section considers the SWELL project's key achievements and the extent to which the SWELL project has:

- Contributed to the achievement of the Priority's Specific Objectives; and
- Contributed to the achievement of the targets for the Result Indicators.

The section also identifies any external factors that have impacted, positively or negatively, the project's ability to contribute to the achievement of the Specific Objective.

9.4.1 Key Activities Undertaken (to May 2022)

The Evaluation Team's review of the SWELL project partners' progress reports indicates that key activities undertaken since the interim evaluation report (between June 2020 and May 2022) include the following: [100]

Table 9.3: Key Activities

Period	Dates	Key Activities/Points of Note
23	1st June 2020 – 31st August 2020	• NI Water installed an additional screen in August at the Strabane wastewater treatment works, completed the aeration tank seeding process at Warrenpoint wastewater treatment works and completed the turn of flows at Donemana wastewater treatment works. • NIE switchgear and transformers were installed in addition to overflow chamber metalwork at the Newpoint waterworks site. • Irish Water completed its site investigation works. • AFBI continued their work with the contracted modellers on the development of the SUCCESS model framework and completed nutrient analyses of marine samples which were collected before the lockdown was imposed as a result of Covid. • Patrols of seven sites were completed by the Lough Agency.
24	1st September 2020 – 30th November 2020	• Ecosystem Modelling for Culmore, Strabane and Warrenpoint was completed by NIW in addition to producing a SWELL article for Your EU. • AFBI continued work on the SUCCESS model framework.
25	1st December 2020 – 28th February 2021	• NI Water completed works at Strabane, Donemana and Warrenpoint sites and they were handed over to NIW operations. • Irish Water's final design layouts relating to their proposed works were under review for compliance with planning applications. • AFBI serviced the SWELL weather station deployed within the Foyle catchment and undertook rainfall reactive sampling within the Carlingford catchment.
26	1st March 2021 – 31st May 2021	• NI Water fully completed its works at the Newpoint site, including NIE's high voltage connection. In addition, NI Water completed its model update and setup for the Culmore Drainage Area Plan. • NI Water also completed up to 98% of its long-term verification and modification for its Warrenpoint Drainage Area Plan. • Irish Water began its site works at Lifford's wastewater treatment works.
27	1st June 2021 – 31st August 2021-	• NIW's completed its wastewater treatment works sampling for Carlingford Lough and Lough Foyle, in addition to closing out press coverage activities. • Furthermore, the UK Water Project Case Studies for NI Water's contracts were completed.

[100] Please note that the key achievements have been documented in respect to the most recent project progress reports that were available to the Evaluation Team at the time of writing (July 2022). The most recently available collated project progress report for the project was for period 29 (December - February 2022), albeit it was 'in progress'. Therefore, key achievements from period 30 have been taken from the latest available individual partner progress reports.

Table 9.3: Key Activities		
Period	**Dates**	**Key Activities/Points of Note**
28	1st September 2021 – 30th November 2021	• NI Water completed its hydrometric checks, river gauging and test runs for the sites at Culmore, Omagh, Limavady, Dungiven, Strabane and Ballykelly. • Irish Water had completed 70% of its infrastructure work across all 4 of its sites. • AFBI staff commenced the post-improvement sampling programme within Lough Foyle and the Foyle catchment in September 2021 and continued the post-improvement sampling programme within Carlingford Lough and the Carlingford Catchment. • The Loughs Agency provided a vessel and skipper for the marine sampling trips and staff and vehicles for the freshwater sampling.
29	1st December 2021 – 28th February 2022	• Irish Water had completed 80% of its infrastructure work across all 4 of its sites. • AFBI staff continued the post-improvement sampling programme within Lough Foyle and Foyle Catchment and continued the post-improvement sampling programme within Carlingford Lough and the Carlingford Catchment.
30	1st March 2022 – 31st May 2022 (From Partner Progress Reports)	• NI Water began further construction at Warrenpoint due to an agreed Compensation Event, for screening to further enhance the site. All of NI Water's other construction projects were considered to be complete at this point. • Concerning Irish Water, the majority of its infrastructure works under the main construction contract were considered to be completed, which had been certified by the consulting engineers for payment. • Members from the SWELL team attended an online Improving Water Quality in Transitional Waters/Cross-Border River Basins evaluation workshop on 5th April 2022 along with other peers in water quality projects.

9.4.2 External Impact Factors

Discussion with the SWELL Project Partners indicates that the project encountered a number of issues during its delivery. The issues and barriers encountered included:

Impact of the Pandemic

The Evaluation Team's discussions with the SWELL Project Partnership during November 2020 as part of the Interim Evaluation report identified that as a result of the pandemic and the related restrictions on the movement of people meant that:

- Project staff began working remotely and there was a reduction in the project's normal hours of operation. Whilst no direct project staff were furloughed, it is understood that contractors and sub-contractors furloughed staff working at the four NI construction sites.
- Irish Water also experienced delays relating to their capital projects, which had a knock-on effect of delaying post-improvement sampling.
- Indeed, it was considered that a full 12-month post-improvement sampling period would be required (as AFBI required coverage for each of the four seasons), to fully assess the project's contribution to the programme results indicator;
- Stakeholder engagement activities such as those that had been planned with schools had to be cancelled.

Unfortunately, the delays encountered meant that all NI Water capital-works contracts incurred compensation events due to contractors having to demobilise and subsequently remobilise.

Ultimately, as outlined in Section 1.4, to allow the SWELL project further scope and time to both implement capital works and gather and collate the monitoring data, the project received a four-month extension to the project to 30th April 2023.[101]

The project partnership reported (in March 2022) that the extension received has allowed the project to successfully progress each of its work packages and it does not anticipate any significant impact on the project achieving its original aims and objectives.

Apart from Covid-19, the project partners noted that other factors influenced the project's progress and impact, including:

- The improvement works undertaken as part of the SWELL project cannot fully influence improvements in water quality status due to pollution pressures (e.g. those associated with agriculture) that are beyond the control of the water companies.
- Irish Water has found the timeframe to implement its infrastructure project to be challenging. Typically, a standard Irish Water WwTP construction project takes 5 years, whilst the SWELL Programme afforded approximately only three years from the Letter of Offer for the construction works. In addition, Early Contractor Involvement (ECI) was not available to Irish Water at the time, and a standalone procurement exercise was required. However, Irish Water advised that this challenge was overcome through a process of fast-tracking its programme (e.g. project and planning approvals, procurement exercises etc.) (albeit Irish Water subsequently received a penalty for not following procurement process), and good partnership working and collaboration with contractors.
- There was a significant Giant Hogweed infestation at the Lifford site and clearance was required before works could commence. The removal of Giant Hogweed usually entails multiyear injecting, however, collaboration with the contractors ensured rapid clearance of the site to allow construction to progress.

Impact of Brexit

A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Discussion with the Project Partnership indicates that the project encountered some complications as a result of Brexit, including increases in construction costs and difficulties in securing equipment, with it noted that contractors also faced resourcing issues with a shortage of skilled labour.

Of concern to the project partnership was the potential for Brexit to lead to differing water quality legislation in the UK from that applied in EU countries, which the partnership suggested might affect cross-border working.

9.4.3 Variation to Planned Activities

The project partnership reported (in March 2022) that the extension received has allowed the project to successfully progress each of its work packages and it does not anticipate any significant impact on the project achieving its original aims and objectives.

[101] To facilitate the completion of the Final Evaluation report within SEUPB's required timeframe, discussions with the project partnership were undertaken during March/April 2022, meaning that the project continued to have circa 1 year before it was anticipated to complete.

9.4.4 Progress Towards the Project Output Indicators

As of March 2022, the SWELL Project Partnership had not yet fully achieved the anticipated (approved) project outputs, but according to the Project Lead the project was proceeding according to its revised work plan, noting the following:

- The SWELL had aimed to demonstrate achievement of the 10,000 population equivalent (PE) output indicator through a "before and after construction" measured improvement that quantified the reduction of Biochemical oxygen demand (BOD) pollutant load being discharged to the shared waters. It was anticipated that the BOD load would then be converted to a PE figure per Urban Wastewater Treatment Directive guidelines. According to the SWELL partnership, its preliminary findings from the four NI Water capital upgrades indicate that the 10,000 target has been surpassed, before construction completion and post-improvement sampling of the ongoing Irish Water upgrades.
- The two sewage network and wastewater treatment projects undertaken as part of the SWELL project comprised of one for the Carlingford Lough catchment (3 work packages) and one for the Foyle catchment (5 work packages). As of April 2022, the Carlingford Lough project has been completed, whilst the Foyle project was ongoing but substantially complete.

Table 9.4: Project Output Indicators

Programme Output Code	Name of Output	Programme Target	SWELL Target	Progress (as of April 2022)
CO19	Additional population benefitting from improved wastewater treatment	10,000	10,000	>10,000
2.311	Sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters	2	2	1

9.4.5 Key Achievements (to March 2022)

Discussion with the SWELL project partnership indicates its view that the project's key achievements include the following:

- The development of a common approach to catchment investigation and modelling work on both sides of the border (and consideration of any potential impacts beyond the border area), which the project partners consider has promoted cross-border cooperation that will facilitate the recovery of selected protected habitats and priority species (e.g. Carlingford clams). The project partners noted that the SWELL project represented the first time that NI Water and Irish Water had worked together on a cross-border basis, and suggested that this would not have been possible to the extent implemented in the absence of INTERREG VA funding. The collaborative working allowed the project partners to agree on priorities and align planned works in a coordinated way.
- The robust and effective cross-border working relationships that had been developed amongst the project partners which had facilitated the sharing of information and knowledge, and system designs. It was noted, for example, that the design data gathered at the Donemana site in Northern Ireland was applied to Irish Water's sites in the Republic of Ireland. In addition, the project partners note that the effective working relationships had allowed the project to overcome some of the challenges encountered which included:

  - Dealing with differing legislative requirements, different planning and land acquisition processes;
  - Dealing with differing internal water company governance structures (i.e. there were different requirements for approval).

- The project partners consider that the works implemented will contribute to improving the water quality status in the Carlingford Lough and Lough Foyle shared transitional waters through the reduction of the pollutant load discharged from several strategic wastewater assets that had previously been assessed as impacting the transitional waters.[102] In addition, it was noted that at the time of consultation some of Irish Water's planned upgrades were still in progress, so further improvement was likely.
- The SWELL project partners consider the project's success in implementing the substantial programme of capital works during the pandemic to be a key achievement, albeit with the requirement for a small extension to the project's end date. The project partners note, for example, that the new works at Donemana WwTW were successfully tested, commissioned and handed over to NI Water in February 2021 and are comfortably meeting the NIEA's final effluent quality standard of 40 mg/l BOD, 60 mg/l suspended solids and 20 mg/L ammonia[103].

Figure 9.1: Works at the start of construction (left) and the completed Donemana WwTW (right)

- The provision of improved operational control and the installation of new coarse and fine screening equipment at the Newpoint WwPS site has resulted in enhanced discharge to the Newry River, which is anticipated will help Carlingford Lough achieve future 'good' WFD classification status. It is also anticipated that the upgrade at the WwPS will also enable more flows to be passed on to Newry WwTW for treatment[104].
- The project partner notes that the scale of sampling (4,000 samples were taken in advance of the construction works commencing) for analysis undertaken as part of the SWELL project had not previously been undertaken by either NI Water or Irish Water in either of the two catchment areas.
- The project partners consider that the ecosystem models developed to be particularly flexible which will ensure their future use, and note, for example, that environmental regulators have already asked if additional information/metrics could be built into the models.

[102] Foyle - Donemana, Strabane, Lifford and Carrigans, Killea. Carlingford – Warrenpoint, Newpoint, and Omeath.
[103] Source: Water Projects Online, Case study - Donemana WwPS (2021)
[104] Source: Water Projects Online, Case study - Newpoint Terminal WwPS (2021)

- Despite the onset of the pandemic and its associated restrictions, the SWELL project has been able to undertake substantial stakeholder engagement activity, including:

  - Environmental regulators on both sides of the border have been consulted at key stages of the project. There was full acceptance obtained on the catchment needs and capital upgrades implemented. In addition, the environmental regulators accepted the ecosystem modelling approach and intend to use the models to drive future water quality improvements within both catchments.
  - The project received a favourable reaction from the shellfish industry CLAMS group regarding the improvements undertaken at Carlingford Lough.
  - Engagement with local schools. For example, at the Newpoint Terminal WwTW, the project team visited a local secondary school for girls to promote the role of women in the construction industry. The visit also allowed pupils to 'enter' the site from the Virtual Reality (VR) model built for the project[105]
  - Attendance at the NI Science Festival;
  - Publication of a SWELL ezine;
  - Use of social media (e.g. Twitter).
  - Engagement with other projects including the Riverine project (a PEACE IV project) which provided opportunities for knowledge sharing with local councils.

9.4.6 The Priority's Specific Objectives & Result Indicator Target

The SWELL project partners advised that the target that had been established to achieve 100% 'shared transitional waters in the region with good or high-quality status' was not achievable as pollution of the shared waters comes from many sources (e.g. wastewater, agriculture, forestry, industry, etc) and the improvement measures that were implemented as part of the SWELL project were limited to water company wastewater assets on both sides of the border. Therefore, the improvements works could only ever contribute to improving water quality status. According to the SWELL project partnership, SEUPB acknowledged from the very earliest stages of the project that the target would not be achievable as a consequence of the SWELL project in isolation.

It was suggested by the SWELL project partners that the full suite of improvements that would be necessary to the water assets within the shared water catchments far exceeded the funding available through INTERREG VA Objective 2.3. However, the project partner notes that a legacy model has been developed that will serve to identify all sources of pollution within the catchments and be used to drive future improvements beyond the project.

Table 9.5: Specific Objectives, Result Indicators and Targets

Specific Objective 2.3	Result Indicator	Baseline	Target
To improve the water quality in shared transitional waters	The percentage of shared transitional waters in the region with good or high quality	0%	100%

[105] Source: Water Projects Online, Case study - Newpoint Terminal WwPS (2021)

9.5 Best Practice and Learning

This section considers whether the SWELL project has resulted in any areas of best practice and learning.

One of the main achievements of, or lessons learnt from, the SWELL project has been NIW's ability to appoint a contractor through its established contractor framework early in the design stage. Discussion with the project partners suggests that this not only expedited the design process, but it offered a number of benefits, such as:

- More informed project costs that are based on actual prices rather than theoretical prices;
- The experience of the contractor has also ensured that new technologies and/or innovative processes (where appropriate) were incorporated into the design stage; and
- The involvement of the contractor at an early stage ensured that the risk was transferred from NIW to the contractor sooner than would have been the case had the contractor been appointed later in the process.

Further discussion with the project partners suggests that the progress made by NIW in the design stage (as set out above) was used to inform IW's development of the projects in Ireland.

In terms of learning for SEUPB, the SWELL project partnership noted the following:

- That it would be beneficial for the project if the Lead Partner had more financial responsibility to adjust budget lines (albeit only in instances where the changes did not impact on the deliverables).
- Improvements are required to the eMS to remove the duplication in reporting.
- The delays in verifying claims and reimbursing partners has had a negative impact on cash flow for the project close out. In addition, the project partners emphasised that smaller organisations would struggle to be involved in similar projects if the claims process was not improved.

9.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the SWELL project's collaborative and partnership working including:

- The effectiveness and added value of the SWELL project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The SWELL project partners indicate that, prior to this project, there was minimal engagement/partnership working between the regions, and in particular between NIW and IW, in relation to the development of WWTWs. The SWELL project was, therefore, considered to be significant in terms of adding value on a cross-border basis.

9.7 Contribution of the Project to Policy Objectives

This Section considers the contribution of the SWELL project to key policy objectives in the eligible region. In doing so the section considers the project's contribution to:

- EU Cohesion Policy and EU 2020 objectives;
- Atlantic Strategy
- The horizontal principles of equality and sustainable development; and
- Other key policies.

9.7.1 EU Cohesion Policy and EU2020 Objectives

The SWELL project has helped to contribute towards delivering the Cohesion Policy with targeted investment in key priority areas including promoting climate change adaption, risk prevention and management and preserving and protecting the environment and promoting resource efficiency research.

The SWELL project worked collaboratively to improve water quality within the shared waters of Carlingford Lough and Lough Foyle, through the improvement of municipal wastewater assets. By adopting a cross-border management approach, the Partnership aimed to ensure maximum environmental benefit and provision of the necessary water quality improvements within the shared waters.

In line with the principles of the WFD, SWELL undertook a holistic approach to sustainable water use within the catchments of Carlingford and Foyle, balancing social and economic factors with the need to protect and improve the water environment.

Whilst the SWELL project was not overtly focused on economic growth, it encouraged sustainable growth: promoting a more resource-efficient, greener and more competitive economy. In doing so, the project served to help prevent environmental degradation, biodiversity loss and unsustainable use of resources.

9.7.2 The Atlantic Strategy

The 'Atlantic Strategy' was the EU's Maritime Strategy for the Atlantic Ocean area. It provided for a coherent and balanced approach that is consistent with the EU 2020 agenda. It was largely focused on helping communities living and working on the Atlantic coast deal with new economic realities, but also recognised that the EU shares responsibility for stewardship of the world's oceans. Broadly speaking the strategy cover the coasts, territorial and jurisdictional waters of the five EU Member States with an Atlantic coastline – France, Ireland, Portugal, Spain and the United Kingdom.

The SWELL project contributed to the Atlantic Strategy's various themes in a number of ways. However, in particular, the project aimed to better manage human activities in the Atlantic thereby delivering a healthy and productive ecosystem. The ecosystem approach was the basis for marine management in both the Common Fisheries Policy and the Marine Strategy Framework Directive.

9.7.3 The Horizontal Principles

The SWELL project aimed to protect and improve the quality of the environment - a key component of sustainable development and as such it contributed (at least in part) to the EU's three Horizontal Principles, per the following discussion:

Sustainable development	Sustainable Development relates to the achievement of a better quality of life through the efficient use of resources, which realise continued social progress and maintain stable economic growth and care for the environment. The SWELL project partners delivered the project in line with the principles of the EU Sustainable Development Strategy and related strategies for each jurisdiction. For example; • The SWELL Project, in line with WFD principles, undertook a holistic approach to sustainable water use within the catchments of Carlingford and Foyle, balancing social and economic factors with the need to protect and improve the water environment. • The development of ecosystem models under the SWELL Project enabled the identification of sources of pollution on a catchment-wide basis and thus facilitated better-targeted remediation to arrive at more sustainable risk-based solutions. The ecosystem models that were to be created were to align with the second cycle RBMP's Programme of Measures stated aim to reduce

pollution by the development of modelling tools to better understand the natural dynamics and science of catchments.

