LONG TERM MANAGEMENT PLAN FOR THE GREAT WESTERN LAKES NON TECHNICAL SUMMARY OF SEA ENVIRONMENTAL REPORT

Prepared under SI 435 of 2004 as amended.

Contents

This report has been prepared by Minogue Environmental Consulting Ltd with all reasonable skill, care and diligence. Information report herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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Minogue & Associates
ENVIRONMENTAL CONSULTANCY

1 Non technical summary of SEA ER

1.1 Context and Purpose

An Environmental Report has been prepared as part of the Strategic Environmental Assessment of the Long Term Management Plan of the Great Western Lakes (the plan) by Inland Fisheries Ireland (IFI). This is the Non-Technical Summary of this report.

1.1.1 Summary and outline of Plan

Inland Fisheries Ireland (IFI) has a statutory remit under the Inland Fisheries Act of 2010 - to protect, conserve and manage Irelands inland fisheries resources. An integral part of this resource is the habitats and waters inhabited by fish species of conservation interest. This plan has been prepared for a group of waterbodies and their catchment areas to advance the conservation and restoration of their ecological integrity and thus, native fish stocks. Seven lakes and their catchments, primarily in Connaught, are managed as salmonid waters in Ireland.

These waterbodies are large by Irish standards (1,266 – 16,562 Ha.) and are generally based on carboniferous limestone. Their bathymetry, water chemistry and unique assemblages of flora and fauna has resulted in the evolution of rare and highly valued ecosystems that offer an abundance of services to society and the natural environment. The lakes have become an integral part of the European Natura 2000 network and immense centres for recreational and cultural activity, particularly angling.

1.1.2 Overview of Plan

This plan sets out a series of measures which aim to address and manage many of the factors currently impacting on the ecosystems and the status of native fish stocks on the designated lakes and their catchments. Key objectives include:

- To ensure the sustainability of salmonid fish and fisheries within the designated waterbodies and to introduce measures to mitigate against the pressures currently impacting on their ecological integrity.
- To protect, manage and where they have been damaged, restore the natural attributes and aquatic biodiversity of the designated waterbodies.
- To restore damaged habitat and its potential to support sustainable wild brown trout and salmon fisheries.

Although this plan relates primarily to the conservation and management of salmonid fish, the importance of their co-dependence and relationship with other, flora and fauna must also be recognised. All seven lakes and significant parts of their catchments are designated as Special Areas of Conservation (SAC) or Special Protection Areas (SPA) under European Legislation (European Communities (Birds and Natural Habitats Regulations 2011 (S. I. No. 477 of 2011). Appropriate Assessments will be carried out for all projects and management actions on the western lakes. These assessments are necessary to ensure that sensitive species and habitats, that are qualifying interests for the Natura sites are not adversely affected by any management measures proposed through this plan.

The implementation will require a multi-disciplinary, multi-agency approach and will seek to engage local communities and other interested stakeholders within the catchment areas.

The plan also endorses the concept of adaptive management, whereby actions and measures are periodically assessed in terms of their benefits and impacts on critical receptors, (e.g., Salmonid stocks, water quality, aquatic habitats) within the western lake catchments.

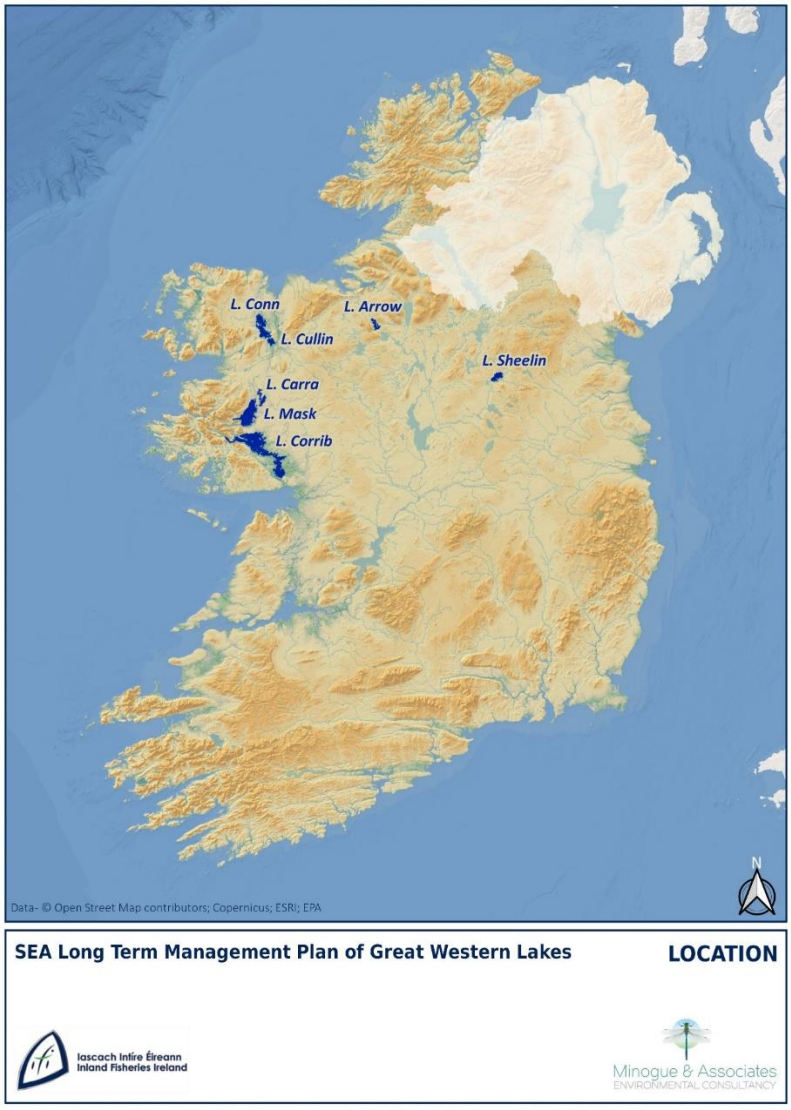
The effects of various management strategies will be regularly evaluated and modified accordingly, to better achieve the desired outcomes. Section 11 of this plan sets out timelines for actions over an initial 5-year period that align with IFI's Corporate Plan 2021 – 2025. The resources required to implement the plan including an outline of funding and staff required is in preparation and will accompany the final draft of this plan.