- The following table outlines the primary long-term aspirations of the SWELL project with regard to environmental, social and economic benefits and thereby demonstrates a sound balance between the three pillars of sustainable development:

Environmental Benefits	- Reduced pollution - Improved water quality - Existing habitat enhancement - Enhancement and protection of aquatic wildlife - Effective and more sustainable use of water resources. - Sustainable solutions resulting in reduced carbon emissions
Social Benefits	- Improved visual amenity - Cleaner, safer waterways - Greater opportunity for leisure and amenity use - Greater stakeholder involvement - Better information on issues relating to the water environment. - Healthier citizens
Economic Benefits	- Provides a cost-effective approach to water protection. - New visitors/tourism - New recreational facilities - Fewer healthcare costs - Increased land/property values; - Reduced OPEX costs; - Benefits to the shellfish industry - Jobs created/safeguarded

- The SWELL Project incorporated the use of sustainable practices as part of any finalised solution design, in accordance with current NIW and IW policy. Such practices included for re-use of existing assets where possible, the use of materials with minimum embodied carbon that were locally sourced to reduce transport and promoted the local economy and the efficient use of wastewater treatment technologies that reduced energy requirements.
- Sustainability during the construction process included the provision of measures to minimise and/or segregate site waste for recycling where possible, pollution (through noise, air, water and run-off) and disruption and ensure the health, safety and welfare of local residents and construction site staff.

Equal opportunities and non-discrimination

The SWELL project partners advised that each was committed to delivering the SWELL Project in full accordance with the principles detailed by the following pieces of legislation:

Northern Ireland	- Section 75 of the Northern Ireland Act 1998 (NI) - Section 49A of the Disability Discrimination Act 1995
Ireland	- Employment Equality Act 1998, - National Disability Authority Act 1999 - Equal Status Act 2000.

Each Company promoted equality of opportunity and good relations in all areas of the project with all individuals being treated in a fair and equal manner and in accordance with the law regardless of gender, marital status, race, religious belief, political opinion, ethnic origin, age, disability or sexual orientation. Good practice was promoted through Equality Screening and the provision of an Equality Impact Assessment if deemed necessary.

In addition, the Partners identified a number of specific measures to promote equality and encourage cross-border, cross-community and all-inclusive involvement in the delivery of the various capital delivery work packages around the eligible area. This included:

- Extensive stakeholder engagement and organisation of public information meetings prior to construction commencement. Particular emphasis on targeting vulnerable groups within the local community that may suffer greater adverse impact from the construction activities e.g. elderly, disabled or non-English speakers.

	• Working with local schools on both sides of the border and both sides of the community (including special needs schools). • Contractually applied social benefit clauses on the employment of local/unemployed/ disabled people. Furthermore, contractors were required to register or adhere to the principles of the Considerate Constructors Scheme, an initiative set up in 1997 by the UK Construction Industry to improve its image. The Scheme's Code consists of five sections, two of which, Community and Workforce, had particular regard for how the site or company was dealing with equality and diversity.
Equality between men and women	As noted above, throughout project delivery the partners sought to ensure that no individual was discriminated against based on all equality considerations, including gender. These principles were applied to all project participants, employees and beneficiaries.

9.7.4 Contribution to Other Strategies

As discussed, compliance with WFD required an integrated approach to the sustainable management and protection of water resources across multiple sectors such as wastewater, agricultural, industrial, forestry, etc. Since the WFD impacts on a diverse range of environmental strategies, it is linked to a wide range of EU Directives, including:

- Birds & Habitats Directives;
- Water Use Directives (Bathing Water, UWWTD & Drinking Water);
- Environmental Regulation Directives (Industrial Emissions, Pollution Prevention & Impact Assessment);
- Priority Substances, Nitrates & Groundwater Directives;
- Use of Pesticides and Sewage Sludge Directives; and
- Flooding and Marine Strategy Framework.

In addition:

- Climate change impacts were considered during the formulation of design flows and assessed as part of the modelling study.
- Sludge removal and disposal was in accordance with the Water Company Wastewater Sludge Strategy Policy and Procedures.

9.8 Potential Legacy Impacts

The SWELL Project Partnership consider that the project has the potential to achieve a variety of legacy impacts beyond the lifetime of the project, including:

- The capital upgrades were designed to serve the needs of the connected populations for at least 25 years (i.e. well beyond the project lifetime).
- The ecosystem models have been developed for the Carlingford & Foyle catchments. These models will be held in government ownership for use in identifying pollution and driving future water quality improvements. The legacy models, with built-in source apportionment capability, will also promote sustainable water quality improvements within both catchments per the EU Water Framework Directive ‘Polluter Pays’ principle.

10. SOURCE TO TAP

10.1 Introduction

This section of the report considers the Source to Tap (StT) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 4 – Improve Freshwater Quality in Cross-Border River Basins.

10.2 Project Overview

10.2.1 Rationale for the Project

The Erne and Derg catchments straddle the Northern Ireland and Ireland border and are predominantly rural. Peatlands and forestry dominate the upper catchments, with grassland-based agriculture and pasture in lower areas. The NIEA and the EPA agree Water Framework Directive (WFD) status and objectives for all cross-border water bodies[106]. Several Drinking Water Protected Areas (DWPAs) have been designated in both catchments.

Regulatory compliance has been threatened at several Northern Ireland Water (NIW) and Irish Water (IW) Water Treatment Works (WTWs) in these shared catchments (Derg WTWs, River Derg and Killyhevlin WTWs, Lough Erne) in relation to colour, turbidity and the pesticide MCPA.[107] More specifically:

- Derg WTWs failed to achieve compliance with MCPA regulatory standards in the years before the Source to Tap project, and the Drinking Water Inspectorate Northern Ireland (DWI NI) issued a Provisional Enforcement Order requiring mitigation measures.
- Similar issues were identified for NI Water's Belleek WTWs and IW's Ballyshannon WTWs, both supplied from the Erne System.

These risks arise because raw water abstracted from watercourses often contains contaminants such as pesticides, organic colour and sediments, which run off the land and must be removed in WTWs to produce drinking water to acceptable water quality standards.

However, it is more cost-effective to reduce contaminants in run-off from the land as this results in reduced:

- Capital investment requirements;
- Carbon outputs; and
- Operational costs that are required to remove pollutants at WTWs.

There is the added benefit of improving water quality as it provides improved wildlife habitats. For example, the Erne and Derg catchments are economically significant salmonid fisheries, and they support endangered freshwater pearl mussel populations – both of which require high water quality.

In addition to the above, risks to drinking water sources have been identified in these catchments in the Drinking Water Safety Plans (DWSPs).

[106] The two catchments lie in the north western International River Basin District (IRBD), which is in its second River Basin Management Plan (RBMP) cycle (2015-2021).

[107] MCPA is a selective herbicide specifically designed to kill weeds without harming crops and is a common active ingredient in both agricultural and domestic herbicide products. MCPA is widely used for controlling the growth of weeds like the Common Soft Rush, which has flourished in grassland following wet weather periods in recent years. MCPA does not bind to soil particles, so it is prone to leaching, directly into watercourses or via land drains. Once in the water it can take 3-4 weeks to break down without treatment. NIW frequently detects high levels of MCPA in rivers and lakes and at abstraction points in many drinking water sources in Northern Ireland. This MCPA is removed in the water treatment process and drinking water is of a high-quality standard. (Source: NIW website).

10.2.2 Project Partners

The StT project partnership was led by NI Water and was made up of Irish Water, AFBI, Ulster University, the Rivers Trust (TRT) and East Border Region Ltd. (EBR).

10.2.3 Project Overview, Objectives and Activities

The StT project was developed to address the issues identified above by:

- Exploring sustainable, cost-effective measures to reduce pollution in shared catchments;
- Contributing to improvements in cross-border raw water quality; and
- Securing safe drinking water sources.

The StT project partnership considered that, in the absence of the project, it was likely that raw water quality would continue to decline due to the aforementioned pressures, which would result in:

- Costly water treatment solutions at WTWs; and
- The maintenance of water quality, as part of WFD status, being prevented.

The main aim of the StT project was to deliver sustainable solutions to the pollution of drinking water sources by developing a Sustainable Catchment Area Plan (SCAMP) for the Erne and Derg cross-border catchments.

Whilst sustainable catchment management had been implemented elsewhere, the StT project partnership proposed that the project would support the implementation of sustainable catchment management across two jurisdictions.[108]

It was anticipated that the SCAMP would:

- Supplement the existing WFD programme of measures and thereby contribute to WFD objectives, including improving water body classifications; and
- Contribute to the Drinking Water Directive (DWD) objective of reducing risks and ensuring safe drinking water.

The StT project partnership intended to:

- Address certain key pollutants in two specific catchments, namely Erne and Derg; and
- Assess the effectiveness of project measures using a two-stage monitoring programme (field and catchment scale), utilising auto-samplers[109] as the best cross-border option. Key aspects of this approach are described below:

The StT project was designed with consideration of river catchments as complex systems, affected by agricultural intensification and other activities, and which require focused management interventions. Consequently, it was further anticipated that the involvement of the local community in the delivery of StT's project objectives would result in behavioural change and the upskilling of community members in river monitoring, which would, in turn, ensure the future legacy of the project outputs and long-term sustainability benefits.

[108] At that time, the newly formed Irish Water had not delivered integrated catchment management approaches, whilst NI Water had only carried out small-scale SCAMP initiatives.
[109] Sampling every 7 hours across a weekly cycle ('24-7') using an autosampler to implement higher frequency monitoring in a reduced spatial area to capture rainfall events.

The following seven work plans were developed:

Table 10.1: Summary of StT Project Work Plans (Per Progress Reports)	
Work plan[110]	**Work plan lead**
1. Management	NIW
2. Community Activities (Community Engagement)	TRT
3. UKWIR[111] Catchment Characterisation and Benefits Assessment	AFBI
4. Development, Implementation and Delivery of the Land Incentive Scheme (LIS)	NIW and IW
5. Peat Restoration Pilot Project - Implementation and Monitoring of Effectiveness	NIW
6. Forestry Best Practice Pilots Workplan Development, Implementation and Monitoring of Effectiveness	NIW and IW
7. Water quality monitoring and evaluation	AFBI

10.2.4 Anticipated Outcomes and Results

The StT project partners envisaged that the project would make a positive contribution towards the results indicator of *"the percentage of cross-border freshwater bodies in 'good' or 'high' quality"*[112] as the project would deliver a SCAMP for drinking water protection at source in the Erne and Derg catchments. It was anticipated that this would, in turn, improve the quality and reliability of raw water received at water abstraction points by reducing the risks from contamination and ensuring the delivery of safe, clean drinking water.

[110] It was anticipated that the forestry and peat interventions (work plans 5 and 6 respectively) would be facilitated by Coillte and Forest Service NI who control access and operational processes in the study catchments.
[111] UK Water Industry Research.
[112] The stated baseline value for 2014 (start of the Programme period) is 32%, whilst the target value for 2023 is 65%.

10.3 Project Budget to July 2022

The Source to Tap project received a Letter of Offer (dated 3rd July 2017) offering a grant of up to a maximum of €4,909,921 (ERDF + Government Match Funding) to be expended and claimed by 31st March 2022, towards total anticipated project costs of €4,909,921.

The Source to Tap project received a revised Letter of Offer (dated 7th February 2019) which approved the reallocation of budget between categories. The project then received an LoO addendum (dated 9th March 2021), which was accepted and granted an extension to the project end date until 30th September 2022.

Further to the above the project received a further revised LoO (dated 16th February 2022) which detailed a further reallocation of the budget between the categories outlined below. As of July 2022, the project had reported a total estimated expenditure of €4,666,547 equivalent to 95% of the total project budget.

Table 10.2: Project Costs – Anticipated and Estimated Actual July 2022 (€)

Summary Budget	Anticipated Total	Total Estimated Expenditure in July 2022[113]			
		Reported to JS by First Level Control (FLC)	Pipeline Expenditure (excluding items deemed ineligible by FLC)	Total Estimated Expenditure	% of total budget
Staff Costs	2,573,040	2,105,491	343,353	**2,448,845**	95%
Office and Administration Costs	385,956	315,734	51,503	**367,237**	95%
Travel and Accommodation Costs	139,398	110,240	13,929	**124,169**	89%
External Expertise and Services	237,353	150,235	15,896	**166,131**	70%
Equipment Costs	238,772	231,737	277	**232,015**	97%
Infrastructure and works	1,335,402	817,722	510,429	**1,328,151**	99%
Total	**4,909,921**	**3,731,160**	**935,387**	**4,666,547**	**95%**

Discussion with the Source to Tap project partnership in March/April 2022 indicates that they are confident that almost all of the project budget will be spent by the anticipated end date of September 2022.

[113] Source: SEUPB's EMS 13th July 2022

10.4 Contribution to the Achievement of the Priority's Specific Objectives & Result Indicators

This section considers the StT project's key achievements and the extent to which the StT project has:

- Contributed to the achievement of the Priority's Specific Objectives; and
- Contributed to the achievement of the targets for the Result Indicators.

The section also identifies any external factors that have impacted, positively or negatively, the project's ability to contribute to the achievement of the Specific Objective.

10.4.1 Key Activities Undertaken (to March 2022)

The Evaluation Team's review of the StT project partners' progress reports indicates that key activities undertaken since the interim evaluation report (between January 2020 and March 2022) include the following: [114]

Table 10.3: Key Activities

Period	Dates	Key Activities/Points of Note
14	1st January 2020 - 31st March 2020	• The Project Manager (PM) attended the Derg Land Incentive Scheme farming family open day. Two sessions were held to raise awareness about the challenges of water treatment and a press release was prepared and issued to promote the scheme. • Forestry sampling continued at forestry pilot sites. • The Project Manager and Peat and Forestry Pilots manager progressed the procurement of the peat pilot. A visit to the CANN peat bog restoration work in Co. Tyrone helped answer queries on procurement of the peat pilot. • A peat depth survey was carried out.
15	1st April 2020 - 30th June 2020	• Monitoring equipment was installed at Lough Ultan and Grousehall in June after Covid restrictions regarding site visits were lifted. • AFBI carried out data analysis and write-up of the CENIT study. • The lab staff returned to work in the second week of June and began working through the backlog of frozen samples, analysing a total of 196 samples within this period.
16	1st July 2020 – 30th September 2020	• A specification for drone videos for the peat and forestry pilots was developed. • The PM and the Finance/Admin Manager attended the Land Incentive Scheme rush control event at Kilen in Castlederg.
17	1st October 2020 – 31st December 2020	• Significant work was undertaken with landowners to make sure that all applications were processed, and the agreement was signed before the state aid deadline on the 31st of December 2020. • Project officers visited farms and liaised with farmers during the period. • Piezometers were fitted by Ulster University staff.
18	1st January 2021 – 31st March 2021	• AFBI gave a presentation to NI Water senior staff on the potential for modelling periods of high risk from "MCPA" travelling upstream. • Peat restoration works were completed at Tullychurry. • Ecoseeds carried out sphagnum re-seeding at Tullychurry and this work was captured for a BBC News report. This publicised the EU funding and the work of the project to a wider audience and the news coverage was also promoted on social media.

[114] Please note that the key activities have been documented in respect to the most recent collated Project Progress reports that were available to the Evaluation Team at the time of writing (July 2022), albeit the period 22 report was stated as being 'in progress'.

Table 10.3: Key Activities		
Period	**Dates**	**Key Activities/Points of Note**
19	1st April 2021 – 30th June 2021	• AFBI continued to sample and analyse the data from the Ambient Water Quality Monitoring System with 629 samples collected and analysed. • Further work was completed by the PM on the peat and forestry reports and meetings were held with UU staff to discuss progress and the comments from Coillte on the 2019 draft report. • The Rivers Trust delivered the Source to Tap education programme remotely via Zoom to several schools across the project area. They also delivered an online seminar for the Grassroots Project, designed and published a poster for the Environmental Protection Agency's Water Conference, and produced a draft series of five 'How to guides' for the forestry measures undertaken.
20	1st July 2021 – 30th September 2021	• Land Incentive Scheme applications and claims processing continued during this period.
21	1st October 2021 – 31st December 2021	• AFBI continued to carry out work on the Erne and Derg reports. • Ulster University continued to carry out fieldwork and peat collection. • The project officers visited Coronea National School. • The project was awarded a Green Apple Award for the work carried out at Tullychurry Forest and the Lough Bradan NI Water restoration site. • Furthermore, it was also shortlisted for an Edie Sustainability Leaders Award under the Partnership and Collaboration of the Year 2022 category.
22	1st January 2022 – 31 March 2022	• Various site visits took place throughout this period. • Drone training was attended by the project manager. • The project staff attended the Edie awards following the success of being shortlisted for partnership and collaboration of the year.

10.4.2 External Impact Factors

Discussion with the StT Project Partners indicates that the project encountered a number of issues during its delivery. The issues and barriers encountered included:

Impact of the Pandemic

The Evaluation Team's discussions with the StT Project Partnership during November 2020 as part of the Interim Evaluation report identified that the pandemic and the related restrictions on the movement of people meant that:

- Project staff across the lead organisation and project partners started working remotely. However, restrictions on travel meant that staff were unable to carry out sampling activity during much of 2020, which meant that the results for 2020 were not consistent with previous years;
- Various events that had been scheduled had to be postponed or adapted to adhere to social distancing measures with reduced attendance. For example, the project held three rush control events (during late 2020) in the Derg Catchment in half-hour blocks with eight per group and outside to ensure social distancing was observed.

Apart from pandemic-related factors, the project's progress was affected by the Meenbog landslide incident in 2020 which caused tonnes of sediment to enter the rivers that the StT project had been working with local landowners and stakeholders to improve.[115] Consequently, the project partnership advised that any potential improvements in terms of reductions in colour and turbidity that might have resulted from the installation of measures by farmers will be unlikely to be evident in the monitoring results due to the huge amounts of sediment caused by the landslide. Nonetheless, the project partners were confident that despite this unforeseen impact, the activity implemented will provide benefits long into the future, and not just over the next few years.

[115] https://www.bbc.co.uk/news/uk-northern-ireland-foyle-west-54994865

Ultimately, as outlined in Section 1.4, to allow the StT project further scope and time to progress its planned activities, the project received a six-month extension to the project to 30th September 2022.[116]

Impact of Brexit

A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Discussion with the Project Partnership indicates that the project encountered some complications as a result of Brexit, including increases in the cost of materials and difficulties in securing materials. In addition, NI Water encountered difficulties setting up the project website as it is NI based and the website required a '.eu' domain. Consequently, Irish Water had to register the domain instead.

The StT project partners suggested that the outworkings of Brexit might impact similar cross-border projects being implemented in future years if there is divergent legislation concerning water quality or agricultural practices.

10.4.3 Variation to Planned Activities

The project partnership (in March 2022) indicated that the project *"went above and beyond"* what was originally proposed. For example, the peat pilot was proposed to repair strips whereas the project actually undertook peat restoration.

A further variation to the planned activities was that the project engaged a PhD student, as opposed to two Erasmus placement students, which the project partnership believe benefitted the project by having a more advanced ability student than was envisaged at the outset.

10.4.4 Progress Towards the Project Output Indicators

Discussion with the StT project partnership in March 2022 indicates that instead of the originally anticipated SCAMP report, the project partners have agreed with SEUPB that the project will produce a legacy website which will have a range of components including videos and technical data reports and that this work is progressing as planned and will be completed by September 2022.

Table 10.4: Project Output Indicators

Programme Output Code	Name of Output	Programme Target	StT Target	Status (as of March 2022)
2.411	Cross-border drinking water 'Sustainable Catchment Area Management Plan' research and pilot project	1	1	0

10.4.5 Key Achievements (to March 2022)

Discussion with the Source to Tap project partnership indicates its view that the project's key achievements include the following:

- The project served to promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species through the implementation of joint actions and sharing of ideas and best practices which would not have been possible in the absence of the INTERREG VA funding;
- The delivery of a cross-border land incentive scheme and associated training of citizens on the importance of water quality on a cross-border basis.

[116] To facilitate the completion of the Final Evaluation report within SEUPB's required timeframe, discussions with the project partnership were undertaken during March/April 2022, meaning that the project continued to have circa 6 months before it was anticipated to complete.

- The StT project partnership notes that whilst it is difficult to definitively determine the extent to which the project has contributed to the achievement of improvement in the baseline condition of water quality, physical structure, and habitat in cross-border catchment areas (and also that such improvement often takes many years to achieve), they advise that the monitoring activity that was implemented as part of the project indicates that the works have had a positive impact on MCPA concentrations and reductions in the colour and turbidity in the Derg catchments.

  The project partners note that the StT project piloted the first cross-border farming scheme (the Land Incentive Scheme or LIS), in the River Derg catchment. The scheme aimed to give landowners, who farm in the River Derg catchment upstream of Derg Water Treatment Works, grants to help make small changes in farming practice (i.e. farm management policies) that would aim to:

  - Protect and improve water quality in the River Derg; and
  - Make the farm business more sustainable.

  A summary of the key activity relating to the LIS is provided in the table below:

Table 10.5: Pilot Land Incentive Scheme Key Activity	
Expressions of Interest	255
Farm visits completed	236
Issues identified	1,700
Water Environment management plans produced	223
Applications Received	119
Applications Approved	118
Total commitment value	€1,161,059.71

As illustrated, 118 farms benefited from support through the pilot LIS. Examples of the types of activities funded under the LIS include:

- Herbicide/Pesticide Control and Rush Management;
- Protection of watercourses from stock & alternative drinking points;
- Reduction of surface flow across farms;
- Peatland Management;
- Other – Farmer Innovation.

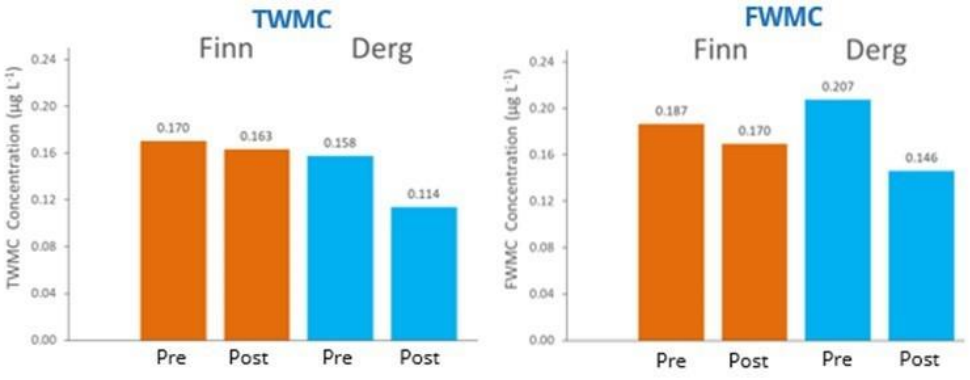
Figure 10.1: Herbicide/Pesticide Control (before and after)

Figure 10.2: Protection of watercourses from stock & alternative drinking points

The project partners consider that the implementation of these shared management/cross-border solutions has been particularly successful. They note that the water quality monitoring undertaken in the Derg and Finn Rivers, before and after the implementation of the LIS indicates that the initiative had a positive impact on MCPA concentrations. The comparisons of time-weighted mean concentrations (TWMC) [117] and flow-weighted mean concentrations (FWMC)[118] indicated a shift to lower concentrations in the Derg catchment. Specifically, the project highlighted the following findings:[119]

For the TWMC:	• In Derg, concentrations after the implementation of the LIS were 27.8% lower than those measured before its implementation. • In Finn, the measurements were 4.1% lower than before the LIS. • Allowing for the control (Finn) then the difference was 23.7% (i.e. 27.8% - 4.1%)
For the FWMC:	• In Derg, concentrations after the implementation of the LIS were 29.6% lower than those measured before its implementation; • In Finn, the measurements were 9.1% lower than before the LIS. • Allowing for the control (Finn) then the difference was 20.5% (i.e. 29.6% - 9.1%).

The graphs compare concentrations for 18 months (start April 2018-end October 2019) before the LIS and 18 months post (start April 2020-end October 2021) implementation (18 months periods were used to ensure equal periods of cover pre- and post-LIS).



[117] Represents the time-weighted average concentration of a toxic substance over a normal 8 hour workday and 40 hour workweek or what the water treatment works abstraction experiences at a constant pumping rate.
[118] Representative of the load moving in the catchment and accounting for differences in the size and occurrence of storm events.
[119] Source to Tap presentation at SEUPB workshop, April 2022.

These outcomes provide a strong indication that the project has successfully contributed to the Drinking Water Directive (DWD) objective of reducing risks and ensuring safe drinking water in the Derg Catchment, with the project partners advising that the outcomes are informing future approaches to catchment interventions to protect drinking water sources.

- The project partnership suggested that the improvements made will contribute to reducing NI Water's and Irish Water's operational costs. For example, with lower concentrations of MCPA, it is anticipated that less carbon will be required to treat the water.

- In addition, AFBI undertook a Cost-Benefit Analysis of the LIS and Community Outreach Programme, which indicates that these elements of the StT will generate (over 30 years) a savings benefit of £3.41 for every £1 invested, as outlined below:

Table 10.6: Summary of LIS and Community Outreach Programme Cost-Benefit Analysis	
Anticipated Savings	**£'000**
Alum	42
Lime	11
Sludge disposal	41
PAC facility - operational	7,359
PAC facility - capital	3,608
GAC filter savings	105
Other exceedance-related savings	1,120
Total water treatment savings	**12,287**
Educational Benefits	144
Total Benefits	**12,431**
LIS Costs	1,577
LIS Extension Costs	1,926
Community Outreach Costs	144
Total Costs	**3,647**
Net Present Value	8,784
Benefit Cost Ratio (Base year=2018; Period of analysis=2019-2048)	**3.41**

- The project has also generated several academic papers, including:

  - Understanding the hydrological dynamics of acid herbicides in river catchments using high-resolution data, AFBI and UU, 2019.
  - New process and management insights from pesticide data captured at high resolution in river catchments, AFBI and UU, 2019, Geophysical Research Abstracts Vol. 21, EGU2019-16870, 2019, EGU General Assembly 2019
  - A review of the pesticide MCPA in the land-water environment and emerging research needs, AFBI, UU and Crops, Environment and Land Use Programme, WIREs Water. 2020;7:e1402.[120]
  - A catchment-scale monitoring solution for MCPA Time and space considerations Poster, AFBI and UU.

10.4.6 The Priority's Result Indicator Targets & Specific Objectives

Whilst the Source to Tap project partnership considers that the project will contribute towards improving the quality of freshwater bodies in cross-border river basins, they consider that at the time of consultation (March 2022) it was too early to determine its impact.

Furthermore, they advised that many variables are outside the control of the project that will impact the water quality, and consequently it might not be possible to definitively determine its impact on the Priority's Specific Objective 2.4 and associated Result Indicator.

[120] https://doi.org/10.1002/wat2.1402

Table 10.7: Specific Objectives, Result Indicators and Targets			
Specific Objective 2.4	**Result Indicator**	**Baseline**	**Target**
To improve freshwater quality in cross-border river basins	The percentage of cross-border freshwater bodies in cross-border river basins with good or high quality	32%	65%

10.5 Best Practice and Learning

The project partners consider that substantial knowledge transfer and exchanges of good/best practices have occurred as a result of the project, including the following examples:

- At the start of the project, an External Advisory Group was established to provide a mechanism for knowledge exchange with relevant organisations that were interested in the work of the project. The External Advisory Group met around twice per year (initially in person and since 2020 online). It has provided advice and information on the various elements of the project and a mechanism for updating each other on policy developments and updates on other similar initiatives.
- The project engaged significantly with the local communities and stakeholders through various means including the LIS, training sessions, stakeholder visits and the development of handouts which have increased awareness of the impact of farming practices on water quality and the presence of a drinking water abstraction downstream;
- The project ran several training sessions concerning Riverfly monitoring, for volunteers to learn how to measure the health of the rivers in the Erne and Derg catchments. Volunteers were trained in methods of how to collect, identify and record river invertebrate samples with it anticipated that they will continue to monitor river health at appropriate times throughout the year, thereby playing an instrumental role in its protection. In total, the Source to Tap project trained 43 volunteers to carry out Riverfly monitoring safely and correctly. [121]
- The Source to Tap Education Programme was targeted at school pupils at the UK's National Curriculum Key Stages 1 & 2 and Ireland's Primary School Curriculum (1999) – Social, Environmental and Scientific Education (SESE) topics. 2019 saw school visits and educational workshops across the Derg and Erne Catchment areas. As of March 2022, approximately 1,636 children had taken part in some form of educational aspect. In response to Covid-19, the project took five of its educational units online, featuring teacher notes and instructional videos.
- The project hosted several rush control demonstration events. These events provided information on best practice guidelines concerning rush control, the benefits of weed wiping instead of boom spraying and how to apply to the LIS. The events were advertised in the local press, radio, in local businesses and farmers were invited.
- Several stakeholder visits were hosted or undertaken. For example, two stakeholder visits were held to enable shared learning from the peat pilot site at Tullychurry in the Erne catchment and the forestry pilot measures in both the Erne and Derg catchments.
- The project collaborated closely with the INTERREG VA-funded CatchmentCARE project. The CatchmentCARE project installed three boreholes at the StT project's Derg water treatment works site, each at different depths to sample the water in different sectors within the aquifer. This provided information on the quantity and quality of ground water resources.
- The project developed several handouts for stakeholders and members of the public including:
  - Source to Tap Peat Pilot How-To Guide: Cell Bunding – This handout provided a guide to cell bunding, an innovative method which was trialled on part of the restoration site. If successful, this method will be used in other catchments to help improve drinking water quality.
  - Source to Tap Peat Pilot at Tullychurry – This handout provided an overview of restoration work undertaken on the Tullychurry Forest site.
  - Lough Braden Peatland Restoration Project – This handout provided an overview of the Forest-to-Bog restoration work which was completed in a 27-hectare area around the shores of Lough Bradan in Co. Tyrone.
- The project produced drone videos of the Derg and Erne to explain the StT story in each catchment.
- The project website contains videos, information and best practice and which the StT project partnership has committed to maintaining for 4 years post project completion.

[121] Source: SEUPB Source to Tap Project Case Study: Working Together Putting Healthy Rivers at the Heart of our Communities

In addition, the Tullychurry (Source to Tap) and Lough Bradan (NI Water Catchment Management team) Forest to Bog restoration projects have received a Green Apple Environmental Best Practice Award 2021. The work at Tullychurry trialled a technique called cell bunding. This technique created low bund walls from fresh oxidized peat, forming watertight cells to hold water, raise the water table and re-wet the area. After trialling the technique at Tullychurry forest, NI Water used the learning from the pilot study to implement the technique on 27 hectares of land adjacent to recently felled forest area close to the Lough Bradan impounding reservoir.

Concerning the pilot Land Incentive Scheme, the project partners consider that its implementation has supported them to identify new partnerships/ways of working, with the following key learnings identified:[122]

- It takes time to build trust in a rural cross-border catchment and for a Scheme to become established;
- Providing support by Project Officers on the ground is vital to building trust and encouraging applicants to a scheme; and
- Things can change significantly from the planning of a Scheme to its completion. For example, Brexit, severe weather events, Covid-19 and the significant changes in the cost of materials all impacted the delivery of the scheme.

10.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the StT project's collaborative and partnership working including:

- The effectiveness and added value of the StT project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The StT project partnership delivered cross-border value by enabling NIW and IW to:

- Jointly plan and deliver catchment activities;
- Save resources through synergies delivered through the project; and
- Share expertise with other partners.

In addition, the StT POs liaised with NIEA Catchment Officers (in Northern Ireland) and the Local Authority Water and Communities Office (LAWCO) in Ireland in relation to cross-border WFD issues.

In doing so, StT project partnership is of the view that this created the potential to generate future initiatives and resulted in permanent sustainability benefits at cross-border level.

10.7 Contribution of the Project to Policy Objectives

This Section considers the contribution of the StT project to key policy objectives in the eligible region. In doing so the section considers the project's contribution to:

- EU Cohesion Policy and EU 2020 objectives;
- Atlantic Strategy
- The horizontal principles of equality and sustainable development; and
- Other key policies.

[122] Source to Tap Ezine Issue 9

10.7.1 EU Cohesion Policy and EU2020 Objectives

The StT project has helped to contribute towards delivering the Cohesion Policy with targeted investment in key priority areas including promoting climate change adaption, risk prevention and management and preserving and protecting the environment and promoting resource efficiency research.

Europe 2020, as per Appendix I, is the EU's response to the Great Recession, which was the period of general economic decline observed in world markets during the late 2000s and early 2010s. The Strategy contained five measurable EU targets for 2020 that were anticipated to steer the process and be translated into national targets, two of which were for:

- **Employment** – 75% of the population aged 20-64 should be employed.
- **Climate change and energy -** The "20/20/20" climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right).

The StT project partnership considered that the project has contributed towards these measures as follows:

- A number of new posts were created as a result of the project, namely: Project Manager, Finance and Administrative post (in NIW), Project Officer posts (x3) and HSO post (in AFBI). The project provided the opportunity for these individuals to gain new experience and build capacity within their respective organisations.
- The improvements made should contribute towards reducing the contaminants in the raw water reaching the Water Treatment Works, which will decrease the costs of electricity required in the treatment process and/or the costs of regenerating the activated carbon as often to remove the herbicides.

10.7.2 The Atlantic Strategy

The 'Atlantic Strategy' was, as set out Appendix I, the EU's Maritime Strategy for the Atlantic Ocean area. Following the development of the Atlantic Strategy document, an Action Plan was developed, with the intention that it should be implemented through to 2020. The StT project contributed towards the following priority area and associated objectives identified in the Action Plan:

Priority	Specific Objectives
1: Promote entrepreneurship and innovation	• **Sharing knowledge between higher education organisations, companies and research centres;** • Enhancement of competitiveness and innovation capacities in the maritime economy of the Atlantic area; • Fostering adaptation and diversification of economic activities by promoting the potential of the Atlantic area.

The StT project aimed to continually share knowledge between higher education organisations, companies and research centres. This was facilitated by the partners involved in the project (AFBI, UU etc.) through, for example, the External Advisory Group, where a range of relevant stakeholders from both jurisdictions met to exchange ideas and knowledge. In addition, the Programme Manager also attended meetings with other organisations e.g. Water Catchment Partnership and Strannooden Group Water Scheme Pilot to raise awareness of the StT projects.

10.7.3 The Horizontal Principles

The StT project aimed to empower local communities to become environmental stewards to address pollution at source and to encourage more efficient and greener use of drinking water resources - a key component of sustainable development and as such it contributed (at least in part) to the EU's three Horizontal Principles, per the following discussion:

Sustainable development	The StT project partnership advised that by improving the quality of raw water sources for the Erne and Derg WTWs, local communities have accrue environmental, economic and social benefits. **<u>Environmental</u>** The StT project partnership advised that the protection and improvement of drinking water supplies through prevention of pollution at source, reducing the need for elaborate, costly and capital-intensive drinking water treatment, was central to this project. This StT project aligned closely with the EU Sustainable Development Strategy's key objectives for natural resource protection and public health, and the priority of promoting a more resource-efficient, greener and more competitive economy. The StT project also addressed environmental enhancement and recovery of degraded environments, and it fit with the guiding principle in the Northern Ireland Sustainable Development Strategy to 'live within environmental limits, respecting the limits of the planet's resources and ensuring that the natural resources needed for life are unimpaired and remain so for future generations'. The Northern Ireland Sustainable Development Strategy also recognised the role of communities in improving the quality of the local environment. The StT project partnership contributed towards this by incentivising behavioural change amongst landowners and involving and up-skilling local community stakeholders. The StT project was based on responsible, sound science, using methodologies proven in previous projects and research by the partners and others, for developing best practice in protecting drinking water sources (e.g. through piloting new techniques to trap sediments from forestry practices). Also, as part of the StT project, there was the re-establishment of peatland on previously afforested sites in order to create buffer strips next to watercourses. The project partners suggested that this will restore native habitats and increase biodiversity, prevent erosion due to forestry operations and improve hydrology and water quality within the sub-catchments over the years. Additionally, peatlands increased the environment's capacity to store carbon and help mitigate climate change. Drinking water treatment is capital-intensive and involves substantial chemical and energy usage. The construction of treatment plants is also expensive, and they produce significant greenhouse gas emissions. This project helped to incentivise alternative practices to reduce pollutant loads and soil erosion at source in upstream catchments, which should reduce the need for elaborate treatment, and therefore further reduce emissions and environmental impact. **<u>Economic</u>** The cost of public water treatment is ultimately borne by society. The project partners considered that the catchment protection and restoration measures undertaken by the StT project will reduce ongoing water treatment costs and future capital investment requirements. It is anticipated that such impacts will support a move to an efficient, competitive and truly sustainable development model. **<u>Social</u>** The project partners considered that the stakeholder engagement, up-skilling and incentives elements of the StT project adopted a 'bottom-up' approach, thereby empowering the local community to engage in the protection of freshwaters on which they depend for their drinking water, and by doing so contributed to a strong, healthy and just society. Inclusivity was a key feature of this approach - reaching all sections of society and demographic groups to foster sustainable communities.

	The project partners considered that good governance was promoted through building new partnerships in cross-border areas and building capacity amongst the local community. It was considered that cross-community relations were enhanced by bringing disparate stakeholder groups together to address fundamental environmental concerns in the common interests of all concerned.
Equal opportunities and non-discrimination	The StT project partners advised that beneficiaries of improved drinking water sources span all demographic classes in the regional population. Community engagement and upskilling was delivered to all demographic groups without distinction through a spectrum of initiatives (including social media, contact with community groups, representatives and networks, published material, website, and schools), thereby ensuring compliance with the horizontal equality theme. The availability of a secure wholesome water supply underpinned local economies and was, therefore, essential to providing and sustaining employment across all sectors of society. Benefits arising from the project outputs provide opportunities for all, regardless of religious belief, political opinion or racial group. In addition, the application criteria for the pilot LIS complied with Section 75 of the Equality Act and implementation was open and transparent.
Equality between men and women	As noted above, throughout project delivery the partners ensured that no individual was discriminated against based on all equality considerations, including gender. These principles were applied to all project participants, employees and beneficiaries.

10.7.4 Contribution to Other Strategies

The StT project partnership considered that the project aligned closely with the WFD and the integrated Community Policy on water by:

- Promoting sustainable water use;
- Reducing pollution/emissions of hazardous substances;
- Controlling transboundary water problems using cross-border solutions/joint management of water bodies straddling the border;
- Securing drinking water supplies;
- Involving the public; and
- Coordinating measures at the river basin level.