It is widely recognised that native fish stocks, water and habitat quality have declined on the western lakes over the last three decades. This plan proposes a series of actions aimed at redressing these declines and, in association with other relevant state authorities and local communities, IFI will endeavour to achieve improvements that will secure native fish stocks and their habitat into the future. In order to successfully achieve the objectives and implement the measures set out in this plan, additional resources will be required. Once these have been allocated, a series of specific targets and performance indicators will be developed to ensure that critical elements within the plan are accomplished.

Other sensitive catchments

The issues currently impacting on vulnerable salmonid stocks are not confined to the lakes included in this plan. There are numerous river and lake systems, particularly in the western counties from Donegal to Kerry where salmonids and other rare native fish species are severely threatened. Problems associated with invasive fish introduction, water quality pressures and aquaculture are of particular concern in some of these catchments. A series of separate plans are proposed for these catchments which will seek to address the issues currently impacting on these waterbodies and their fish stocks. As detail and location of these sensitive catchments are not included in this Conservation Management Plan for the Great Western lakes they are not assessed in detail in this SEA ER as they will be subject to their own plans. Figure 1.1. below presents the locations of the Great Western lakes.

FIGURE 1-1 LOCATION OF GREAT WESTERN LAKES



1.1.3 Steps in the SEA Process

The steps involved in SEA are as follows:

- Screening (determining whether or not SEA is required).
- Scoping (determining the range of environmental issues to be covered by the SEA).
- *The preparation of an Environmental Report (current stage)*
- The carrying out of consultations.
- The integration of environmental considerations into the Plan or Programme.
- The publication of information on the decision (SEA Statement).

1.1.4 Consultation on scoping stage

Submissions received at scoping stage have all informed the scope of this SEA. Consultation undertaken by IFI over 2022 has also informed the plan preparation.

1.1.5 Relationship to other plans and programmes

It is a requirement of the SEA to review and assess how the draft strategy may interaction with other plans and programmes; this review was undertaken as part of the SEA and please see Chapter 3 of the Environmental Report for more detail. Arising from the review, the following Table 1.1 highlights key implications from this review and how it relates to the UN sustainable development goals and the EPA State of Irelands Environment Themes. The objectives in the first column are also used to undertake the detailed assessment of the plan as shown in Chapter Seven of the SEA ER.

TABLE 1-1 STRATEGIC ENVIRONMENTAL OBJECTIVES AND THEIR LINKS TO THE EPA AND UN SUSTAINABLE DEVELOPMENT GOALS

SEA Topic	Principles for the Plan and SEA	EPA Irelands Environment 2020 Key Messages	United Nations Sustainable Development Goals
Biodiversity, Flora and Fauna	• Conserve and enhance biodiversity at all levels • Avoid and minimise effects on nationally and internationally rare and threatened species and habitats through sensitive design and consultation, recognising ecological connectivity • Facilitate species and habitat adaption to climate change • Avoid and minimise habitat fragmentation and seek opportunities to improve habitat connectivity • Ensure careful consideration of non-native invasive and alien species issues	SOE 4 Climate SOE 5 Air Quality SOE 6 Nature SEO 8 Marine SOE 11 Water Services SEO 12 Circular Economy SOE 13 Land use	SD Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Population and Human Health	• Support citizen science and stakeholder engagement	SOE3 Health and Wellbeing SOE4 Climate SOE5 Air Quality SOE 11 Water Services SOE 12 Circular Economy SOE13 Landuse	SDG 3. Ensure healthy lives and promote wellbeing for all at all ages. SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable.
Water	• Protect and enhance the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystem (quality, level, flow). • Maintain or improve the quality of surface water and groundwater (including estuarine, marine and transboundary waters) to status objectives as set out in the Water Framework Directive (WFD), the National River Basin Management Plan and POMS.	SOE3 Health and Wellbeing SOE5 Air Quality SOE4 Climate SOE6 Nature SOE 11 Water Services SOE13 Landuse	SDG 6. Ensure availability and sustainable management of water and sanitation for everyone SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Soil and Geology	• Conserve, protect and avoid loss of diversity and integrity of designated habitats, geological features, species or their sustaining resources in designated ecological sites .	SOE4 Climate SOE6 Nature SOE 11 Water Services	SD Goal 12. Ensure sustainable consumption and production patterns.