In addition, the StT project was closely aligned with a number of key EU directives and regional strategies, such as:

- Drinking Water Directive (98/83/EC), which has an objective to reduce risks and ensure the delivery of safe drinking water.
- 'Sustainable Water', A Long-Term Water Strategy for Northern Ireland (2015-2040).
- IW's Water Services Strategic Plan (2015-2040) - which (along with the above strategy) refers to the sustainable management of drinking water.
- Directive 2009/128/EC (Sustainable Use of Pesticides).
- The UK National Action Plan for the Sustainable Use of Pesticides (Plant Protection Products) (Department for Environment, Food & Rural Affairs, 2013).
- The National Action Plan for the Sustainable Use of Pesticides (Pesticide Registration & Control Division, DAFM, 2013).
- Code of Good Agricultural Practice for the prevention of Pollution of Water, Air and Soil (DARD, 2008).
- The EU's 'Good Agricultural Practice for Protection of Waters' Regulations (S.I. No. 31 of 2014).
- 'Foodwise 2025' - A 10-year vision for the Irish agri-food industry (2015).
- 'Going for Growth' - A Strategic Action Plan in support of the Northern Ireland agri-food industry (2013).

- 'Delivering Our Future, Valuing Our Soils: A Sustainable Agricultural Land Management Strategy for Northern Ireland'.

10.8 Potential Legacy Impacts

The Source to Tap Project Partnership considers that the project has the potential to achieve a variety of legacy impacts beyond the lifetime of the project, including:

- The delivery of the LIS has educated farmers on the importance of water quality, and upskilled them in areas of land management that affect water quality;
- The videos created for the educational programme will be sustainable beyond the project, and be available for schools to use for some years;
- As the project instigated several initiatives, it was considered that an 'exit' strategy was required to ensure that their immediate impact was not lost, and their legacy was sustainable. Consequently, the StT project produced a 'Project Exit Strategy' in January 2022 which has considered the potential risks arising once StT ceases to be in operation or provides a supporting role. The strategy provides details of suggested means to address the causes of the risk and is summarised in Appendix II.

11. CATCHMENTCARE

11.1 Introduction

This section of the report considers the CatchmentCARE project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 4 – Improve Freshwater Quality in Cross-Border River Basins.

11.2 Project Overview

11.2.1 Rationale for the Project

Land use activities can impact aquatic ecosystems across jurisdictions. Given that Northern Ireland and Ireland share three International River Basin Districts, there is a requirement for a coordinated, cross-border approach when implementing the EU WFD.[123]

Difficulties associated with the spatial fit and institutional interplay (due to differences between administrative, political and International River Basin Districts' boundaries) pose a significant challenge for cross-border management. For example, while agencies in both Northern Ireland and Ireland were adopting risk-based approaches to the targeting of resources and measures for the WFD[124], there was (at the time the CatchmentCARE project was developed) limited coordination of these activities to ensure the approaches were compatible. In developing these risk-based approaches, it was considered that the use of different models, datasets and scales would impact the ability to implement and manage cross-border strategies.

In addition, it was considered by the CatchmentCARE project partnership that there had been a notable failure to incorporate catchment and water body heterogeneity successfully into catchment management, with administrative and operational constraints limiting a greater focus on targeted mitigation strategies. The CatchmentCARE project partnership – involving key stakeholders that had been involved in delivering programmes to support the cross-border coordinated protection of aquatic ecosystems – consequently identified a specific need for intervention in the following three catchments:

Blackwater catchment	Throughout much of the Blackwater catchment, agriculture was considered to pose a significant threat to water quality due to its relatively high intensity and its location on impermeable drumlin soils (which have high connectivity to water bodies). For example, the EPA estimated that 85% of the phosphorus in the southern half of the catchment was coming from diffuse agricultural sources. In addition, wastewater treatment works (WWTWs) were also having an impact on, for example, the Clontibert Stream, Mountain Water and Blackwater. The high export of nutrients and sediment from agricultural land and WWTWs, in conjunction with poorly drained soils, meant that there was potential for willow and riparian zones to break the hydrological connectivity and reduce contaminant export. Previous studies[125] highlighted the contribution of point source nutrients to rivers during periods of low flow in the summer, with Willow used as a proven (cost-effective) technology for reducing the risk associated with the export of nutrients from small WWTWs.

[123] The WFD was established to protect and prevent further deterioration of inland surface waters, estuaries and coastal waters and implement a framework to enhance and return these aquatic ecosystems to at least "Good Status". The WFD is implemented on the basis of hydrologically discrete River Basin Districts, which have been identified and classified according to their physical and biological characteristics, by the Regulating Authority of each EU Member State. The management of cross-border catchments is specifically recognised in Article 3.3 and 3.4 of the WFD, which specifies that member states are required to coordinate activities within international river basin districts.
[124] NIEA utilises Critical Risk Mapping and EPA utilises Catchment Investigative Assessment.
[125] E.g. through the Blackwater TRACE project.

	The Blackwater catchment had also been subject to significant arterial and land drainage, which had altered the hydromorphology of the river. Numerous artificial barriers on tributaries such as Benburb, Butterwater and Emyvale were also impacting the hydromorphology and passage of fish.
Finn catchment	The Finn River had been designated as an Area of Special Scientific Interest for Atlantic Salmon and Otter. However, River Hydromorphology Assessment Technique (RHAT) assessments had indicated that the hydromorphology was at a 'moderate' status for habitat in much of the catchment. It was considered therefore that in-stream and riparian water body quality improvement actions were required. In addition, alien invasive plants such as Japanese Knotweed and Himalayan Balsam were present in the riparian zones. Whilst the physiochemical status of the river on the Ireland side of the border was high, the macroinvertebrate element was poor. This, therefore, suggested that the stream was impacted by other pressures, such as chemical escapes from land-use practices or potentially from hydromorphological impacts.
Arney catchment	The status of Upper Lough MacNean deteriorated from 'Good' to Moderate status between 2010 and 2014. The elements that determined the status were macrophytes, phytoplankton and nutrients and dissolved oxygen caused the change to Moderate status. Also, the status of Lower Lough MacNean deteriorated from 'Good' to 'Bad' status between 2010 and 2014.

The WFD includes a reference to both surface-water and groundwater bodies. The distribution of boreholes in the border region was, however, inadequate to satisfy the monitoring requirements of the WFD. While groundwater modelling predictions had provided some estimates of the impact of land use on groundwater quality, it was considered that there was a need for these estimates to be verified through a water quality monitoring programme. In addition, very little was known about the interaction of groundwater bodies with surface water bodies.

Furthermore, with the implementation of a range of policies, regulations and initiatives related to the environment and sustainable land use in both jurisdictions, there had been an intensification of the knowledge requirements of all local, regional and national stakeholders. This posed a particular challenge in border areas, as stakeholders often had to consider information from two separate jurisdictions.

11.2.2 Project Partners

The CatchmentCARE project partnership was led by Donegal County Council (DCC) and was made up of Inland Fisheries Ireland (IFI), the Loughs Agency (LA), the Agri-Food and Biosciences Institute (AFBI), Ulster University (UU), Armagh, Banbridge and Craigavon Borough Council (ABCBC), British Geological Survey (BGS) and Geological Survey of Ireland (GSI).

11.2.3 Project Overview, Objectives and Activities

The CatchmentCARE project was therefore developed to:

- Provide a platform to integrate the two risk-based approaches that were being implemented in Northern Ireland and Ireland;
- Add value to the Critical Risk Mapping and the Catchment Investigative Assessment and examine how these approaches could be integrated on a cross-border basis;
- Facilitate a greater focus on catchment heterogeneity by identifying and targeting actions that were specific to the land-use pressures impacting aquatic ecosystems in the Finn, Arney and Blackwater catchments;
- Add value to the stakeholder engagement activities carried out by Catchment Officers (NIEA) and Community Water Officers (in Local Authority Water and Community Offices, LAWCO, in Ireland) in the catchments; and
- Liaise with the LAWCO coordinator for the border region and with the NIEA Water Management Unit to ensure the proposed CatchmentCARE project activities added value to the WFD Programme of Measures (POMs).

The CatchmentCARE project aimed to establish 3 water quality improvement projects and install 51 boreholes through a series of 6 interrelated 'objectives':

1. Implement actions to reduce the impact of land use activity on the ecology, physio-chemical and hydro morphology of the catchments.
2. Implement 51 boreholes across the border region.
3. Assess the impact of catchment land use on groundwater and its contribution to achieving GES in surface waters.
4. Develop soil type and farm type-specific nutrient advice for cross-border catchments.
5. Assess the costs and feasibility of achieving the WFD targets in the three catchments.
6. Use the knowledge and skill arising from objectives 1-5, to improve the capacity of stakeholders to support sustainable land use in the catchments.

The following seven work plans were developed:

Table 11.1: Summary of CatchmentCARE Project Work Packages

Work Package	Description[126]
1. Management	This work package was led by Donegal County Council and related to all aspects of governance and oversight relating to project delivery.
2. Scoping and Action Targeting	The CatchmentCARE project partnership noted that existing available information did not provide the level of detail required for the implementation of targeted actions within sub-catchments at the scale of fields, farms, river reaches and point source inflows. It was considered that targeting actions at this scale would increase the cost-effectiveness of the interventions and improve the likelihood of contributing to an improvement in water body status. In addition, it was anticipated that a proposed scoping study would facilitate the integration of the different actions (e.g. surface water monitoring with groundwater monitoring) and with the communication work package.
3. Water Body Actions in Catchments	This work package aimed to deliver actions within rivers and lakes that were identified during work package 2. It was anticipated that this work package would focus on improving in-stream habitats, river connectivity, riparian zones and reducing the internal loading of phosphorus in lakes. It was anticipated that existing river surveys of some sections of the Finn and Blackwater catchments would also be used.
4. Catchment Land Use Actions	It was anticipated that this work package would undertake actions aimed at reducing the impact of WWTW and diffuse agricultural pollution in each catchment. It was proposed that the focus would be on 'breaking' the hydrological connection between the land and water bodies using strategically targeted willow and riparian zones.
5. Groundwater	It was anticipated that the installation of 51 boreholes would bring significant added value to the establishment of 3 river improvement projects in the Finn, Blackwater and Arney catchments. This work package, therefore, aimed to install 51 boreholes across the border region, characterise the aquifers, conduct a baseline survey of water quality and investigate the interaction with surface water bodies.
6. Project Legacy	This work package focused on enhancing the capacity of stakeholders and assessing the costs and feasibility of achieving the WFD targets in the three catchments. It was also anticipated to evaluate lag-times in response, ecological recovery trajectories, future land use intensification, climate change, disproportionate costs etc. and their impact on achieving the objectives of the WFD in the catchments.
7. Communication	This work package aimed to implement a range of activities targeted at stakeholders at local, regional, national and international levels. It was anticipated that stakeholder capacity (local, NGOs and Government) would impact a community's ability to make the changes required to implement the WFD; achieve sustainable agriculture and housing and develop a thriving rural economy in the catchment areas.

[126] Per Stage 2 Application Form/Business Plan.

11.2.4 Anticipated Outcomes and Results

The CatchmentCARE project partners envisaged that the project would have a positive contribution towards the results indicator of *"the percentage of cross-border freshwater bodies in 'good' or 'high' quality"*[127] as the project would:

- Establish 3 water quality improvement projects in the Finn, Blackwater and Arney Catchments; and
- Develop and implement 50 cross-border groundwater monitoring wells (by installing 51 boreholes across the region) [128].

In doing so, the CatchmentCARE project's actions would contribute to the improvement of the established baseline conditions of water quality, the physical structure and aquatic habitats, while also seeking to enhance the capacity of stakeholders within the three catchment areas.

[127] The stated baseline value for 2014 (start of the Programme period) is 32%, whilst the target value for 2023 is 65%.
[128] NB: Boreholes needed to be installed in multiplies of three (i.e. 17 x 3 = 51 boreholes).

11.3 Project Budget to July 2022

The CatchmentCARE project received a Letter of Offer (dated 31st October 2017) offering a grant of up to a maximum of €13,792,436 (ERDF + Government Match Funding) to be expended and claimed by 31st October 2022, towards total anticipated project costs of €13,792,436. In August 2020, the SEUPB approved the reallocation of the budget between categories.

In March 2021, the SEUPB issued a further revised LoO (dated 22nd March 2021) which approved another reallocation of budget between categories. Furthermore, the Evaluation Team's review of SEUPB's EMS indicates that the project received a further eight-month extension until 30th June 2023 along with a further reallocation of the budget between categories, as reflected below. As of July 2022, the project had reported a total estimated expenditure of €8,562,928 equivalent to 62% of the total project budget.

Table 11.2: Project Costs – Anticipated and Estimated Actual July 2022 (€)

Summary Budget	Anticipated Total	Total Estimated Expenditure in July 2022[129]			
		Reported to JS by First Level Control (FLC)	Pipeline Expenditure (excluding items deemed ineligible by FLC)	Total Estimated Expenditure	% of total budget
Staff Costs	5,651,692	3,206,365	1,043,608	**4,249,972**	75%
Office and Administration Costs	847,753	486,297	156,541	**642,838**	76%
Travel and Accommodation Costs	362,482	118,160	55,885	**174,045**	48%
External Expertise and Services	2,079,406	529,350	888,856	**1,418,207**	68%
Equipment Costs	688,801	314,091	98,451	**412,542**	60%
Infrastructure and works	4,162,301	394,124	1,271,201	**1,665,325**	40%
Total	**13,792,436**	**5,048,387**	**3,514,542**	**8,562,928**	**62%**

Discussion with the CatchmentCARE project partnership in March/April 2022 indicates that there is potential for underspend, and they intend to discuss with SEUPB the potential for a further modification in the project's activities that might allow them to avail of the potential balance in the project's budget.

[129] Source: SEUPB's EMS 13th July 2022

11.4 Contribution to the Achievement of the Priority's Specific Objectives & Result Indicators

This section considers the CatchmentCARE project's key achievements and the extent to which the CatchmentCARE project has:

- Contributed to the achievement of the Priority's Specific Objectives; and
- Contributed to the achievement of the targets for the Result Indicators.

The section also identifies any external factors that have impacted, positively or negatively, the project's ability to contribute to the achievement of the Specific Objective.

11.4.1 Key Activities Undertaken (to June 2022)

The Evaluation Team's review of the CatchmentCARE project partners' progress reports indicates that key activities undertaken since the interim evaluation report (between October 2019 and June 2022) include the following:[130]

Table 11.3 Key Activities

Period	Dates	Key Activities/Points of Note
9	1st October 2019 - 31st December 2019	• In conjunction with the Loughs Agency, Donegal County Council attended and managed the 'WFD Coordination' subcommittee meeting. • Donegal County Council in conjunction with AFBI planned a dissemination event in spring 2020. The planning focussed on the feasibility of establishing a Willow Supply Chain and support for diffuse pollution mitigation activities. • Assessment of the Community Incentive Scheme (CIS) applications took place. • A site visit to AFBI's Hillsborough site was carried out by delegates from the project partners and Steering Committee.
10	1st January 2020 - 31st March 2020	• Planning continued for the dissemination event in spring 2020. • The project gave a presentation about the programme to the Border Region Management Committee. • Ulster University submitted reports on lake remediation works.
11	1st April 2020 -30th June 2020)	• Donegal County Council continued to manage the project during the Covid 19 pandemic and adapted to a new way of working with all the project partners. • Planning and procurement continued to be progressed so that work would be ready to proceed at a point when restrictions eased. • All partners continued to work on the project outputs during the pandemic, however, all fieldwork was delayed due to restrictions.
12	1st July 2020 – 30th September 2020	
13	1st October 2020 – 31st December 2020	
14	1st January 2021 – 31st March 2021	
15	1st April 2021 – 30th June 2021	• All partners were progressing work on the project outputs, but fieldwork remained somewhat hampered by restrictions despite the gradual easing of the Covid restrictions.

[130] Please note that the key achievements have been documented in respect to the most recent Project Progress reports that were available to the Evaluation Team at the time of writing. The most recently available collated Project Progress report for the project was for Period 16 (June - September 2021) albeit it was considered to be 'in progress' and did not detail key achievements. Therefore, key achievements from period 16 onwards have been taken from the latest available partner progress reports albeit some partner reports for period 19 were still in progress.

Table 11.3 Key Activities		
Period	**Dates**	**Key Activities/Points of Note**
16	1st June 2021 – 30th September 2021 (From Partner Progress Reports)	• ABCBC completed works at Beattie's Stream and at Clogher in addition to completing Upper Blackwater Farmer Group Phase 1 works. • Series 2 of the 'River' Education Programme was completed and distributed to schools across the three catchments and beyond. • AFBI received Lidar data and applied it to the fields/farms involved in the CatchmentCARE project. • British Geological Survey gave presentations at the Marble Arch caves in the Arney catchment. • A contractor was appointed to carry out a hydrological options report on the Emyvale weir and field sampling took place. Furthermore, data was gathered from local authorities and group water schemes. • Works by the Loughs Agency on the instream and riparian works on the Elatagh river were underway, with all instream components completed.
17	1st October 2021 – 31st December 2021 (From Partner Progress Reports)	• ABCBC completed the Mountain Water Phase 2 works. • ABCBC installed 12 new interpretive panels and equipment and all planned Bioblitz sessions had been delivered to groups. • AFBI completed its modelling in the Arney catchment. • The drilling of 6 monitoring boreholes was completed at the AFBI site in Hillsborough. This meant a total of 34 had been completed on the island of Ireland. 25 were completed in NI, representing the full complement and 9 were completed in ROI. • Inland Fisheries Ireland had completed their works relating to the Arney Phase 1, with the majority of works completed at the Arney Phase 2 and progressing well. • The main body of works in the Roo River was completed. • Hydrological models were produced, and a draft report was reviewed by Inland Fisheries Ireland. • BASICC launched an art exhibition in October 2021 using the art produced by students at schools participating in the school art competition.
18	1st January 2022 - 31st March 2022 (From Partner Progress Reports)	• AFBI's work during this period focused on fieldwork and finishing up the agronomic field trial, involving sampling over 400 fields and commencing the analysis of the data. • Water quality sampling and site maintenance continued at the CENIT and Whitehill sites. • Work continued on knowledge transfer with a particular focus on the development of video and animation related to nutrient management. • British Geological Survey gave presentations and updates on progress from the groundwater team at the project partner meeting and had land access agreements in place in ROI. • ABCBC completed Phase 1 of its instream and riparian works at Upper Blackwater. • In terms of Phase 1 of the Community Incentive Scheme, all 11 projects had been completed at this point. For Phase 2, 10 of 12 projects had been completed. • Inland Fisheries Ireland completed their hydrological options report relating to the Emyvale weir. • Furthermore, they carried out data processing and analysis of water quality and metrics of success. Analysis of aerial imagery, RHAT data, temperature loggers and e-fishing data took place, and the preliminary results were contributing to reports to be presented at project meetings. • The Loughs Agency completed their initial Elatagh works package and additional works were undertaken and were ongoing in this period.

Table 11.3 Key Activities		
Period	**Dates**	**Key Activities/Points of Note**
19	1st April 2022 – 30th June 2022 (From Partner Progress Reports)	• AFBI's work during this period focused on the fieldwork-related analysis of the nutrient management data and application of the pharm model to example farms. • Inland Fisheries Ireland completed all of their Arney Phase 2 works. All items were installed and were working. • Planting of all native saplings took place. • Further funding for the project was awarded for monitoring equipment which will go beyond the life of the CatchmentCARE project. • The FinnAPP group continued to monitor water quality in the catchment. • British Geological Survey undertook additional meetings with Marble Arch Caves to discuss means to better promote their visualisation at schools and local groups.

11.4.2 External Impact Factors

Discussion with the CatchmentCARE Project Partners indicates that the project encountered a number of issues during its delivery. The issues and barriers encountered included:

Impact of the Pandemic

The Evaluation Team's discussions with the CatchmentCARE Project Partnership during November 2020 as part of the Interim Evaluation report identified that as a result of the pandemic and the related restrictions on the movement of people meant that:

- Project staff across the lead organisation, project partners, and project beneficiaries started working remotely, which had an impact on the various surveys and fieldwork which was required to enable works to be delivered, including elements of the Groundwater programme, Farm studies, Education programme and River Restoration works (in-stream / riparian works).
- There was also a reduced level of monitoring, which posed a risk to the anticipated project results;
- Procurement activity was also impacted, e.g. some suppliers did not respond to requests for quotations or were having difficulty making deliveries.
- Stakeholder engagement activities (including fieldwork with landowners and the project's education programmes in schools) were impacted. However, in response, the project:
  - Arranged online meetings to the best effect;
  - An online education programme procured, designed and delivered; and
  - Project videos were produced and circulated via social media and on the project's website.

Ultimately, as outlined in Section 1.4, to allow the CatchmentCARE project further scope and time to progress its planned activities, the project received an eight-month extension to the project to 30th June 2023.[131]

Impact of Brexit

A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Discussion with the Project Partnership indicates that the project encountered some complications as a result of Brexit, which have been compounded by the war in Ukraine, concerning securing materials and also increases in the cost of those materials.

[131] To facilitate the completion of the Final Evaluation report within SEUPB's required timeframe, discussions with the project partnership were undertaken during March/April 2022, meaning that the project continued to have circa one and a quarter years before it was anticipated to complete.

11.4.3 Progress Towards the Project Output Indicators

Discussion with the CatchmentCARE project partnership in March 2022 indicates that the project has not yet achieved its anticipated outputs. However, the project partners advise that they are confident that the work is now progressing as originally planned and that the targets will be achieved by June 2023.

Table 11.4: CatchmentCARE Project Output Indicators

Programme Output Code	Name of Output	Programme Target	Project Target	Status (as of March 2022)
2.412	Develop and implement cross-border groundwater monitoring wells	50	50	0
2.413	Establish 3 river water quality improvement projects	3	3	0

11.4.4 Key Achievements (to March 2022)

Discussion with the CatchmentCARE project partnership indicates its view that the project's key achievements include the following:

- The project has served to promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species by bringing together eight partners from across the border region and implementing various governance structures including a Water Framework Directive (WFD) Coordination Sub Committee to ensure that the planned activities have the necessary impact. The partnership notes that as part of the project, information related to the WFD in the catchment area was collated together into one place to allow for a shared understanding of the issues between each of the project partners.
- However, the project has not served to integrate the two risk-based approaches to the WFD that are being implemented in Northern Ireland and Ireland. The project partners noted that the two separate risk-based approaches are continuing to be implemented on the respective sides of the border. However, whilst the two separate approaches are continuing to be applied, the CatchmentCARE project undertook significant work to develop conversion factors for the different approaches that are being applied to assess soil phosphorus levels.[132] This work was reported in a peer-reviewed journal article.[133]
- The project also influenced the application of these risk-based approaches in the cross-border catchment through the adaption of the EPA SALM model for Northern Ireland. This model had previously only been applied in RoI but adapting it for NI means that it can now be applied on a cross-border basis. SALM is a nutrient source appointment model, and it is the first time such a model has been applied on a cross-border basis in Ireland. It is anticipated that the application of this model will help to identify the sub-catchments that pose the greatest risk to water in the cross-border catchment. The application of the SALM model to the Blackwater and Arney catchment was described in reports produced by AFBI/UU.[134]

[132] In NI, Olsen P is used whilst in the Republic of Ireland, Morgan's P is used.
[133] Source: Vero, S. E. Doody, D., Cassidy, R., Higgins, S., Nicholl, G., Campbell, J., Mellander, P.-E., McDonald, N., Burgess, E., Daly, K., & Sherry, E. (2021). Comparison of soil phosphorus index systems for grassland in the cross-border region of Ireland. Journal of Plant Nutrition and Soil Science, 1–10. https://doi.org/10.1002/jpln.202100194
[134] AFBI, Overview of Source Load Apportionment Model (SLAM) (5th May 2021) and AFBI/UU, Overview of Source Load Apportionment Model (SLAM): Application to Arney Catchment (October 2021).

- The project partners consider that the project has brought added value to the Critical Risk Mapping and Catchment Investigate Assessment approaches used through the development and evaluation of a farm yard risk assessment tool to help quantify phosphorus losses originating from farmyards. This tool is currently being applied throughout the CatchmentCARE catchments, and the work has resulted in two journal publications[135], a research report[136], a farmers' knowledge transfer leaflet, and several presentations to stakeholders.
- Of note, groundwater level and temperature loggers were installed immediately after the boreholes were completed. One of the boreholes had an innovative sampling system installed that has enabled a sampler installed as part of the INTERREG VA-funded 'Source to Tap' project to collect weekly samples of groundwater to test for the herbicide component MCPA.
- The partnership considers that its efforts to include local communities through its Community Incentive Scheme (CIS) have also served to achieve cross-border cooperation to address common issues. The project delivered two phases of the CIS to local groups across the 3 catchments. 37 projects have been funded and successfully delivered, as summarised below:

Table 11.5: CIS Projects			
Catchment area	**Phase 1 (2019)**	**Phase 2 (2020)**	**Total**
Arney	3	7	**10**
Blackwater	11	12	**23**
Finn	3	1	**4**
Total	**17**	**20**	**37**

Examples of the types of projects funded include:

- Access works at loughs and rivers;
- Water quality improvement projects;
- Education and awareness campaigns;
- Volunteer training;
- Specialised equipment;
- Community river trails;
- Bio-blitzes;
- Citizen science projects; and
- Interpretation and signage.

The table below provides a short overview of three projects.

Table 11.6: Case studies of CIS Projects[137]	
Case Study – Arney Catchment	Kiltyclogher Heritage Group was funded for a project entitled 'Corracloona Link'. 8 panels were developed and installed to help inform local people and visitors about the natural, built and cultural heritage of the area. The panels cover local wildlife, bogs, underground cave systems and local river systems.
Case Study – Blackwater Catchment	The Torrent River Enhancement Association based in the village of Newmills near Dungannon was funded for a project named 'Torrent Riverwatch'. The information panel installed as part of the project provides information about the Torrent River and its industrial heritage which gave Newmills its name. It also details many of the creatures that live in, on and close to the river including dippers, grey wagtails, otters, damselflies as well as pipistrelles and Daubenton's bats.

[135] Sources: Vero, S. E., Sherry, E., & Doody, D. (2020). Evidence and perception of phosphorus loss risk factors in farmyards. Environmental Science and Policy, 114, 542–548. https://doi.org/10.1016/j.envsci.2020.09.025 and Vero, S. E., & Doody, D. (2021). Applying the nutrient transfer continuum framework to phosphorus and nitrogen losses from livestock farmyards to watercourses. Journal of environmental quality, 1–13. https://doi.org/10.1002/jeq2.20285

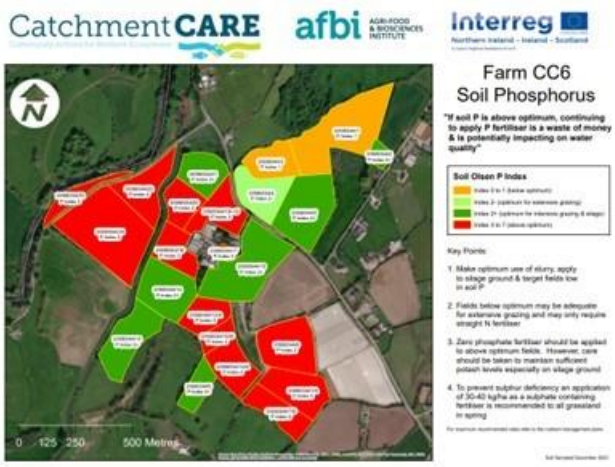
[136] Source: Campbell, J., Douglas, R.W., Rippey, B.H.R.T (UU) (2022) Timescale of lake recovery from legacy sediment phosphorus in Upper and Lower Lough Macnean.
Julie Campbell, Richard Douglas, and Brian Rippey

[137] Source: SEUPB Project Case Study: CatchmentCARE (Community Actions for Resilient Eco-systems) - Interpretive Panels Developed for Local Community Groups

Table 11.6: Case studies of CIS Projects[137]	
Case Study – Finn Catchment	BASICC (Ballybofey and Stranorlar Integrated Community Company) was funded through the CIS for a project named 'Finn through the Lens'. As part of the project, two new interpretive panels were installed. The panels provide information about the River Finn and its Catchment, as well as the history and wildlife of the area. 

- The CatchmentCARE project has implemented a series of measures that are seeking to improve the baseline condition of water quality, physical structure, and habitat in cross-border catchment areas, including for example:

  - The project completed repeat soil sampling of 400+ fields for the 17 participating nutrient management farmers in January 2022. As a result, 120 colour-coded soil maps have been generated using RAG colours (red, amber and green) to indicate whether soil pH, soil P & soil K are above, below or at optimum levels for each nutrient. Soil maps and updated nutrient management advice were then delivered to farmers in March and April 2022. The project partners consider that there is scope for this activity to be 'scaled up' beyond the project's lifetime.



  - The Loughs Agency, ABC and IFI carried out a range of riparian improvement works across the three Catchments, with approximately 40km of works completed in March 2022. Examples of works included:

    - Fencing, planting/buffer strips/ stiles, drinkers;
    - Bank stabilisation – soft/green engineering;
    - Habitat improvements – rubble mats, flow deflectors; and
    - Alternative water sources were provided for livestock – on and offline cattle drinkers.

  - The project developed a GIS sheep dip dashboard with some clusters identified to help focus on areas for action to address a chemical export issue. In addition, the project produced information sheets and videos concerning this issue and sent links to the videos to farmers in the catchment areas.
  - The project partners (AFBI, in conjunction with UU) have undertaken upgrades with willow bio-filtration at existing wastewater treatment plants at Liscooley (Finn catchment) & Cavanagrow (Blackwater catchment). Short Rotation Coppice (SRC) Willow Planting is a nature-based solution for Water Quality Protection.

- The project partners advise that the project involved considerable investment in capital works, which they consider will contribute to reduced operating costs, at least in the short to medium term. They note, for example, that the use of SRC Willow Planting as a means of bio-filtration at existing wastewater treatment plants is anticipated to reduce the need for further capital investment and will reduce operational costs, as this tertiary treatment reduces the quantity and number of chemicals required in improving the water quality and should mitigate against treatment plants being taken out of operation, as well as contributing towards a more bio-diverse and net zero carbon future.
- The project has involved a variety of activities that have sought to transfer knowledge and exchange good/best practices, including the following examples:

  - An event was held in Dundalk in March 2020 which explored the benefits of SRC and aimed to assess the extent of stakeholder interest and commitment to the principle of SRC and how this might fit with national strategies and address future environmental challenges. The event was organised by Donegal County Council, AFBI and Teagasc, as part of the CatchmentCARE project. It was attended by bodies with an interest in exploring the potential of using willow as part of landscape interventions and as a contributor to sustainable energy, bioresources and climate change challenges. The event confirmed that biomass crops if implemented properly in the agricultural landscape, can provide sustainable waste management and environmental protection, and can also contribute significantly to a more bio-diverse and net zero carbon future while underpinning rural biomass supply chains, agricultural diversification and SME development & employment benefits.
  - One of the Blackwater CIS projects (with South Tyrone Farmers Group) provided funding to develop farmer engagement to address the build-up of MCPA (the chemical used to treat rushes), through the use of a more targeted method of weed wiping which is applied directly to the rush using a quad drawn weed wiper. Similar work was undertaken as part of the Source To Tap project.
  - The project developed a Community Training Programme to support groups that engaged in the CIS. Whilst it was intended to be delivered face to face, it was developed into a bespoke online course for community groups to avail of.[138] The course's modules included the following:

    - Water & Flood Awareness Safety Training;
    - Non-Native Invasive Plant Identification and Control Options training;
    - Habitat / Invertebrate Scoring Training Course (SSCT); and
    - Bespoke Fisheries Habitat Assessment.

    As of 14th March 2022, 133 participants had signed up across the three catchment areas (Arney 80; Blackwater 51 and Finn 2).

[138] available at https://youtu.be/C2BGm6YCR30

- CatchmentCARE developed a range of education programmes to support local schools, teachers and pupils. Whilst in 2019 partners were able to visit schools and deliver a seven-week educational programme, as a consequence of pandemic-related restrictions, the project partners produced an online programme titled 'The River' in 2020.

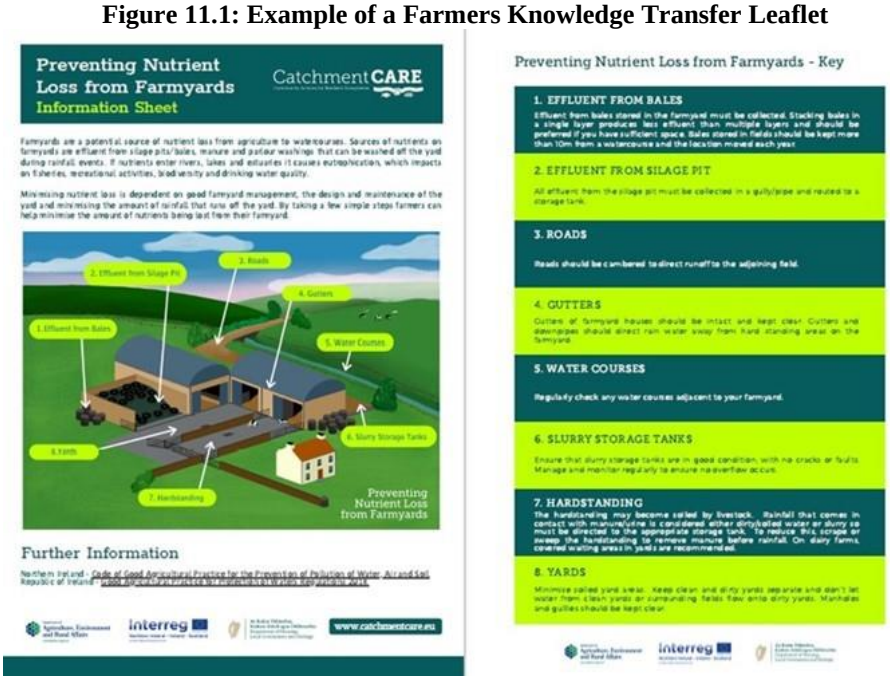
  In total, 24 schools, 1,064 children and 43 teachers participated in the education programme. In addition, a further 72 schools (2,880 children/108 teachers) based both within and outside the project catchments have requested (in March 2022) and received the programmes for their teaching purposes.

  At the time of consultation, the project partners advised that their plans for 2022 include running a CatchmentCARE Education Roadshow in selected schools in each of the three catchments between March – June, with 28 schools expected to take part (targeting c.1,120 children / 42 teachers).

- Information factsheets have been developed including:

  - Preventing Nutrient Loss From Farmyards – Information Sheet;
  - Forestry Regulations and Water Quality - Advice Sheet; and
  - Nutrient Management – Looking After Your Soil - Information Sheet.

Figure 11.1: Example of a Farmers Knowledge Transfer Leaflet



- The project has produced a range of videos to help people learn more about the project and to understand the actions that need to be taken to look after river systems, including:

  - **Caring for River Catchments – 'Pressures & Solutions'** - To coincide with river works on the Blackwater Catchment, Armagh City, Banbridge and Craigavon Borough Council produced a 15-minute video to help local communities, landowners, farmers and other stakeholders understand the pressures that the Blackwater faces and the actions that CatchmentCARE is undertaking to address these problems. The resource can be viewed on the CatchmentCARE YouTube channel. There are c. 50 videos are available on the CatchmentCARE YouTube Channel.[139]
  - **Sheep Dip Information Video** - CatchmentCARE in partnership with Teagasc and Loughs Agency produced an informative video looking at the correct use and disposal of Sheep Dip. The video focuses on the potentially harmful effects of the chemicals on our rivers and wildlife and

[139] https://www.youtube.com/watch?v=YhOXzMqjQKk&feature=youtu.be

shows ways in which to mitigate the risks of inappropriate storage and leaking of spent sheep dip into the local environment.[140]

- **Bioblitz Videos for Local Communities** - Four videos have been produced by Mantella Environmental Education. The videos aim to educate families within each local community area on how important their nearby rivers and associated habitats are.

- The CatchmentCARE project made use of both VR and AR to explore a borehole. The VR application has a solo mode or a class mode which is 'teacher-led' and can be tailored to any specific aspect of the Groundwater story through a user interface accessing modular learning, covering an in-depth approach to Groundwater. It is anticipated to be used as an educational asset at Marble Arch Caves from May 2022 onwards. The AR application will display the 3D content and assets used in the immersive VR application via an intuitive interface 'augmented' into the classroom environment and can be tailored to any specific aspect of the Groundwater story through a user interface accessing modular learning, covering an in-depth approach to Groundwater.
- Storyboards have been developed as part of the River Restoration element of the project which provides an accurate, easily accessible account of the challenges faced in the three catchments and the restoration actions taken in each case.

11.4.5 The Priority's Result Indicator Targets & Specific Objectives

Whilst the CatchmentCARE project partnership considers that the project will contribute towards improving the quality of freshwater bodies in cross-border river basins, they consider that at the time of consultation (March 2022) it was too early to determine its impact. Indeed, they advised that it might take many years before the impact becomes measurable.

Furthermore, they advised that many variables are outside the control of the project that will impact the water quality, and consequently it might not be possible to definitively determine its impact on the Priority's Specific Objective 2.4 and associated Result Indicator.

Table 11.7: Specific Objectives, Result Indicators and Targets

Specific Objective 2.4	Result Indicator	Baseline	Target
To improve freshwater quality in cross-border river basins	The percentage of cross-border freshwater bodies in cross-border river basins with good or high quality	32%	65%

11.5 Best Practice and Learning

This section considers whether the CatchmentCARE project has resulted in any areas of best practice and learning.

In addition to the variety of activities that sought to transfer knowledge previously highlighted, the project partnership noted that research reports had been produced by UU/AFBI outlining best practice techniques developed throughout the project.

[140] www.youtube.com/watch?v=AGLOgeMmA5g&t=106s and www.youtube.com/watch?v=_LEQzJVWIxc&t=617s

11.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the CatchmentCARE project's collaborative and partnership working including:

- The effectiveness and added value of the CatchmentCARE project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The project partnership was specifically designed to provide expertise on the main issues related to water body quality improvement, such as:

- Hydro morphology (IFI and Loughs Agency);
- Water quality (AFBI);
- Catchment management (UU);
- Stakeholder engagement (ABCBC); and
- Groundwater (BGS).

As lead partner, Donegal County Council's extensive expertise in project, financial and technical management of EU cross-border projects (e.g. North-South Shared Aquatic Resource project[141]) ensured that the cross-border integrated management of the project and governance arrangements delivered a robust and efficient project.