SEA Topic	Principles for the Plan and SEA	EPA Irelands Environment 2020 Key Messages	United Nations Sustainable Development Goals
		SOE 12 Water Services SOE13 Landuse	SD Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
Air Quality and Climate	• Adapt and improve resilience to the effects of climate change • Minimise adverse impacts associated with air and noise quality	SOE3 Health and Wellbeing SOE5 Air Quality SOE4 Climate SOE6 Nature SOE 8 Marine SOE9 Clean Energy SOE 11 Water Services SOE12 Circular Economy SOE13 Landuse	SD Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation SD Goal 12. Ensure sustainable consumption and production patterns SD Goal 13. Take urgent action to combat climate change and its impacts.
Material Assets	• Plan and provide for sustainable water management and wastewater treatment	SEO3 Health and Wellbeing SOE 5 Air Quality SOE 8 Marine SOE9 Clean Energy SOE 13 Land use SOE 11 Water Services SOE 12 Circular Economy	SD Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation SD Goal 12. Ensure sustainable consumption and production patterns SD Goal 13. Take urgent action to combat climate change and its impacts
Cultural Heritage	• Conserve, preserve and record architectural and archaeological heritage	SOE3 Health and Wellbeing SOE 12 Circular Economy SOE13 Landuse	SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable. SD 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Landscape	• Integrate green and blue network considerations • Improve landscape connectivity to surrounding area	SOE3 Health and Wellbeing SOE 4 Climate SOE 5 Air Quality	SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable. SD Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage

SEA Topic	Principles for the Plan and SEA	EPA Irelands Environment 2020 Key Messages	United Nations Sustainable Development Goals
		SOE 6 Nature SEO 8 Marine SOE 11 Water Services SOE 12 Circular Economy SOE 13 Land use	forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

2 Describing the current environment

Baseline data has been gathered to present information on the current environment within the area. The Baseline section describes the following topics structured within the relevant catchment area for each lake.

For water, a catchment is simply defined as an area of land around a river, lake or other body of water. Living in a catchment that has healthy water can help a community to have a better quality of life. A healthy water catchment provides high-quality drinking water and supports livelihoods such as agriculture, recreational angling and water sports. It also supports local ecosystems so plants, animals, fish and insects that depend on having healthy water can thrive and flourish.(EPA catchments.ie)

- Biodiversity, Flora and Fauna
- Population and Human Health
- Soil and Geology
- Water Resources including flooding
- Air Quality and Climate
- Cultural Heritage
- Landscape
- Material Assets, and the
- Interaction between the above topics.

These are summarised below for each lake.

2.1.1 Corrib Catchment

Three of the lakes are located within the extensive catchment of the Corrib. The Corrib catchment includes the area drained by the River Corrib and all streams entering tidal water between Renmore Point and Nimmo's Pier, Galway, draining a total area of 3,112km² .

The largest urban centre in the catchment is Galway City. The other main urban centres in this catchment are Tuam, Ballinrobe, Claremorris and Ballyhaunis. The total population of the catchment is approximately 116,866 with a population density of 38 people per km².

This catchment is characterised by a wide, flat, limestone plain occupying the eastern two-thirds of the catchment which terminates in the large lakes of Corrib and Mask that abut against the igneous granites of Galway and the metamorphic uplands of southwest Mayo. The entire area of this catchment east of the large lakes is karstifed and groundwater and surface water are highly interconnected in this region.

Lough Corrib is situated to the north of Galway city and is the second largest lake in Ireland, with an area of approximately 18,240 ha (the entire site is 20,556 ha). Lough Corrib, the largest of the western lakes and the second largest lake in Ireland (after Lough Neagh), is situated in Co. Galway in the River Corrib catchment. The lake stretches from outside Galway city to within three km of Maam Cross, a distance of over 50 km. The main rivers draining into Lough Corrib include the Black, Clare, Dooghta, Cregg, Cornamona, Maam, Owenriff rivers and the Cong canal which joins Lough Corrib to Lough Mask. It is one of the best game fisheries in the world and is internationally renowned for its brown trout fishing. The lake is known to hold brown trout, salmon, perch, roach, bream, roach x bream hybrids, eels, 3- spined stickleback, 9 spine stickleback, pike, tench and stone loach.

Lough Mask, at over 8,000 ha, is the sixth largest lake in the country. It is located in south Co. Mayo with a small area extending across the border into Co. Galway. It extends for over 14 km along its long axis and is on average about 5 km in width. Lough Mask is one of the most important inland gull breeding sites in the country, with nationally important populations of three gull species. It also has a nationally important colony of Common Tern. The site supports a good diversity of wintering waterfowl, including a nationally important population of Tufted Duck. The site is also regularly utilised by a proportion of the Erriff/Derrycraff population of Greenland

White-fronted Goose. Lough Mask, Carra and Cloon make up the Lough Carra/Lough Mask Special Area of Conservation (SAC) complex. Six habitats listed on Annex I of the EU Habitats Directive are found in this site, including two priority habitats - limestone pavement and Cladium fen (NPWS, 2004). Roach, an invasive fish species was first recorded in a fish stock assessment survey in 1996, since then the population has spread throughout the lake. Lough Mask is noted for its populations of brown trout and ferox trout. During the most recent survey perch, roach, bream, roach x bream hybrid, brown trout, Arctic char, pike, three-spined stickleback and eels were recorded (Corcoran et al., 2020).

Lough Carra, which extends for over 9 km along its long axis, lies to the north-east of Lough Mask, in the Corrib catchment in Co. Mayo. The average size of the brown trout taken from Lough Carra is greater than any of the other western lakes as they grow rapidly in this rich ecosystem. Lough Carra is believed to be one of the few remaining wild brown trout calcareous lakes within the EU (Irvine et al. 2003). Whiteclawed Crayfish (Austropotamobius pallipes), a species listed on Annex II of the E.U. Habitats Directive, has been recorded from Lough Carra. The islands in Lough Carra have traditionally supported nesting gulls.

2.1.2 Moy and Killala Bay Catchment

This catchment includes the area drained by the River Moy and all streams entering tidal water in Killala Bay between Benwee Head and Lenadoon Point, Co. Sligo, draining a total area of 2,345km². The largest urban centre in the catchment is Castlebar. The other main urban centres in this catchment are Ballina, Tubbercurry, Kiltimagh, Swinford, Foxford, Enniscrone and Crossmolina. The total population of the catchment is approximately 77,262 with a population density of 33 people per km². The lowland parts of the catchment are underlain by various types of limestones while the upland areas from the Ox Mountains and Croaghmoyle are underlain by a band of igneous and metamorphic rocks. Much of the lowland area south of Lough Conn exhibits a drumlin topography. There are extensive sand and gravel aquifers lying between Swinford and Charlestown to as far south as Knock, to the east of Ballina and southwest of Crossmolina.