In addition, discussion with the project partnership indicated that the following key aspects of the project illustrate the effectiveness and added value of the CatchmentCARE project's cross-border collaboration in relation to the specific objectives:

- Adding value to the stakeholder engagement activities carried out by Catchment Officers (NIEA) and Community Water Officers (in LAWCO in Ireland) in the catchments.
- Liaising with the LAWCO coordinator for the border region and with the NIEA Water Management Unit to ensure the CatchmentCARE project activities add value to the WFD Programme of Measures (POMs).
- Engaging with stakeholder organisations and community groups across the border, including via the three sub-committees e.g. the Community Incentive Scheme which, amongst other things, encouraged cross-border capacity building.

11.7 Contribution of the Project to Policy Objectives

This Section considers the contribution of the CatchmentCARE project to key policy objectives in the eligible region. In doing so the section considers the project's contribution to:

- EU Cohesion Policy and EU 2020 objectives;
- The horizontal principles of equality and sustainable development; and
- Other key policies.

[141] Funded under the INTERREG IIIA Programme.

11.7.1 EU Cohesion Policy and EU2020 Objectives

The CatchmentCARE project has helped to contribute towards delivering the Cohesion Policy with targeted investment in key priority areas including promoting climate change adaption, risk prevention and management and preserving and protecting the environment and promoting resource efficiency research.

Whilst the CatchmentCARE project was not overtly focused on economic growth, it encouraged 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

11.7.2 The Atlantic Strategy

The CatchmentCARE project did not contribute to the aims and objectives of the 'Atlantic Strategy'.

11.7.3 The Horizontal Principles

The CatchmentCARE project aimed to protect and improve the quality of the environment - a key component of sustainable development and as such it contributed (at least in part) to the EU's three Horizontal Principles, per the following discussion:

Sustainable development	The following outlines the primary long-term aspirations of the CatchmentCARE project in relation to environmental, social and economic benefits: **<u>Environmental Sustainability Energy & Climate Change:</u>** • The emplacement of willow crops as a method of tertiary treatment for small WWTW will become a local source of renewable fuel for communities. It will also reduce greenhouse gases attributed to producing, transporting and burning other fossil fuels. • Built Environment and Land Use – the Catchment Land Use Actions focused on land use activities that were negatively impacting on water quality. It implemented actions to improve land use, biodiversity, habitats and species in the catchment. Improving in-stream conditions, hydromorphology and riparian zones also positively contributed to the attenuation of floodwaters. • Waste – the use of willows on selected small WWTW will minimise waste to the environment and increase the recycling of nutrients. • Biodiversity - the improvements in catchment habitats included removal of riparian invasive species. These activities will support improved water quality, habitats and wildlife populations and enhance the landscape of the catchments. • Natural Resources - phosphorus is a limited natural resource and its overuse, and the impact it has on water quality needs to be managed. Good nutrient management is key to the efficient use of Phosphorus. **<u>Social Sustainability:</u>** • Health and well-being and equality outcomes – the CatchmentCARE project promoted a greater awareness of the aquatic environment, which will enhance health and well-being by encouraging river walks and other outdoor activities. There were opportunities for all abilities to engage in educational and knowledge exchange activities (e.g. talks, active outdoor events etc.). • Sustainable Communities - communities benefited socially, environmentally and economically through improved land use, innovation, biodiversity and tourism through water quality and catchment resilience. The aim, through knowledge transfer, education and capacity building, was to establish the intrinsic value and uniqueness of the individual catchments from a heritage and biodiversity perspective and engender a spirit of partnership, cohesion, sharing and integration, between all stakeholders, in securing improved water quality and the ultimate survival of the cross-border catchments.

	• Culture - lakes and rivers are part of the cultural identity of rural communities. The CatchmentCARE project, therefore, built upon the sense of shared ownership that water bodies bring to a community. • Safer Communities – it was anticipated that the project partners and other key stakeholders will be active and visible on the ground, both throughout the project and beyond its lifetime. This will, in turn, deter anti-social behaviour and will also enhance community safety and reduce the fear of crime. This will be of particular importance in remote sparsely populated parts of the catchments. **Economic Sustainability:** • Economic Development – The restoration of aquatic ecosystems will contribute towards a sustainable tourism industry in the local regions. This is achieved by improving nutrient efficiency on farms, increasing the profit margin of farmers and by providing them with a viable land-use alternative (in the form of willow for biomass production). These may also have a knock-on effect such as, for example, the potential establishment of a supply chain for willows (thereby creating local job opportunities) and low carbon approaches to new enterprise and economic developments in the longer term. • Societal Benefits – It was considered that providing stakeholders with education and information was central to delivering new skills and the catchment specific knowledge that is required by stakeholders to take advantage of these economic and funding opportunities. For example, the project engaged 133 volunteers (as of 14th March 2022) in citizen science activities and farmers in environmentally friendly farming practices that will facilitate the continuation of catchment improvements post project. In addition, an education programme specifically for schools was delivered to 24 schools (as of March 2022) across the three catchments, whilst a further 72 schools requested and received the programmes for their teaching purposes.
Equal opportunities and non-discrimination & Equality between men and women	Each of the CatchmentCARE project partners were committed to delivering the project in full accordance with their internal policies and proofing systems to ensure that they met the legislative requirements related to equality. The project will established a 'bottom-up' community organisations/networks that was open to all members of the community to participate in. All sectors of the community, including target groups, had equal access to the actions, events, and documents arising out of the CatchmentCARE project. All organised activities were based in facilities that were accessible to people with disabilities and every care was taken to ensure full participation was open to all societal groups. The project complied with the EU Sustainable Development Strategy and ensured that the principle of equity was adhered to during all project activities.

11.7.4 Contribution to Other Strategies

The CatchmentCARE project was designed to complement the existing structure established to implement the WFD. In doing so, it was closely aligned with a number of key EU directives and regional strategies, such as:

- WFD;
- The Nitrates Action Programme (in Northern Ireland and Ireland) - which implements the EU Nitrates Directive;
- The Rural Development Programmes (in Northern Ireland and Ireland);
- Sustainable Land Use Strategy for Northern Ireland;
- The Phosphorus Regulation in Northern Ireland; and
- The programme of work associated with the 2nd cycles of River Basin Management Plans (RBMP).

11.8 Potential Legacy Impacts

Alongside anticipated enhancements in water quality, the CatchmentCARE Project Partnership consider that the project has the potential to achieve a variety of legacy impacts beyond the lifetime of the project, including:

- River Restoration work – The Project has adopted a novel approach using GIS Storyboards to illustrate the achievements and progress made at each site. It is anticipated that the Storyboards will offer an accurate, easily accessible account of the challenges faced in the three catchments and the river restoration actions taken. It is anticipated that the relevant organisations/stakeholders will continue to record the longer-term benefits accruing from those interventions. [142]

- It is anticipated that findings drawn from the ongoing research work will help inform policy, for example:

  - The potential to remediate lake water quality (phosphorus) led by Ulster University;
  - AFBI's work concerning Farm Nutrient Management is aimed at developing an evidence base to help shape policy/regulations related to agricultural nutrient management. Specifically:
    - To provide an evidence base to show the economic viability of reducing the agronomic soil P target of beef and sheep farms to Index 1 or -2;
    - To show the economic viability of reducing fertilisers & feed inputs to beef and sheep farms to reduce the nutrient surplus;
    - To evaluate the potential contribution of nutrients from farmyards and to determine the reduction in nutrient loss that is required from agriculture if the P target of the WFD is to be achieved; and
    - To show the economic impact of this reduction on farm productivity.

- The support provided by the Project through its unique 'Community Incentive Scheme' is considered to have helped develop stronger community groups across the three catchment areas.
- The resources developed as part of the Education Programme will continue to be availed of by the school communities.
- The CatchmentCARE Project website – catchmentcare.eu includes various resources developed by the Project which will be available to guide others, e.g. various Information Sheets; Storyboards, training material; and c.50 videos on the CatchmentCARE YouTube Channel.
- A Project Legacy Work Package was in progress (in March 2022) which will aim to capture the key outputs from the project in a Project Report and on the project's website 'catchmentcare.eu'.
- Of note, it is anticipated that the impact of catchment heterogeneity on achieving the targets of the Water Framework directive will be the focus of one of the end-of-project reports arising out of CatchmentCARE. This report will examine the need for alternative WFD objectives for phosphorus water quality targets in the Blackwater catchment and will also provide a method by which this can be assessed in other catchments. In March 2022, this work was ongoing but had, in part, been addressed in the Olsen P vs Morgan P peer-reviewed study and the SALM models referred to previously.[143] It is anticipated that the variation in nutrient management practice on 17 study farmers in the Blackwater catchment will also be reported.

[142] An example at the Cummirk (Finn Catchment) can be seen at https://storymaps.arcgis.com/stories/48c03ec5143a431193f1fa5625d8c43b

[143] Source: Vero, S.E. Doody, D., Cassidy, R., Higgins, S., Nicholl, G., Campbell, J. Mellander, P.E. McDonald N., Burgess, E., Daly, K., & Sherry, E. (2021). Comparison of soil phosphorus index systems for grassland in the cross-border region of Ireland. Journal of Plant Nutrition and Soil Science, 1–10. https://doi.org/10.1002/jpln.202100194

12. SUMMARY POSITION OF THE PROJECTS (AT TIME OF REPORT)

12.1 Project Expenditure

Table 12.1 provides a summary of the total estimated expenditure and the proportion of 'project time' that has passed in July 2022.

Table 12.1: Project Costs – Anticipated and Estimated Actual July 2022[144]

Project	Anticipated Total (€)	Total Estimated Expenditure in July 2022 (€)	% of total budget	Proportion of Timescale Passed at July 2022
Object 2.1				
CANN	9,391,034	7,971,255	85%	92%
CABB	4,935,984	4,371,927	89%	94%
Sub-total	**14,327,019**	**12,343,182**	**86%**	**-**
Objective 2.2				
COMPASS	7,726,441	6,198,880	80%	94%
SWIM	1,393,075	1,354,517	97%	100%
MarPAMM	6,360,857	5,213,149	82%	95%
SeaMonitor 2	4,722,672	3,876,815	82%	87%
Sub-total	**20,203,045**	**16,643,361**	**82%**	**-**
Objective 2.3				
SWELL	35,047,604	31,774,240	91%	90%
Objective 2.4				
Source to Tap	4,909,921	4,666,547	95%	96%
CatchmentCARE	13,792,436	8,562,928	62%	83%
Sub-total	**18,702,357**	**13,229,475**	**71%**	**-**
Total	**88,280,024**	**73,990,258**	**84%**	**-**

Key points to note in relation to expenditure (at July 2022) under INTERREG VA Programme Investment Priority 2: Environment include:

- At an overall Axis level, the nine projects have incurred more than four-fifths (84%) of their total budget.
- Except for the CatchmentCARE project, each of the seven remaining projects that have yet to complete have advised the Evaluation Team that they expect to spend most, if not all, of their project budget by the time the project has been completed;
- Discussion with the CatchmentCARE project partnership in March/April 2022 indicates that there is potential for underspend, but the project intends to explore with SEUPB the potential for a further modification in the project's activities that might allow them to avail of the potential balance in the project's budget.

[144] Source: SEUPB's EMS 13th July 2022

12.2 The Extent to which the Priority Axis Output & Result Indicators have been achieved

The table below summarises the extent to which each of the nine projects has achieved its project outputs as of March/April 2022:

Table 12.2: Extent to which Approved Outputs have been achieved (by Project)

Name of Output (by Project)	Programme Output Indicator Target	Project Target	Status (as of March/April 2022)[145]
CANN			
Nature and biodiversity Surface area of habitats supported to attain a better conservation status (hectares)	4,500ha	3,650ha	2,042ha
Conservation Action Plans	25	27	24
CABB			
Nature and biodiversity Surface area of habitats supported to attain a better conservation status (hectares)	4,500ha	2,228ha	3,006ha
Conservation Action Plans	25	8	8[146]
COMPASS			
A network of buoys for regional seas, including telemetry and oceanographic monitoring (e.g. for seals, cetaceans and salmonids)	1	1	1
Models developed to support the conversation of habitats and species	5	3	3
SWIM			
System for the prediction of bathing water quality and install real-time signage	1	1	1
MarPAMM			
Models developed to support the conversation of habitats and species	5	4	3
Marine management plans for designated protected areas complete	6	6	0
SeaMonitor 2			
Models developed to support the conversation of habitats and species	5	5	0
Marine management plans for designated protected areas complete	6	3	0
SWELL			
Additional population benefit from improved wastewater treatment	10,000	10,000	>10,000
2 Sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters	2	2	1
StT			
Cross-border drinking water 'Sustainable Catchment Area Management Plan' research and pilot project	1	1	0
CatchmentCARE			
Develop and implement cross-border groundwater monitoring wells	50	50	0
Establish 3 river water quality improvement projects	3	3	0

[145] Source: Consultation with project leads in March/April 2022
[146] Albeit the project lead indicated that whilst NIEA/NPWS/Nature Scot were happy with the CAPs the project was awaiting on the SEUPB to sign off.

The following is noted:

- Whilst it has not yet fully achieved either of its targets, the CANN project anticipates that the targets will be achieved by the project's revised end date of December 2022;
- The CABB project considers that it has fully achieved both of its targets, albeit it was awaiting sign-off by SEUPB in April 2022;
- The SWIM project considers that it has fully achieved its target, albeit discussion with SEUPB at the time of writing indicates that further evidence and action are required regarding the signage network and model's future use;
- The COMPASS project considers that it has fully achieved both of its targets;
- Whilst it has not yet fully achieved either of its targets, the MarPAMM project anticipates that the targets will be achieved by the project's revised end date of September 2022;
- Similarly, the SeaMonitor 2 project anticipates that its two targets will be achieved by the project's revised end date of March 2023;
- The SWELL project is confident that it will achieve its one outstanding target by its revised end date of April 2023;
- The Source to Tap project advises that it has agreed with SEUPB that its proposed SCAMP will be in the form of a website and that this will be delivered by the project's revised end date of September 2022;
- The CatchmentCARE is confident that it will deliver its targets by the project's revised end date of June 2023.

Whilst recognising that each project is confident that all the Output Indicator Targets will be achieved by their stipulated end date, the Evaluation Team considers that there continues to be an element of risk associated with the full achievement and recommends that SEUPB continues to monitor the activities and outputs until each project's respective end date.

Unfortunately, whilst each of the nine projects is confident that the activities implemented have contributed positively to the achievement of Priority Axis 2: Environment's Specific Objectives, as reflected in Section 2, the projects have had difficulty determining the extent to which their projects have contributed to the respective Result Indicators and Targets. The rationale for this includes:

- The result indicators have too many influencing factors affecting their achievement, and consequently, it is difficult for a single project, in isolation, to determine whether it has measurably influenced performance on the metric;
- The method by which the result indicator was intended to be measured not being clear to the project.

As reflected in Section 2, discussion with SEUPB and NISRA indicates that whilst it was anticipated that the nine projects would contribute to the achievement of the four result indicators, it was not anticipated that the projects, in isolation, would be responsible for achieving the targets established. That is, the result indicators were not anticipated to measure the direct impacts of the projects supported and instead they were anticipated to measure changes in the characteristics of a given area due to programme interventions and / or other factors (i.e. external to the Interreg VA programme).

In addition, SEUPB has had exploratory discussions with the departments on the 'adjusted means' of measuring the success of the projects to ensure the project work can be correctly verified as complete. Whilst the adjusted means of measuring is not yet finalised (at November 2022), it is suggested that both the projects and the departments will be required to sign the project work off as complete.

13. CONCLUSIONS AND RECOMMENDATIONS

13.1 Introduction

This report has considered the effectiveness and impact of the investment made under INTERREG VA Programme Investment Priority Axis 2 – Environment. This section of the report considers key conclusions and recommendations arising from the review of each of the nine projects supported.

It should be noted that this report represents the final in the series of three impact evaluation reports. As a consequence of the outworkings of the Covid-19 pandemic and resultant delays caused in the implementation of projects, it should be noted that only one of the nine individual projects supported under Priority Axis 2 has been fully completed at the time of this report (July 2022). However, for SEUPB's reporting requirements to the EU Commission, it was necessary to develop the final evaluation report at this time.

13.2 Conclusions

13.2.1 Overarching Conclusion on Activity Supported

Launched in January 2016, the INTERREG VA Programme was one of over sixty funding programmes across the EU that had been specifically designed to address problems that arise from the existence of borders. Borders can reduce economic development, hamper the efficient management of the environment, obstruct travel and hinder the delivery of essential health and social care services. The INTERREG VA Programme, therefore, aimed to promote greater levels of economic, social and territorial cohesion to create a more prosperous and sustainable cross-border region.

The INTERREG VA Programme had four key priority axes, which were selected to address identified weaknesses in the programme region's economy, as set out in the Cooperation Programme for the INTERREG VA Programme 2014-2020. One of those was Priority Axis 2: Environment, which aimed to *"encourage investment to achieve a resource-efficient, sustainable economy through the implementation of green infrastructure and environmental risk management strategies"*.

It was anticipated that this priority axis would tackle two key challenges that were being experienced in the programme region, namely the integrity of its:

1. Biodiversity; and
2. Water quality.

The selected investment priorities under Priority Axis 2: Environment and their associated objectives were as follows:

Investment Priority	Associated Objectives
2a - Protecting and restoring biodiversity and soil and promoting ecosystem services, including through Natura 2000, and green infrastructure.	**2.1** Recovery of Protected Habitats and Priority Species **2.2** Manage Marine Protected Areas and Species
2b - Investing in the water sector to meet the requirements of the Union's environmental acquis and to address needs, identified by the Member States, for investment that goes beyond those requirements.	**2.3** Improve Water Quality in Transitional Waters **2.4** Improve Freshwater Quality in Cross-Border River Basins

Ultimately, nine projects (with total costs of c€88.0m) were supported under Priority Axis 2: Environment, as summarised below:

- Two projects were funded under Specific Objective 2.1, with total costs of c€14.3m;
- Four projects were funded under Specific Objective 2.2, with total costs of c€20.2m;
- One project was funded under Specific Objective 2.3, with total costs of c€35.0m; and
- Two projects were funded under Specific Objective 2.4, with total costs of c€18.7m.

Across the nine project, Lead Partners were drawn from the statutory and voluntary sectors across Northern Ireland and Ireland, and included a range of project partners, with an interest in the environment.