Lough Conn and Lough Cullin

Lough Conn and Lough Cullin are situated in north Co. Mayo and are connected by a narrow inlet near Pontoon. Both Lough Conn and Lough Cullin are part of an important salmonid fishery.

The Arctic Char (*Salvelinus alpinus*), an interesting relict species from the last ice age, which is listed as threatened in the Irish Red Data Book has been recorded from Lough Conn and in only a few other lakes in Ireland. The latest reports suggest that it has disappeared from the site. More recently a whole 13 lake fish stock survey was undertaken in 2016 (Kelly et al., 2017) and 2022 (in prep). Roach followed by perch were found to be the most dominant species during the 2016 survey followed by brown trout, eel, pike, salmon and tench (Kelly et al., 2017)

Loughs Conn and Cullin support important concentrations of wintering waterfowl and both are designated Special Protection Areas (SPAs). A nationally important population of the Annex I species Greenland White-fronted Goose (average 113 over 6 winters 1994/95 to 1999/00) is centred on Lough Conn.

2.1.3 Sligo Bay and Drowse catchment, Unshin sub catchment

The Sligo Bay & Drowes catchment includes all streams entering tidal water in Sligo Bay and between Lenadoon Point and Aughrus Point, Co. Donegal. The catchment has a surface area of 1,866km² . The largest urban centre is Sligo. The other main urban centres are Ballymote, Collooney, Ballysadare and Manorhamilton. The total population is approximately 59,184 with a population density of 32 people per km².[1]

Lough Arrow

[1] Sligo Bay & Drowes (catchments.ie) Accessed 08.04.2023.

Lough Arrow, located in Counties Sligo and Roscommon, is a large limestone lake that conforms to a type listed on Annex I of the E.U. Habitats Directive. The lake is sheltered on three sides by hills and is the source of the Unshin River. The wooded islands and some areas along the shore are used by nesting Tufted Duck , the reedbeds are also used by nesting wildfowl. Lough Arrow supports the highest density of breeding Great Crested Grebe, Merganser and Tufted Duck of any of the large lakes in western Ireland.

The lake is notable for its Brown Trout and Eel populations, both of which are fished. Otter, a Red Data Book species which is legally protected under the Wildlife Act, 1976, and is listed on Annex II of the E.U. Habitats Directive, has been recorded at the site.

2.1.4 Upper Shannon catchment, Inny (Shannon) sub-catchment

Lough Sheelin is situated in counties Cavan, Meath and Westmeath in the Inny sub-catchment of the River Shannon Basin District. The lake is located north-east of Finnea, Co. Westmeath. It is seven kilometres long and has a surface area of 1,900 hectares. The River Inny flows through the lake. Lough Sheelin is a relatively shallow lake with a mean depth of 4.4m, a maximum depth of 15m, and 51% of the lake is less than 5m in depth. Lough Sheelin is a nationally important site for four species of wintering wildfowl and is one of the main Midlands lakes sites for wintering birds. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Great Crested Grebe, Pochard, Tufted Duck and Goldeneye. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. Whole lake fish stock surveys have been conducted on the lake every three years since 2008 for Water Framework Directive purposes. During the 2017 survey perch were the dominant species recorded followed by roach, brown trout, pike, three-spined stickleback, tench and roach x bream hybrids (Conor et al., 2018)

Chapter Four of the SEA ER presents additional information across all the environmental topics in the SEA Directive.

2.1.5 Other sensitive catchments

The issues currently impacting on vulnerable salmonid stocks are not confined to the lakes included in this plan. There are numerous river and lake systems, particularly in the western counties from Donegal to Kerry where salmonids and other rare native fish species are severely threatened. Problems associated with invasive fish introduction, water quality pressures and aquaculture are of particular concern in some of these catchments. A series of separate plans are proposed for these catchments which will seek to address the issues currently impacting on these waterbodies and their fish stocks.

2.1.6 Key Environmental Issues for the Great Western Lakes.

The SEA ER has identified the following key environmental issues as follows:

Water Quality is the most important factor influencing the ecological health of the western lakes, Their wider catchments and the fish communities they support. It has been declining in some areas and rivers over the last 3 decades although a rating of good status was assigned to all but one of these (L. Cullin) based on the most recent WFD-fish stock surveys.

However, the disappearance of Arctic char, periodic algal blooms and the failure of many of the Annex1 habitats and Annex 2 species associated with the Western lakes to meet their conservation objectives under the Habitats Directive, indicate that water quality on the western lakes and their wider catchments is not in a sustainable condition in the long term.

The sources of pollution have changed over recent decades with point sources, e.g., wastewater treatment plants and diffuse sources, e.g. septic tanks being significant issues in the past. These pressures are usually known and generally subject to monitoring and risk assessment by the relevant public authority.

Although some water quality pressures still arise from these sources, the principal concern is now related to nutrient loss from agricultural lands with forestry being a more significant pressure in areas of low agricultural activity. Degraded hydromorphology, (i.e. from barriers or physical damage caused to watercourses) is also a significant pressure in the western lakes catchments). This impact is often a cause for the failure of waterbodies to achieve good ecological status under the provisions of the

The plan identifies the following non native species as requiring management, some of which such as Bream have been removed on a trial basis (at Lough Mask) and charophyte beds appeared to recover rapidly. The following non native species are identified as requiring management:

- Pink Salmon (Oncorrhyncus gorbusha
- Pike (Esox licuis)
- Perch (Perca fluviatilis
- Bream
- Chub
- Roach

2.1.7 Climate Change

The likely impacts of climate change on Irelands landscape and ecosystems are currently being considered and assessed by various agencies including IFI. A targeted research programme "the Climate Change Mitigation Research Programme" (CCMRP) is underway to address a knowledge gap related to the impacts of climate change on Ireland's fish species and their habitats. The primary objective of the CCMRP programme is to build an evidence-based assessment programme to evaluate the impact of climate change on the Irish inland fisheries sector, with the aim of informing and building capacity for fisheries conservation and protection measures. The work is being carried out through a series of work packages including the establishment of a long-term monitoring network for fish, water temperature and other environmental variables, undertaking a species vulnerability assessment, developing species distribution models, assessing potential mitigation/adaptation strategies and education.

Water Quality and Water Services Infrastructure Climate Change Sectoral Adaptation Plan identifies a number of impacts on fish and water quality, water dependant habitats from climate change, including:

- Increased stormwater from weather events: Environmental risks: High pollutant concentrations and loads could negatively affect ecosystem health, impacting fish, aquatic invertebrates and vegetation, either directly through toxic effects of pollutants or indirectly through habitat damage caused by excess sediment or processes such as eutrophication caused by high nutrient loads.

- Drought conditions: Environmental risks: High pollutant concentrations and loads could negatively affect ecosystem health. One potentially significant impact is the increase in nutrient concentration in rivers, lakes, reservoirs and coastal water resulting in more frequent eutrophication and algal and cyanobacterial blooms. These processes are likely to be enhanced by high temperatures, which are often associated with low precipitation.

- Low water levels combined with depletion of dissolved oxygen (DO) due to eutrophication and algal blooms, and the toxic effects of cyanobacteria, may result in increased fish kills and significant damage to, or local extinctions of pollution sensitive species such as freshwater pearl mussels.

- Increased temperature: Increased temperature is likely to change the range of many species, particularly where species already have distinct or narrow distributions, for example montane species or coldwater fish species that will not have areas of higher altitude/latitude to move to where temperatures are cooler. Changes in the geographical range of native or naturalised species may result

in them becoming 'invasive' to a region within Ireland in which they move to where they were not previously found.

- Water quality impacts, for example changing lake nutrient dynamics or bank erosion and sedimentation due to invasive species. The impacts described above may also impact on the resilience of aquatic habitats and ecosystems to other water quality pressures.
- Service provision: water service provision may be affected due to invasive species. Zebra mussels can block water intake pipes and have indirect impacts, for example changing nutrient cycles in lakes and causing a decline in native species.
- Lowered water tables due to climate change can modify hydrological conditions leading to increased nutrient and sediment transport to rivers and lakes resulting in significant water quality problems and toxic impacts for freshwater ecology, suchas fish. This is particularly the case for degraded peatlands, which comprise most of the Irish peatland resource, as these systems can no longer retain water, nutrients and sediment as they do in undisturbed settings. Warmer temperatures also increase the rates of microbial decomposition and could cause an increase in dissolved organic carbon (DOC) in water released from the peatland.

2.1.8 Evolution of the environment in the absence of the plan

Table 2.1 below presents a summary of the evolution of the environment in the absence of the plan.

TABLE 2-1 EVOLUTION OF THE ENVIRONMENT

SEA topic	Evolution of same
Biodiversity, Flora and Fauna	Flora and fauna, habitats and ecological connectivity would be protected under existing provisions at legal and policy level. There would be limited considerations of the inter-connections between such issues including water quality, water dependent habitats, species decline and loss. With the absence of focus on Biodiversity and Climate change under the plan including actions, collaboration, enforcement and research these actions would not be maximised and availed off fully and within the timeframe required.
Population, Human health	Core issues including stakeholder engagement, collaboration around catchment management would not be as comprehensively addressed in the absence of the plan. As many of the actions are cross cutting for example habitat restoration, in turn, benefits accrue under this topic for improved water quality, habitat resilience and potentially healthier fish stock. In combination, effects relating to human health and air quality, water quality and climate change would not be availed of.
Air Quality and Climate	In the absence of the plan, there may be fewer opportunities to support adaptation to climate change such as increased flooding and integrating actions to improve habitats for fish.
Water Resources including flood risk	Supporting softer interventions may not be supported. Research and innovation to support a high quality aquatic environment would be missed. Potential effects across a number of other topics such as biodiversity and flora and fauna, human health.
Soil and Geology	Legislation relating to water related activities would apply. There would be less opportunity to strategically plan for soil and geology through research and the potential interactions between terrestrial and water resources.

SEA topic	Evolution of same
Material Assets	Existing objectives that relate to this parameter would apply. The current legislation which provides for the protection and enhancement of the water resources and quality at the European, National, Regional and County level will protect and maintain existing water bodies in the Plan area.
Landscape	In combination effects would continue relating to the interaction of landuse, agricultural activities and parameters such as soil, water and biodiversity.
Cultural Heritage	Legislation and guidance from international and national level afford both the architectural and archaeological elements a high level of protection. However, intangible cultural heritage and vernacular features which are not protected could continue to be lost through loss of piers, slipways etc. The potential setting of archaeological sites may in combination be adversely affected.
Inter-relationships	The potential for in combination effects arising due to the absence of the plan would be potentially significant. Evolution of the environment in the absence of the plan could generate effects in terms of loss of ecological connectivity and non-designated habitats. Disturbance and significant ongoing negative effects on biodiversity, flora and fauna through absence of controls, monitoring, data gathering and support for actions such as catchment management that can provide multiple benefits. The support for stakeholders as well. Effects of climate change on the recreational fish sector, combined with loss of opportunity to adapt to climate change and provide for restoration of natura 2000 sites and evidence based decision making would be minimised. Potential adverse effects on water quality for, freshwater and groundwater with accompanying interactions across all SEA parameters.