At an overall level, the Evaluation Team's review of the projects supported under each Specific Objective area indicates the following:

Specific Objective area	Evaluation Team's Overarching Conclusions
2.1 Recovery of Protected Habitats and Priority Species	Two projects, CANN and CABB, were supported under this objective, with both undertaking a wide-range of actions that sought to protect and enable the recovery of a number of designated habitat sites of cross-border importance and identified areas for priority species. These included nationally designated areas, areas of specific scientific interest (ASSI), sites of special scientific interest (SSSIs), natural heritage areas (NHAs)) and European designated areas (special protection areas (SPAs) and special areas of conservation (SAC)). Other areas for breeding wader species and marsh fritillary that were not designated were also included where they were considered to be important to the ecological functioning of habitats within the designated site network. In many cases, the sites chosen were close to or straddled the border between Northern Ireland and the Republic of Ireland, alongside some sites in Western Scotland, which are considered to be of cross-border significance (e.g. where priority species were known to migrate between the locations). As reflected further below, the Evaluation Team considers that it is evident that both projects have been considerably successful in achieving increased levels of integration in the planning and management of the environment across the region, the sharing of knowledge and the development of best practice methodologies. Despite the constraints imposed by the pandemic-related restrictions, considerable outreach activity was undertaken with landowners and local communities which has increased awareness of, and responsiveness to, the potential threats of climate change to habitats and species. Whilst the full impact of the work undertaken might not be fully realised for a number of years, the scale and nature of work undertaken suggests that the two projects have successfully promoted cross-border cooperation to facilitate the recovery of selected protected habitats and priority species. To achieve this objective, the expected logic was that it would be necessary to invest in increased cross-border integrated planning and management of habitats and species, using best-practice methodologies. It was anticipated that this investment would lead to results beyond the lifetime of the Programme in the form of increased compliance with EU directives in the area of environmental protection.
2.2 Manage Marine Protected Areas and Species	Four project (COMPASS, MarPAMM, SeaMonitor 2 and SWIM) were supported under this objective. Each of the projects sought to enable enhanced cross-border co-operation in the management of regional seas to meet Good Environmental Status by 2020 in line with the requirements of the Marine Strategy Framework Directive (MSFD). The Evaluation Team's review of project activity indicates the each of the projects facilitated substantially increased levels of cooperation concerning the management of marine protected areas and species. This occurred within project partnerships but also notably between the COMPASS, MarPAMM, SeaMonitor 2 project partnerships, which enhanced the overall outworkings of the three individual projects, and the quality of data captured. Discussion with the three projects indicates that the sharing of information and resources between the projects was a consistent feature throughout their implementation. The Evaluation Team considers that this level of cooperation will have considerably enhanced the potential for a more coherent approach to emerge across the region

Specific Objective area	Evaluation Team's Overarching Conclusions
	and its shared waters, and the individual efforts to safeguard biodiversity will have been further strengthened than would have been the case were the projects to have operated in isolation from one another. Such efforts should better position the region to achieve Good Environmental Status and to develop an ecologically coherent network of Marine Protected Areas. On an overall basis, it is clear that the projects supported have therefore achieved the aim of Objective 2.2 which was to *"develop cross-border capacity for the monitoring and management of marine protected areas and species"* and provided the information, methodologies and strategies with which the region's marine protected areas can be managed and mitigated in a manner which will promote, sustain and conserve the marine environment.
2.3 Improve Water Quality in Transitional Waters	One project, SWELL, was funded under Specific Objective 2.3, with total anticipated costs of c€35.0m. This project focused activity on the following transitional water bodies that Ireland and Northern Ireland share: 1. Carlingford Lough - between County Louth in Ireland and County Down in Northern Ireland; and 2. Lough Foyle - between County Derry~Londonderry in Northern Ireland and County Donegal in Ireland. Given the shared nature of these waters, cross-border collaboration was considered to be essential if their water quality was to be improved, and thereby address the requirements of the Water Framework Directive. To inform the project's activities, extensive modelling of the two water bodies was undertaken to identify sources of pollution and subsequently, the most effective interventions and improvements required for the sewage network and wastewater treatment works that impact the shared transitional waters. Discussion with the project partners indicates that the project represented the first time that the two key state-owned regulated water companies (Northern Ireland Water and Irish Water) with sole responsibility for wastewater services on both sides of the border worked together to such an extent, which helped them to prioritise and align works in a coordinated way through the implementation of common approaches to the management of the water resources. The project also allowed both organisations to share knowledge and best practices and technical expertise across the eligible region, drawing on their respective strengths and experience. Whilst it is anticipated that the outworkings of the actions implemented will be realised over the medium-to-longer term, and also reflecting the fact that both water companies advised that the water quality in the two shared water areas will be affected by factors that are also outside their control, the Evaluation Team considers it reasonable to conclude that the SWELL project will have contributed to improvement in the water quality of the two shared transitional waters, and will continue to do so beyond the lifetime of the Programme.
2.4 Improve Freshwater Quality in Cross-Border River Basins	Two projects, Source to Tap and CatchmentCARE, were funded under Specific Objective 2.4, with total anticipated costs of c€18.7m. Both projects sought to improve water quality across the region, through the introduction of shared management approaches to shared water resources, and therefore support the achievement of targets featured in the EU Water Framework Directives. Whilst the extent to which both projects have been successful in achieving improvements in the baseline condition of water quality, physical structure, and habitats in the target cross-border catchment areas may only be measurable in the medium-term, it is evident that the actions implemented provide a very strong basis for achieving good water quality, enhanced ecological status of a variety of water bodies (rivers, lakes, groundwater, transitional waters), whilst also protecting and enhancing biodiversity.

Specific Objective area	Evaluation Team's Overarching Conclusions
	Encouragingly, both project partnerships report that the extent of cross-border planning and management of shared river catchment areas has been considerably increased, as has the sharing of knowledge and best practice approaches. On that basis, the Evaluation Team considers that both projects have successfully served to achieve the aim of Objective 2.4 i.e. *"to improve freshwater quality in cross-border river basins".*

Taken together, the nine projects that were supported under Priority Axis 2: Environment have involved a very considerable range of actions that would not have been possible in the absence of INTERREG VA monies, and whilst the full outcomes and impacts of most of the actions implemented may only be observable over the medium-to-long term, it is evident that they have followed best-practice approaches, and consequently offer very significant potential to both:

- Protect and restore protected marine and terrestrial habitats and priority species; and
- Improve water quality in transitional waters and cross-border river basins.

13.2.2 The extent to which the Project Outputs have been achieved

As a consequence of the outworkings of the Covid-19 pandemic and resultant delays caused in the implementation of projects, only one of the nine individual projects supported under Priority Axis 2 had been fully completed at the time of this report (July 2022). However, for SEUPB's reporting requirements to the EU Commission, it was necessary to develop the final evaluation report at this time.

At the time (circa March/April 2022) of the Evaluation Team's consultations with the nine individual projects there continued to be activity required before all of the project outputs were achieved. However, 6 of the 16 individual targets were reported as being achieved.

Whilst recognising that each project is confident that all the Output Indicator Targets will be achieved by their stipulated end date, the Evaluation Team considers that there continues to be an element of risk associated with the full achievement and recommends that SEUPB continues to monitor the activities and outputs until each project's respective end date.

13.2.3 The extent to which the Specific Objectives & Result Indicators have been achieved

Unfortunately, whilst each of the nine projects is confident that the activities implemented have contributed positively to the achievement of Priority Axis 2: Environment's Specific Objectives, as reflected in Section 2, the projects have had difficulty determining the extent to which their projects have contributed to the respective Result Indicators and Targets. The rationale for this includes:

- The result indicators have too many influencing factors affecting their achievement, and consequently, it is difficult for a single project, in isolation, to determine whether it has measurably influenced performance on the metric;
- The method by which the result indicator was intended to be measured not being clear to the project.

As reflected in Section 2, discussion with SEUPB and NISRA indicates that whilst it was anticipated that the nine projects would contribute to the achievement of the four result indicators, it was not anticipated that the projects, in isolation, would be responsible for achieving the targets established. That is, the result indicators were not anticipated to measure the direct impacts of the projects supported and instead they were anticipated to measure changes in the characteristics of a given area due to programme interventions and / or other factors (i.e. external to the Interreg VA programme).

In addition, SEUPB has had exploratory discussions with the departments on the 'adjusted means' of measuring the success of the projects to ensure the project work can be correctly verified as complete. Whilst the adjusted means of measuring is not yet finalised (at November 2022), it is suggested that both the projects and the departments will be required to sign the project work off as complete.

Nonetheless, the Evaluation Team's review of the activities implemented under each of the nine projects indicates that the suite of projects has served (where relevant):

- To promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species;
- To develop cross-border capacity for the monitoring and management of marine protected species in the region;
- To improve the water quality in shared transitional waters; and
- To improve freshwater quality in cross-border river basins.

In addition, each of the project partnerships has demonstrated that their respective projects are closely aligned (where applicable) with EU 2020 objectives; the Atlantic Strategy, the EU's horizontal principles of equality and sustainable development and a variety of regional strategies, including:

Objective 2.1 projects	• EU 2020 Strategy • EU Birds and Habitats Directive • EU Biodiversity Strategy • The Prioritised Action Frameworks (PAFs) of the three countries and in particular selected protected sites and species of cross-border relevance
Objective 2.2 projects	• EU Atlantic Strategy and Action Plan • Marine Strategy Framework Directive • EU Marine strategies
Objective 2.3 projects	• EU Water Framework Directive
Objective 2.4 projects	• EU Water Framework Directive (including integrated river basin management plans)

13.2.4 Factors that have impacted on project delivery including the achievement of Project Output and Result indicators and the Priority's Specific Objectives

Each of the Project Partners in receipt of support under Priority Axis 2: Environment advise that they encountered issues that have impacted on the delivery of their respective projects. Examples of issues commonly cited by the projects' partners include:

- **Covid-19 –** The Covid-19 pandemic impacted each of the nine projects, for example the pandemic-related restrictions on the movement of people meant that:
  - Various staff across the lead partner's organisation, project partners or direct beneficiaries started working remotely and/or had furloughed staff.
  - The project's lost access to testing and fieldwork, which had a substantial impact on data collection and monitoring activities.
  - Onsite capital work had to be placed on hold.
  - Aspects of planned educational activities were reduced as they could not be carried out on a face-to-face basis.

- **Brexit** - A further marketplace factor of considerable significance that occurred during the project period was the withdrawal of the United Kingdom (UK) from the European Union on 31 January 2020. Several of the projects' partners noted during consultation that the outworkings of Brexit resulted in the project facing difficulties, for example with exchange rate fluctuations, setting up its website as the domain had to be '.eu', securing materials and equipment deliveries.

Whilst specific to individual projects, the following is noted:

- The Sea Monitor project partners advised (in March 2022) that the project had experienced some complications and delays associated with licensing requirements to legally deploy research equipment in the waters across the jurisdictions. The project also faced delays deploying equipment due to Ministry of Defence training being undertaken in the waters.
- On the SWELL project, Irish Water has found the timeframe to implement its infrastructure project to be challenging. Typically, a standard Irish Water WwTP construction project takes 5 years, whilst the SWELL Programme afforded approximately only three years from the Letter of Offer for the construction works.

In addition, Early Contractor Involvement (ECI) was not available to Irish Water at the time, and a standalone procurement exercise was required. However, Irish Water advised that this challenge was overcome through a process of fast-tracking its programme (e.g. project and planning approvals, procurement exercises etc.), and good partnership working and collaboration with contractors.

- The Source to Tap project's progress was affected by the Meenbog landslide incident in 2020 which caused tonnes of sediment to enter the rivers that the StT project had been working with local landowners and stakeholders to improve.

13.2.5 The effectiveness and added value of cross-border collaboration

Each of the project partnerships has demonstrated that their respective projects were jointly:

- Developed;
- Implemented;
- Staffed; and
- Financed.

The project partnerships were uniformly of the view that the INTERREG VA funding received had enabled the projects to undertake projects that would not otherwise have been possible, and consequently achieved impacts that would not otherwise have been possible (or only a substantially lower level of activity or quality of operation) had a single jurisdiction attempted to undertake related works in isolation.

The Evaluation Team's review of the individual project's activities indicates a strong level of cross-border collaboration and sharing of resources and know-how. Whilst it is evident that there continues to be scope for further alignment of activity at a policy level, the activities undertaken by the nine projects have served to achieve a level of cohesion that did not exist in advance of their implementation.

Indeed, the effectiveness of the cross-border collaborative working, and engagement is perhaps best evidenced by the fact that each of the nine projects has, or anticipates, achieved its output indicator targets despite the considerable upheavals associated with both the pandemic and Brexit that have occurred during their implementation.

13.2.6 Key areas of best practice and learning

Encouragingly, the projects partners in receipt of support under Priority Axis 2: Environment, cited a number of key areas of best practice and learning which have, in their view:

- Supported project delivery;
- Enhanced levels of cross-border and transnational knowledge transfer and collaboration;
- Created a joint sense of project ownership;
- Supported the potential for longer-term sustainability after the INTERREG VA funded period.

Specific examples of the good practice cited by the Projects Partners include:

- One of the main opportunities to establish and share best practice from the CABB project has been the coordination and facilitation (by the project partnership) of site visits to various locations being considered as part of the project e.g. the Irish Peatlands Conservation Group visited the Garron SAC, which served to identify what works well and could possibly be replicated elsewhere. This facilitated the project to help achieve increased levels of cross-border integration in the planning and management of the environment across the region.
- The COMPASS project considers that one of the main achievements of, or lessons learnt from, this project has been the successful interaction with stakeholders and civil society (or 'citizen science'). For example, as part of the project's Salmonid research, fishermen have played an important supporting role in catching trout and salmon for tagging and deploying equipment. The COMPASS project partnership notes that this results in a number of direct benefits:

- Catching fish by fly appears to cause the least distress to the fish;
- Using fishermen at sea to deploy equipment brings additional knowledge and expertise to the project; and
- This method provides an important opportunity to involve and engage a broader stakeholder group.

- The SeaMonitor 2 project tested a remote-operated "ocean glider", and their use as part of the project represented the first time it has been applied to Atlantic salmon in Europe. The SeaMonitor 2 project partners note that as the first mission was a success, autonomous remote-operated platforms will likely become a key method by which spatial data on cetacean occurrence will be acquired, as it is less expensive than chartering a research vessel and its crew. It is also more sustainable as autonomous remote-operated platforms do not require fuel, and emit less noise so are better suited to acoustic data collection, and the impact on the environment and disturbance to animals is likely reduced too.
- The SWIM project partnership highlighted that a key learning for future projects is to ensure that sufficient engagement (and collaboration where appropriate) with the public is undertaken at the outset of a project to explain why the project is undertaking the work, which should help to minimise and/or mitigate any potential objections to the project's work.

13.2.7 New ways of working/partnerships/relationships created

Across the nine projects, a myriad of new cross-border relationships have been developed and which are reflected, in part, in the earlier sections of this report. Most positively, each of the project partners has indicated that they hope to continue to work in partnership and share knowledge and good practice with both their project partners and stakeholders engaged with.

Whilst none of the nine projects have been mainstreamed in their entirety, each of the project partners advised that aspects of the across-border activity undertaken will be continued. Of note, at the time of consultation, some projects advised that they would be seeking Peace Plus funding to pursue their project activities further.

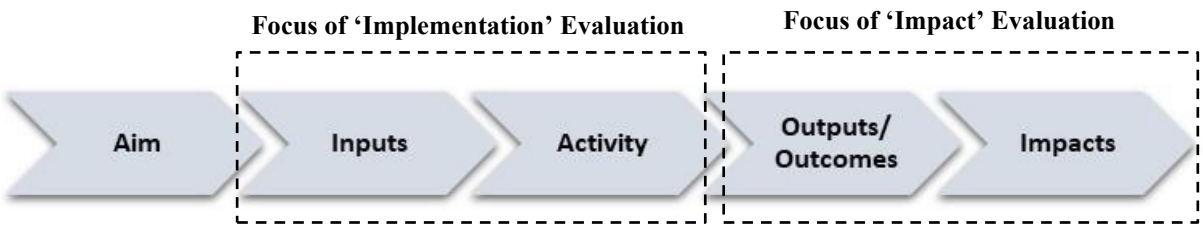
13.3 Recommendations

To help inform similar programmes of activity going forward, the Evaluation Team makes the following recommendations;

1. By way of aiding post-project evaluation, SEUPB should ensure that all objectives, outputs and result indicators established for all future programmes adhere to the 'SMART' criteria.

2. The 'logic chain' to Evaluation illustrates the intrinsic linkages between an intervention's aims, inputs, activities, outputs and outcomes (as depicted in Figure 13.1). However, the Evaluation Team understands that SEUPB has commissioned two separate evaluations – an 'Implementation' Evaluation and 'Impact' Evaluation - which focus on assessing the progress made by the Priority (and projects supported therein) at different stages of the logic chain.

Figure 13.1: The logic chain to Evaluation



However, given the interlinkages that exist between each stage of the logic chain, the Evaluation Team is of the view that a more rounded, holistic approach should be taken to Evaluation which would require the assessment of the implementation and impact made by the Priority axis as part of one evaluation. For example, in a scenario in which an intervention does not achieve its anticipated outputs/outcomes or impacts, this would naturally lead to the question as to why such a scenario arose. Based on the logic chain to Evaluation, such a scenario could have arisen as a result of the implementation of the activities of the intervention which, in turn, may have been influenced by the scale and quality of inputs utilised to deliver the activities. Therefore, any rationalisation as to why an intervention's outturns are achieved (or otherwise) requires a 'joined-up' approach to Evaluation focused on each stage of the logic chain.

3. Most projects considered that aspects of the INTERREG VA programme were administration intensive and on occasion the level of work needed was not commensurate with the value offered to the project. SEUPB outlined that there were internal processes that affected this such as staffing shortages, projects being slower than required in uploading documentation, the covid impact on the frequency of Steering Committees (i.e. held less often), the self-training principal for eMS, audit requirements within the claims process etc. However concerning such aspects of the programme, the following is recommended:

    - Where possible, simplify both the procurement and claims processes used and ensure that the same processes are not overly prohibitive for partner organisations and inadvertently act as a deterrent to their participation;
    - If this is not possible, offer the projects and programme participations greater level of support to navigate and understand the processes used (including the use of eMS);
    - Seek to streamline SEUPB's own claims and verification processes so that projects are not placed under undue cashflow pressures;
    - Simplify the project monitoring requirements and ensure that monitoring is focused on key indicators;
    - Respond to project modification requests in a timelier fashion.

Appendix I – Overview of Key Strategies

EU Cohesion Policy 2014-2020

Cohesion Policy is the EU's main investment policy which targets all regions and cities in the European Union in order to support job creation, business competitiveness, economic growth, sustainable development, and improve citizens' quality of life.

The investments help to deliver many other EU policy objectives. It complements EU policies such as those dealing with education, employment, energy, the environment, the single market, research and innovation. In particular Cohesion Policy provides the necessary investment framework and strategy to meet the goals of the Europe 2020 Strategy for smart, sustainable and inclusive growth in the European Union.

Cohesion Policy set 11 thematic objectives supporting growth for the period 20142020 as follows:

1. Strengthen research, technological development and innovation;
2. Enhancing access to, and use and quality of, information and communication technologies;
3. Enhancing the competitiveness of SMEs
4. Supporting the shift towards a low-carbon economy;
5. Promoting climate change adaption, risk prevention and management;
6. Preserving and protecting the environment and promoting resource efficiency;
7. Promoting sustainable transport and improving network infrastructures;
8. Promoting sustainable and quality employment and supporting labour mobility;
9. Promoting social inclusion, combating poverty and any discrimination;
10. Investing in education, training and lifelong learning; and
11. Improving the efficiency of public administration.

EU2020 Objectives

Europe 2020 – A Strategy for smart, sustainable and inclusive growth – is the EU's response to the Great Recession, which was the period of general economic decline observed in world markets during the late 2000s and early 2010s. The Strategy aimed to ensure that Europe emerged stronger from the economic and financial crisis.

Europe 2020 put forward three mutually reinforcing priorities:

- **Smart growth**: developing an economy based on knowledge and innovation.
- **Sustainable growth**: promoting a more resource efficient, greener and more competitive economy.
- **Inclusive growth**: fostering a high-employment economy delivering social and territorial cohesion.