3 Consideration of Alternatives

The SEA legislation requires that alternatives are considered as follows within the Environmental Report:

- Reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme;
- The alternatives are identified, described and evaluated;
- An outline of the reasons for selecting the alternatives dealt with;
- A description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how encountered in compiling the required information.

The SEA Statement, which is required at the end of the plan-making and SEA process, must include and summarise "the reasons for choosing the plan as adopted, in the light of other reasonable alternatives dealt with" The following alternatives were considered through the SEA process and assessed against the SEOS as shown in Table 1.1.

The alternatives considered in this regard are set out below:

Alternative 1 - Current Situation (Business as Usual)

This current situation presents Alternative 1 (Business as Usual) to be considered by the SEA. Under this alternative, the existing trends and patterns of in relation to the current conservation actions relating to the

Great Western Lakes via current IFI programme and practices would apply. This would include for example working with LAWPRO, ongoing monitoring and fish surveys and research. Resources and funding streams would be maintained at the annual allocation basis with no prioritisation of actions.

Alternative 2 – Prioritise conservation actions on the Corrib catchment

This alternative would entail the three lakes of the Corrib catchment – Lough Corrib, Lough Mask and Lough Carra being the focus on conservation actions. This catchment is one of the largest and the three lakes represent a significant ecological resource. Given Lough Mask is identified as being at risk of not meeting WFD objectives, there is merit in focusing intervention through this approach. This approach would prioritise Lough Mask as it is the only lake identified at risk of not meeting the WFD objectives due a range of pressures many of which are diffuse sources. Much of the water that moves from Lough Mask to Lough Corrib does so via subterranean channels. The shallow mean depth of Lough Mask of 5m and its classification as an oligiotrophic lake contributes to its sensitivity and vulnerability in terms of responding to diffuse inputs as well as subterranean connections with Lough Corrib. Agriculture and domestic wastewater are identified in the draft Catchment Assessments for the Corrib as a significant pressure on Lough Mask. The remaining Great Western Lakes of Lough Conn, Lough Cullin (Moy and Killala Bay catchment), and Lough Arrow (Sligo Bay and Drowse catchment) with Lough Sheelin (Upper Shannon Catchment) would be managed under existing IFI measures and interventions.

Alternative 3 –multi- catchment approach

This would entail the seven Great Western Lakes being the focus on conservation actions through actions responsive to the challenges facing each lake, combined with interventions around habitat improvement and riparian habitat improvement. The challenges facing each lake and their catchments are complex and include pressure from agriculture, forestry and domestic wastewater. This alternative would support the need for a number of stakeholders and agencies to work together to improve water quality through reduction in sources of pollution, habitat improvements and addressing invasive species as well as supporting communities around the lakes.

Based on the assessment table above, Alternative 3 is identified as the most sustainable alternative for the Conservation Management Plan for the Great Western lakes for the following reasons:

- It provides for a longer term, strategic approach to addressing the environmental challenges facing the lakes in particular, water quality issues, invasive species, stakeholder engagement and climate change, taking into consideration sustainability issues
- It focuses on engagement, awareness raising, research across key environmental issues, and interventions to address these
- As the relevant city/county development plans will remain the primary landuse and planning framework for any new development activities, many of this SEOS would be achieved through the implementation of the existing environmental measures in each CDP.

The SEA and AA processes to date have also recommended a number of additional mitigation measures under this preferred alternative to support awareness raising, education and landuse measures that will further improve the environmental performance of the Conservation Management Plan for the Great Western Lakes.

4 Assessment of Significant Environmental Effects

The table overleaf provides an overall evaluation of the environmental effects arising from the plan. These effects encompass all in-combination/cumulative effects arising from implementation of the Strategy. The potentially significant adverse environmental effects (if unmitigated) arising from implementation of the plan are detailed as are residual effects, taking into account mitigation through both provisions integrated into the Plan and existing provisions already in force through the relevant statutory planning framework as appropriate.

Environmental impacts which occur will be determined by the nature and extent of multiple or individual projects and site specific environmental factors.

The SEA process to date has considered the potential for transboundary effects. SEA Scoping was undertaken with the Northern Ireland Department of Agriculture, Environment and Rural Affairs who provided a response to the Scoping Report including recommendations in terms of policies/plans, baseline information and other suggestions. These have been integrated to the SEA.