Of particular relevance to Priority Axis 1: Research & Innovation, smart growth means strengthening knowledge and innovation as drivers of future growth. This requires improving the quality of education, strengthening research performance, promoting innovation and knowledge transfer through the Union, making full use of information and communication technologies and ensuring that innovative ideas can be turned into new products and services that create growth, quality jobs and help address European and global societal challenges But, to succeed this must be combined with **entrepreneurship, finance and a focus on user needs and market opportunities.**

The Strategy contained five measurable EU targets for 2020 that were anticipated to steer the process and be translated into national targets: for employment; for research and innovation; for climate change and energy; for education; and for combating poverty. They represented the direction that it was considered Europe should take.

- 75% of the population aged 20-64 should be employed.
- 3% of the EU's GDP should be invested in R&D.
- The "20/20/20" climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right).
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree.
- 20 million less people should be at risk of poverty.

The Atlantic Strategy

The 'Atlantic Strategy' is the EU's Maritime Strategy for the Atlantic Ocean area. It provides for a coherent and balanced approach that is consistent with the EU 2020 agenda. It is largely focused on helping communities living and working on the Atlantic coast deal with new economic realities, but also recognises that the EU shares responsibility for stewardship of the world's oceans. Broadly speaking the strategy cover the coasts, territorial and jurisdictional waters of the five EU Member States with an Atlantic coastline – France, Ireland, Portugal, Spain and the United Kingdom.

The Strategy is based around five themes. Actions within each will contribute to the overriding objective of creating sustainable jobs and growth.

Theme	Proposed Actions
Implementing the ecosystem approach	Management of human activities in the Atlantic must deliver a healthy and productive ecosystem. The ecosystem approach is the basis for marine management in both the Common Fisheries Policy and the Marine Strategy Framework Directive. However, the implementation processes for ensuring sustainable fisheries and achieving a good environmental status are still largely separate in practice and will require additional effort in the Atlantic Ocean area. Therefore, the strategy for the Atlantic must focus on developing the following aspects: • Fisheries have been a central plank in economies on both sides of the Atlantic. However, single-species management must make way for multi-species long-term plans that take into account the wider ecosystem. • Aquaculture, which can satisfy EU demand for healthy and sustainably produced fish products over and above the level that can be provided by capture fisheries. The strategy, therefore, promotes spatial planning as a tool for implementing the ecosystem approach in the Atlantic Ocean area. Such a process should strengthen coherence, connectivity and resilience of marine protected areas in the Atlantic in line with the EU biodiversity action plan. • Finally, Atlantic oceanic circulation drives changes in European terrestrial as well as marine ecosystems. Forecasting future changes in Europe's climate and adapting to these changes will never be achieved without a better understanding of the Atlantic. This calls for sustainable observation systems, from space and at sea, of key marine variables.
Reducing Europe's carbon footprint	As climate change mitigation is an integral part of all EU policies, the strategy focuses on the following elements: • The Atlantic has stronger winds than the other seas that wash Europe's shores. Not only does this offer clean energy but it can also contribute to reducing dependency on distant sources of fossil fuel. By 2020, around 20% of the European offshore wind installed capacity could be located in the Atlantic basin. • The potential of the Atlantic's powerful waves and strong tides needs to be exploited as well. The predictable nature of energy from tides can complement the fluctuating energy from wind. However successful deployment of large scale offshore renewable energy will only happen if grid connections are ensured to link the main production centres to the consumption. • Changes in maritime transport will also contribute to the carbon footprint reduction in the Atlantic.
Sustainable exploitation of the Atlantic seafloor's natural resources	This strategy aims to focus on the following aspects in order to develop the sustainable exploitation of the Atlantic seafloor's natural resources: • Tackling the challenges in commodity markets and on raw materials by emphasising the need to increase investment in Europe's natural assets whilst ensuring that minerals are extracted under safe conditions that respect the environment and workforce. • Marine research institutes on both sides of the Atlantic are well placed to deepen understanding of what the rich biodiversity of the ocean can offer further for food, fuel and pharmaceuticals whilst preserving its ecosystem functions. • Access to the data produced by research institutes and other public authorities has not always been easy in the past. The EU's marine knowledge 2020 initiative will support business and conservation authorities by providing a unique access point for marine data harmonised over sea-basins, so reducing the cost of assembling the data necessary to design, build and operate coastal or offshore infrastructure. Unlocking the patrimony of

Theme	Proposed Actions
	marine data will not only make existing business processes more competitive but will stimulate innovation by opening access to previously excluded researchers and small businesses.
Responding to threats and emergencies	The EU needs to be prepared for threats and emergencies in the Atlantic whether they are caused by accidents, natural disasters or criminal activity. The following aspects are priorities for the Atlantic Ocean area: • The adoption of important legislative measures on maritime safety; • In addition, early warnings require continuous monitoring of the sea, fast transmission of information, coordination of response teams and mobilisation of expert advice. • The Atlantic is Europe's lifeline for trade. Europe's security of supply must be absolutely secure and the trafficking of arms, people and drugs must stop.
Socially inclusive growth	Whilst there is considerable variation along the Atlantic coast, many communities need to cope with a decline in employment in fisheries and shipbuilding, the shift of mass tourism to sunnier climes and the tendency of elderly people to choose the coast for retirement. The challenge is to ensure that new high-added-value jobs are created at the coast and at the same that those who seek employment in the new economy have the right skills to do them. • Wider mutual recognition of training, including the next generation of marine scientists, re-training and professional qualifications are required to retain maritime expertise and restore the attractiveness of maritime professions. • Regional clustering of maritime industries with educational establishments can ensure a skilled workforce and promote labour mobility within sectors. The advent of new communication technologies means that a critical mass of industries and researchers in geographically separate locations can set up virtual clusters. The strategy has a focus on encouraging the development of these clusters through territorial cooperation projects. • A discerning tourism can help regenerate some Atlantic coastal areas but it needs to attract all-year-round trade rather than summertime only in order to support quality jobs. The Atlantic's rough natural beauty, rich biodiversity, traditional seafood cuisine and Celtic culture are assets that can be readily exploited. Nautical activities are an important source of revenue and a creator of high-value jobs, however, the Atlantic coast has a major deficit in berths especially for large recreational vessels. The Atlantic strategy incorporates the opportunities for development in this field.

Following the development of the Atlantic Strategy document, an Action Plan was developed, with the intention that it should be implemented through to 2020. These action areas are designed to meet the challenges of the Atlantic strategy and deliver smart, sustainable and socially inclusive growth and jobs. It comprises an indicative set of action areas for research and investment to tackle common challenges. Addressing these priorities can promote innovation, contribute to the protection and improvement of the Atlantic's marine and coastal environment, improve connectivity and create synergies for a socially inclusive and sustainable model of regional development.

Priority	Specific Objectives
1: Promote entrepreneurship and innovation	• Sharing knowledge between higher education organisations, companies and research centres; • Enhancement of competitiveness and innovation capacities in the maritime economy of the Atlantic area; • Fostering adaptation and diversification of economic activities by promoting the potential of the Atlantic area.
2: Protect, secure and develop the potential of the Atlantic marine and coastal environment	• Improving maritime safety and security • Exploring and protecting marine waters and coastal zones • Sustainable management of marine resources • Exploitation of the renewable energy potential of the Atlantic area's marine and coastal environment
3: Improve accessibility and connectivity	• Promoting cooperation between ports.
4: Create a socially inclusive and sustainable model of regional development	• Fostering better knowledge of social challenges in the Atlantic area; • Preserving and promoting the Atlantic's cultural heritage.

The Horizontal Principles

The three Horizontal Principles are as follows:

Sustainable development	This principle seeks to ensure that the Programme supports activity that promotes sustainable development and creates sustainable communities by safeguarding and requiring the sustainable use of, existing resources to enhance the long-term management of, and investment in, human, social and environmental resources for future generations.
Equal opportunities and non-discrimination	In accordance with Section 75 of the Northern Ireland Act 1998, the Employment Equality Act (1998) and the Equal Status Act (2000), as amended by the Equality Act (2004) in Ireland and the Equality Act (2006) in Scotland, operations part-financed by the Programme shall comply with and, where appropriate, contribute to Community policy and legislation on equal opportunities and non-discrimination. Accordingly, the Programme will have due regard for the need to promote equality of opportunity: • Between persons of different religious belief, political opinion, racial group, age, marital status or sexual orientation: • Between men and women generally; • Between persons with a disability and persons without; • Between persons with dependants and persons without; and • Without prejudice to the above, have regard to the desirability of promoting good relations between persons of different religious belief, political opinion or racial group.
Equality between men and women	The Programme shall pursue the objective of equality between men and women and take appropriate steps to prevent any discrimination during the preparation, implementation, and monitoring and evaluation stages of the programme. Gender equality aims to ensure that men and women enjoy the same rights and opportunities; with equal value and weighting attributed to the different behaviour, aspirations and needs of women and men

Appendix II – Source to Tap Exit Strategy

Risk Area	Potential Risk	Possible Cause	Potential Exit Strategy
Farming for water – Pilot Land Incentive Scheme	Landowners go back to boom spraying MCPA = increased MCPA loads in river	• Funding for weed-wiping is no longer available • Weed-wiping more expensive than boom spraying • Landowners do not know who to approach for weed wiping • Sprayer in poor condition/not calibrated	• **Clearly demonstrate the cost/benefit of weed-wiping vs boom spraying (AFBI/Teagasc may be able to input)** - speak to contractors to get prices and present as a case study Also bring in the science showing that boom spraying is not as good as weed-wiping (efficacy of method). • **Rush Control Contractor and Equipment event** so that landowners can relate to local contractors to continue with weed-wiping. Include boom sprayer servicers but with the emphasis that weed wiping is better. • **Land-owner LIS farm tour** – allowing local landowners to see the impact of weed-wiping at farm-scale. • **Responsible Contractor Badge** for local contractors - for those that have supported the StT Project and helped to deliver environmental benefits • **Weed Wiping Newsletter** (special edition) to landowners including contact details for contractors (invite contractors to submit details) • **Encourage Contractors to promote weed-wiping services** - ahead of each weed-wiping season (could be supported by Water Catchment Partnership) • **Inclusion of new and additional measures in a future funded project** <u>Considerations for future projects</u> • Buyout of boom spraying equipment • Supply of weed-wipers • Booms sprayers servicing and supply of low-drift nozzles • StT do not feel that servicing boom sprayers is the right way to go as it may encourage/incentivise people to use boom sprayers • AR/QR codes on pesticide stores and at agri-stores
	Cattle are allowed back into the river = increased sediment loss to river	• Fences are not maintained or are deliberately removed/opened • Alternative water points stop working and not fixed	• **Clearly demo the cost/benefit of fencing (AFBI/Teagasc may be able to input)** - speak to contractors to get prices and present as a case study Also bring in the science showing that fencing benefits the farm business and the environment. • **Landowner Fact Sheets** - To be made available as hard copy to LIS landowners and digital to everyone else. Top tips on maintaining: 1. Fencing 2. Pasture pumps 3. Solar drinkers 4. Mains-fed drinkers 5. Who to go back to for parts (local agri-store) • **Spare parts** - Speak to local Agri-stores in the Derg catchment area to have spare parts available (on request) • **AR/QR codes** on fences/ at agri-stores near the fenceposts and wire that link back to the cost/benefit of fencing and the StT fencing video.
Farming for water – Pilot Land Incentive Scheme (continued)	Chemicals and containers are poorly handled and disposed of = increased chemical levels in river	• Chemicals not stored in Pesticide Cabinet provided • No pesticide cabinet • Accidental spills when handling • Inappropriate disposal of chemical containers	• **Pesticide cabinet stickers** – highlighting best practice in storage and handling (to be given to all LIS landowners and made available through local agri-stores). • **Drip trays** - given to all LIS landowners • **Spill kits** - given to all LIS landowners • **PR on the good news story** – around reductions in MCPA loss to local rivers - thank the landowners • **Landowner Fact Sheets** - Top tips on how to: Dispose of unused pesticides Dispose of chemical bottles Safe filling of sprayers/weed wipers • **Promote pesticide disposal facilities** -make landowner aware of Irish pesticide disposals facilities available through Local Authorities i.e., Donegal CoCo.

Risk Area	Potential Risk	Possible Cause	Potential Exit Strategy
			• **Pesticide Amnesty (subject to external funding or future project)** - provided through a waste management contractor, taking unused and unwanted chemical and containers.
	Peatland is further drained, or peat drains (sheughs) are cleaned without any mitigations in place, resulting in increased colour and turbidity	• Land becomes wetter due to increased rainfall and requires drainage to be farmed	• **Landowner Fact Sheets** - Top tips on how to: 1. Reduce sediment loss when cleaning out existing drains (explain why this is an issue, simple measures that can be taken, contact details/consents) - endorsed by UFU/IFU - refer to Ireland guidelines that are being produced. 2. Rewetting peat, drain blocking. • **Explore how we engage with carbon/climate agenda** and policy discussions around future agri-schemes. Tie in with peat restoration/conservation. • **Highlight to policy makers (**NIEA, NPWS/DAFM) the fact that no landowners took up the peat measures. Discuss how future policy will support landowners to rewet and block drains. • One-page policy brief (for consultation)- to influence Nitrates Action Plan review in Ireland, RBMPs and Future Farming review for NI. • **Inclusion of on-farm peat restoration measures in a future funded project** <u>Considerations for future projects.</u> • How do you incentivise on-farm peat restoration? • How do we link on-farm peat restoration with the emerging Carbon economy?
Love Your Water – Riverfly Monitoring	Trigger levels are not set for monitoring points resulting in volunteers have nothing to benchmark riverfly samples against	• Lack of will in Government to set the trigger levels • Lack of clarity on who should set the trigger levels	• **Riverfly Volunteer Fact Sheets:** To be shared with existing volunteers and made available on the SCAMP website**.** How to: 1. Establishing a monitoring group 2. Establishing and registering monitoring sites and setting trigger levels 3. Health & Safety and Biosecurity. • **Contact the local authorities** in Ireland to establish who can set trigger levels (incorporate detail into fact sheets). • **Link Irish CoCo contacts with NIEA** • **WMU ARMI contact point** to encourage knowledge exchange. • **Establish operating procedure for ARMI trigger level breeches** in the Irish parts of Erne and Derg catchments. • **Explore the potential to trial ARMI monitoring in red-dot streams** (Red Dot programme in border areas).
	Volunteers stop monitoring or are no longer available to volunteer resulting in citizen science initiative fizzles out	• Loss of interest/ bored • Volunteers move away/die • Volunteers feel what they are doing is not making any difference/not taken seriously	• **Riverfly Volunteer Fact Sheets:** Supporting information on how to keep the group going - ideas for other Citizen Science activities that can be incorporated or run alongside ARMI (NNIS id, outfall safari, winged phase id).
	The monitoring group is not sufficiently supported = group do not communicate/ have no direction and so stops functioning	• No clear lead for the group • Lead not sure what their role is as Coordinator	• **Affiliate volunteers to local groups** (i.e. Erne Rivers Trust, Friends of the Dromore River, Derg Anglers) - need to meet with potential lead groups to agree adoption of volunteers to explore support they may need to do this. • **Establish leads or coordinators** for each group • **Explore the potential for a Community of Practice supported by The Rivers Trust** - direct link to statutory contact (Ire/NI) • **Explore the potential for a Citizen Science Annual Awards** - coordinated by TRT supported by NIW/IW
	Methodology becomes outdated or no longer relevant = method no longer supported	• Methodology changes but no funding for retraining/ equipment • Methodology falls out of favour with supporting authorities	• **Meet with authorities in Ireland** to see how they can support ARMI in border areas (County Councils, LAWPRO - Community and Scientific Officers, EPA).

Risk Area	Potential Risk	Possible Cause	Potential Exit Strategy
Learning for water – Learning and Outreach Programme	Resources are not used by schools	• Schools do not know where to find resources • Schools do not know how to use the resources • Schools do not see the link between the resources and the curriculum • It is too difficult for teachers to integrate the resources into lesson plans	• **Appoint an education specialist to** produce lesson plans linked to both the NI /Ire curriculums, Train the trainer, and produce a video about to use the resources. • **Write to schools in the Erne and Derg** - explain what resources are available and where they can be accessed. • **Make contact Green School/Eco-Schools programmes** to promote our package of resources. Agree what value our modules will contribute towards audit/flags • **Link in with workshops/committees for Green/Eco schools** to promote our resources (TRT has links for Green Schools and Eco-Schools) • **Contact other education/outreach initiatives** to explore whether StT resources be integrated with existing schemes e.g. STEM project in NI, NI Water Bus (Anna Killen), IW Regional Comms Team.
	Resources are not used properly by schools	• Schools do not know how to use the resources • Activities are too complicated/lack of instructions	• **Lesson plans** (link to curriculum), train the trainer, video about to use the resources
Peatlands for Water	There is a missed opportunity to continue learning from the Tullychurry site and to inform the climate change agenda.	• Lack of understanding that there is only 1 year of data post restoration.	• **Emphasise the fact that the monitoring is too short** and there needs to be a long-term study of the site adding in DOC in water and CH4 and CO2 in atmosphere. Do this on the legacy SCAMP website and through conversations with stakeholders. • **Publish popular article** with supporting data (UU/TRT)
	The monitoring is not continued and there is a missed opportunity to learn further from the restoration over the long-term.	• Lack of resources by others to fund. • Universities are unlikely to be able to pursue this monitoring without formal agreement and resources to undertake the monitoring. Student will not be able to undertake monitoring without the necessary H & S and staff support.	• **NIW to arrange a meeting with Forest Service and NIEA Natural Heritage** to discuss future of the site (possibly link to Challenge Fund bid [lead to be identified]).
	The lack of positive monitoring results in the time available means the restoration method isn't taken seriously.	• StT has only monitored the establishment phase of the recovery.	• **Consider potential for others** (i.e. NIEA) to just do water level monitoring going forward and not colour. • **Explore the potential for this to be parked for a couple of years** and then re-looked at for monitoring e.g. in Year 5 and again for Year 10. • See above for potential routes to securing further monitoring work (Challenge Fund).
	Data is lost from the monitoring	• Figures not included in reports.	• **Report will be written with figures included** and added to legacy SCAMP website. Legacy website will be live for 4 years.
	The site is not maintained, and no management plan is produced	• Lack of resources by others to engage	• **Arrange a meeting with Forest Service and NIEA Natural Heritage** to discuss future of the site.
Forests for water – Forestry pilot sites	Measures are not removed from all locations annoying Forest Service, Coillte and local landowner	• Lack of resources. • Need a Section 46 licence to remove the Corgary Road geotextile dams	• **NIW to check with Forest Service and Coillte** if any measures need to be removed.
	Measures aren't taken up further by forestry staff and used in the future.	• Lack of knowledge sharing with Forestry sector	• **Stakeholder visit** held to share knowledge. • **Forestry 'How to' Fact Sheets** – are available on the legacy SCAMP website and are shared with forestry operators (NI and Ireland). • **Scope out further research** and do it jointly with Forest Service and Coillte if funding can be found.
	Opportunities to share learning are missed	• Lack of opportunities to share learning through site visits before measures are removed	• **Visit undertaken** for Loughs Agency staff. • **Possible follow-up visit** for local foresters to be organised • **Ensure leaf, branch, root is implemented**.