TABLE 2:OVERALL EVALUATION OF SIGNIFICANT EFFECTS OF THE GREAT WESTERN LAKES PLAN

High Level Objectives	Actions x number	Summary of significant effects
Stakeholder Engagement	3 actions	Positive direct impacts on Population and Human Health SEOS relating to engagement and communication. The development and enhancement of site-specific management goals through the engagement of local and national stakeholders. Creation of an awareness among stakeholders of the diversity and worth of the resident fishes (and associated fauna, flora and habitat) in these lakes, and the work being conducted to protect them. Indirectly through collaboration and common catchment management goals, positive impacts on Biodiversity, Flora and Fauna, Water resources and Material Asset SEOS. Action 1.3 Enhance Communication Mechanisms is recommended for mitigation .
Climate Change and Biodiversity	3 actions	Climate resilience of sensitive habitats and species will play a key role in maintaining the Conservation Objectives of the Natura 2000 network into the future as well as other non designated habitats and sites. Positive interactions with Biodiversity, Flora and Fauna, Water resources, Air Quality SEOs directly and indirectly positive interactions across other SEOS by identifying factors that will provide resilience to sensitive habitats and species, some of which are highly vulnerable to climate change effects. Mitigation measures recommended through the Habitats Directive Assessment process in relation to projects that arise under these actions.
Water Quality	4 actions	Improvement of implementation and compliance with Water Quality Regulations and underpinning with scientific data. Positive for Biodiversity, Flora and Fauna, Water, Population and Human health SEOs in particular. Cumulative positive impacts on other SEOS
Invasive Species	5 actions	These Actions fundamentally aims to improve the management and condition of habitat quality for the long-term sustainability of salmonid populations. The implementation of future plans and projects based on the guidance of this Longterm Management Plan for the Great Western Lakes may present uncertain impacts on Natura 2000 sites. As the details of the future plans or projects associated to this action are as yet unknown, the potential for adverse impacts are uncertain. Mitigation measure recommend for action 4.1
Stock Management	4 actions	The protection of Native Species of High Conservation value through stock management plans produced annually, on a local RBD basis, involves the management of several Non-Native fish species. Native fish species may be subject to pressures from other species through predation, competition for spawning habitat and other resources and even reported habitat destruction. Where there is empirical evidence that other fishes (e.g. bream, perch, roach, pike) are having a direct and adverse impact on salmonid fish populations, stock management plans to mitigate this should be produced. This Action fundamentally aims to improve the management and condition of habitat quality for the long-term sustainability of salmonid populations. The implementation of future plans and projects based on the guidance of this Long term Management Plan for the Great Western Lakes may present uncertain impacts on Natura 2000 sites. Annual fish stock management plans, including those for 2022, must be Screened for Appropriate Assessment on a case-by-case basis. As the details of the future plans or projects associated to this action are as yet unknown, the potential for adverse impacts are uncertain. Future plans or projects arising from the development of this action in relation to the production of stock management plans annually must be Screened for Appropriate Assessment on a case-by-case basis.

High Level Objectives	Actions x number	Summary of significant effects
Habitat Restoration	3 actions	Targeted and appropriate restoration projects that are underpinned by scientific studies and assessment is of considerable benefit. Surveyed, designed and implemented properly and where appropriate in tandem with relevant stakeholders this action could generate positive impacts across all SEOs and include co benefits for SEOS such as Landscape, Soil and Geology, and Material Assets SEOs, addition to direct positive interactions with Biodiversity, Flora and Fauna, and Water SEOs. Mitigation recommended for action 6.3.
Research	4 actions	Positive interactions at strategic level across all SEOS especially Biodiversity, Flora and Fauna and Water. Research into climate change impacts and adaption positive for Climate change and other SEOs. Mitigation recommended for Actions 7.1 and 7.2

5 Mitigation measures

This section presents some of the mitigation measures that will prevent, reduce, and offset as much as possible any significant adverse effects on the environment of the plan area resulting from the implementation of the Plan. Mitigation measures can be generally divided into those that:

- Avoid effects;
- Reduce the magnitude or extent, probability and/or severity of effect;
- Repair effects after they have occurred, and
- Compensate for effects, by balancing out negative impacts with positive ones.

The table below presents mitigation measures identified through the SEA process, additional measures from the Appropriate Assessment and other IFI Standard mitigation measures can be found in the SEA ER.

Table 3: SEA mitigation measures

Action	SEA/AA mitigation measure
1.3: Enhance communication mechanisms and networks between IFI, relevant stakeholder groups, state agencies, farming organisations, academic institutions, local communities and catchment groups	It will be important to ensure that the communication is a two-way process, to derive the maximum benefit from the wide range of stakeholders engaged.
Action 4.1: Remove and/or manage high risk invasive species through strategic stock management and weed management programmes.	A definition of an invasive alien species must be made clear prior to the establishment of any strategic stock management and weed management programmes. Ensure proper biosecurity for staff or any persons or groups involved with IAS management
Action 5.3: Enable local stakeholder groups to contribute to population modelling and research programmes including creel surveys (through citizen science).	It will be important that proper guidance is provided to these stakeholders and that the data provided is regularly monitored for its accuracy
Action 6.3: Ensure that all relevant environmental protection processes are in place to avoid damage to other sensitive species and habitats	This action represents good practice and should be implemented and adhered to throughout. Where required, appropriate guidance and environmental protection measures should be applied to each waterbody reflecting particular local characteristics and challenges.
Action 7.1: Continue to develop new and refine existing fish stock monitoring programmes (e.g. WFD) to	These programmes should not be restricted to salmonids but also include those fishes that may impact on salmonid populations.

Action	SEA/AA mitigation measure
provide the necessary data for fish population models for the western lakes	
Action 7.2: Use all available sources of data incl. WFD surveys, Stock management and, where appropriate, angling returns to feed into population models for the western lakes.	Ensure the veracity of angler returns, where possible- could be a monitoring consideration. This measure is included under Section 9 Monitoring

5.1.1 IFI Standard Practice Mitigation Measures and Guidance Documents.

As standard practice within IFI the works associated with these Actions follow several Guidance documents including;

Appendix 2 'Biosecurity Measures for working in (or beside) Rivers' (IFI 2012);

Appendix 3 'Standard Operating Procedure - Cleaning of gravels and spawning habitat maintenance' (IFI Future plans or projects arising from this proposed Action must be Screened for Appropriate Assessment on a case-by-case basis.

Appendix 4 'Standard Operating Procedure - Hedge Pruning and Tree Maintenance';

Appendix 5 'Guidelines on protection of fisheries during construction works in and adjacent to waters' (IFI 2016); and

Appendix 6 'EP 10 Silt Management, page 58 of the "Environmental Guidance: Drainage Maintenance & Construction" handbook' (OPW 2019).

Biosecurity measures for Field Surveys (IFI 201): research_biosecurity_biosecurity_for_fieldsurveys_2010.pdf (fisheriesireland.ie)

Link to all IFI Biosecurity protocols: Research theme: Biosecurity | Inland Fisheries Ireland

The implementation of standard construction and operational phase controls in compliance with a Method Statement, IFI Guidelines/ Protocols, OPW, Water Pollution Acts.

Please also see: Standard Operating Procedure Hedge Pruning and Tree Maintenance May 2020

5.2 Monitoring

The monitoring programme will consist of an assessment of the relevant indicators and targets against the data relating to each environmental component. Similarly, monitoring will be carried out frequently to ensure that any changes to the environment can be identified.

It is proposed that the SEA monitoring reporting should be undertaken as a mid term review of the plan. Should new data or the following occur, additional monitoring will be required:

- Significant spread of invasive species
- Illegal waste activity
- Water pollution incidents (not resulting from oil spills).

In turn the list below is subject to review at each reporting stage to reflect new data. Should the monitoring regime identify significant impacts (such as impacts on designated sites) early on in the plan implementation, this should trigger a review of the plan and monitoring regime. In addition, the identification of positive impacts from monitoring should also be reported as this will assist in determining successful environmental actions.

The following monitoring thresholds will apply for the three issues listed above are presented below in Table 5.1. Table 5.2 overleaf presents the overall monitoring regime.

Table 5-1 Thresholds for remedial action by Inland Fisheries Ireland

Events	Action
Significant spread of invasive and alien species (IAS)	Any new introduction of IAS in areas where it was not present beforehand. To be cross referenced with IFI Biosecurity measures checklist and works statement. Remedial action must be prioritised to minimise and eradicate newly introduced IAS.
Illegal waste activity	Incidents of illegal waste activities associated with projects arising from the plan. Remedial actions must be prioritised to address illegal waste activity.

It is recommended that data arising from planning applications, particularly in terms of environmental constraints mapping and Environmental Impact Statements be integrated into the GIS and monitoring system. This will assist in assessing cumulative impacts also, in particular ecology and water quality.

Table 5-2 SEA Monitoring Programme

SEA Topic Strategic Environmental Objectives	Monitoring Requirement and Data Source
Biodiversity, Flora and Fauna	
Conserve and enhance biodiversity at all levels Avoid and minimise effects on nationally and internationally rare and threatened species and habitats through sensitive design and consultation, recognising ecological connectivity Facilitate species and habitat adaption to climate change Avoid and minimise habitat fragmentation and seek opportunities to improve habitat connectivity Ensure careful consideration of non-native invasive and alien species issues Ensure the veracity of angler returns, where possible	• Condition of European sites [data source: NPWS (6 yearly reporting)] •Implementation of SEA and AA mitigations from plans arising from the Conservation Management Plan for the Great Western Lakes (IFI and relevant Local Planning Authority) •Status of surface water bodies (including transitional and coastal) [data source: EPA]. IFI River, Lake and Transitional waters Fish Stock Surveys (Data source: IFI under Water Framework Directive) Use all available sources of data incl. WFD surveys, Stock management and, where appropriate, angling returns to feed into population models for the western lakes (Action 7.2). Triannual monitoring of fish stocks of Great Western lakes Percentage increase or area in m2 of additional riparian habitat created adjacent Great Western Lakes and rivers. Percentage increase in buffers at m2.
Population and human health	

SEA Topic Strategic Environmental Objectives	Monitoring Requirement and Data Source
Support citizen science and stakeholder engagement	Number of new catchment management associations for Great Western Lakes (Action 1.2) Number of citizen science programmes Number of training hours/projects on citizen science and awareness raising eg; fish returns, biosecurity etc. Data source: IFI, LAWPRO
Water	
Protect and enhance the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystem (quality, level, flow). Maintain or improve the quality of surface water and groundwater (including estuarine, marine and transboundary waters) to status objectives as set out in the Water Framework Directive (WFD), the National River Basin Management Plan and POMS.	Status of surface water bodies (river, lake, transitional and coastal including transboundary) as reported by the EPA Water Monitoring Programme for the WFD [data source: EPA]. IFI River, Lake and Transitional waters Fish Stock Surveys (Data source: IFI under Water Framework Directive)
Soil and Geology	
Conserve, protect and avoid loss of diversity and integrity of designated habitats, geological features, species or their sustaining resources in designated ecological sites .	• Condition of European sites [data source: NPWS Geological Survey of Ireland and Planning Authorities
Climate Change, Air Quality	

SEA Topic Strategic Environmental Objectives	Monitoring Requirement and Data Source
Adapt and improve resilience to the effects of climate change Minimize adverse impacts associated with air and noise quality	IFI Environmental Management Systems Key actions -energy(transport), energy (buildings), water and wastewater Data source: IFI Action 2 of IFI Climate Action Framework Plan Develop a climate monitoring and mitigation strategy for the Inland Fisheries Resource. Research and monitoring of climate change under HLO 2 Climate Action and Biodiversity and HLO 7 Research
Material Assets	
Plan and provide for sustainable water management and wastewater treatment	IFI Environmental Management Systems Key actions -energy(transport), energy (buildings), water and wastewater Data source: IFI Action 2 of IFI Climate Action Framework Plan
Cultural Heritage	
Conserve, preserve and record architectural and archaeological heritage	Planning applications (data source: relevant Planning Authority and IFI)
Landscape	
Integrate green network considerations Improve landscape connectivity to surrounding area	Planning applications (data source: relevant Planning Authority and IFI) Increase in riparian habitat at Great Western Lakes