

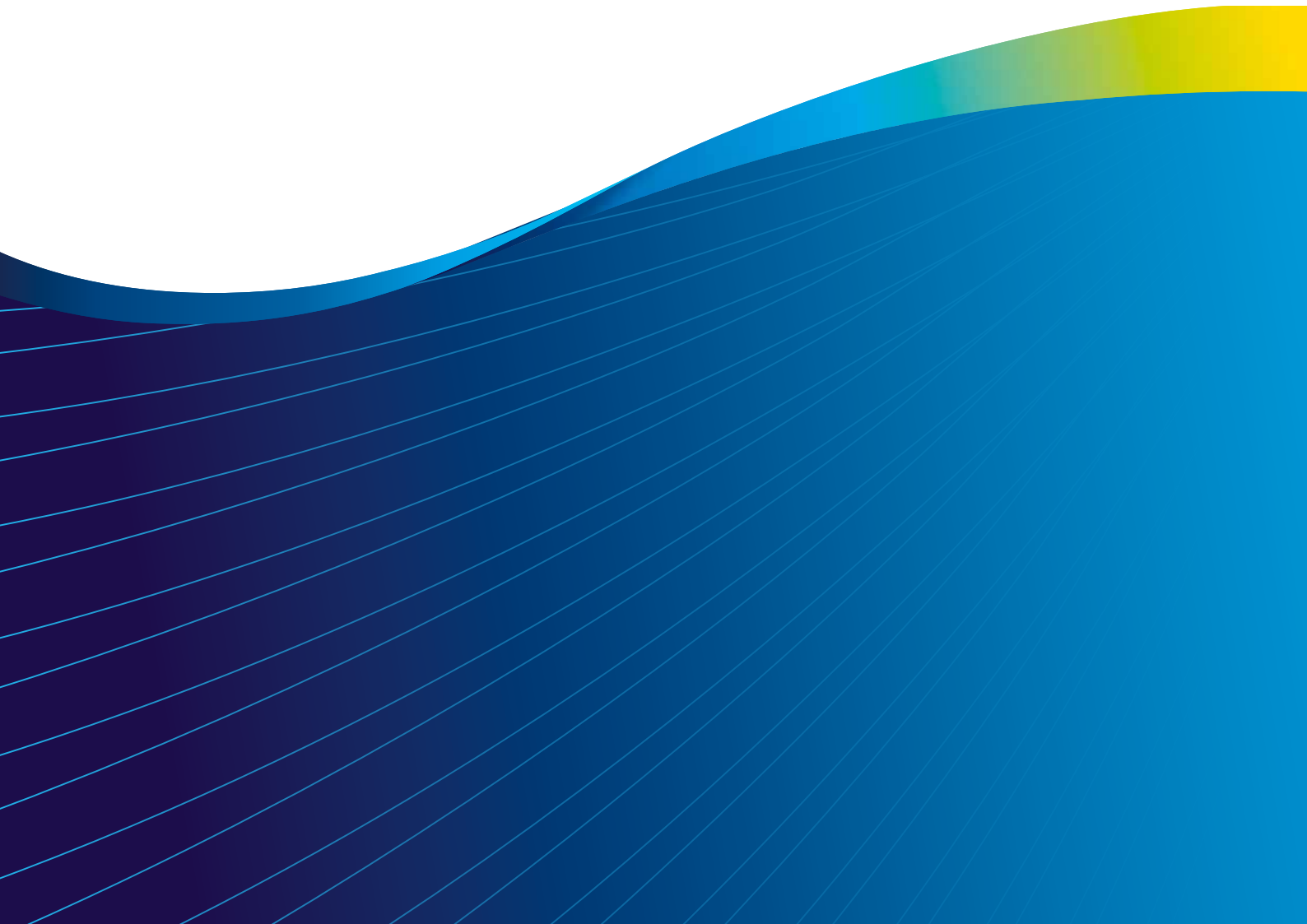


Energy for
generations

THE 2021 SHANNON FISHERIES PARTNERSHIP REPORT

(YEAR ENDING DECEMBER 2021)

esb.ie



Contents

Introduction	7
Objectives	8
The 2021 Shannon Fisheries Partnership Report	9
The 2021 Shannon Fisheries Partnership Work Plan	52

The 2021 Shannon Fisheries Partnership Report

ESB Instream Work Program 2021

1. The Nenagh River (Lough Derg catchment)

Other ESB supported initiatives

The Shannon Salmon Management Programme

The Shannon Eel Management Programme

Habitat works outside the Shannon Fisheries Partnership

- The Mulkear (Lower Shannon)
- Cloghan lake (Mid-Shannon)
- McNamara's Lake (Lower Shannon).
- Castleconnell (Lower Shannon).

IFI initiatives completed in 2021:

1. Stand and structures
2. River restoration Projects
 - Sheelin riverine restoration
 - Dysart riverine restoration
 - Upper River Suck riverine restoration.
3. Support to clubs and organisations.

Angling club initiatives:

1. The Ormond Angling Club

The 2022 Shannon Fisheries Partnership Work Plan

The 2022 ESB habitats work plan

Introduction

Following the successful implementation of the Partnerships previous work plans this report details our plans for 2022 and also reports on the work completed in 2021. The Partnership has built on the lessons learned in previous work programmes and have developed an extensive programme of instream and bank side works which will focus on the improvement of fish stocks and fish habitat. The 2021 Work Plan also outlines works to be carried out by ESB, Inland Fisheries Ireland and the Angling Clubs.

The Partnership wishes to thank all those in Local Communities and State Bodies for their help in making the implementation of the various work plans possible. We would also wish to thank all the individuals who gave of their time and assistance during the past year to support the work of the Partnership. The staff of ESB, IFI and the members of angling groups who worked to deliver our work plan are to be commended for their hard work. This unique coming together of the three groups has enabled the scarce resources of all three to be harnessed to deliver a greater level fishery restoration work than by one group alone.

The River Shannon fishery is owned and managed by ESB, which has the primary function of hydroelectric generation. Subject to that, it performs the duty of managing, conducting and preserving the Shannon fisheries under the Shannon Fisheries Act (1935).

In 2010, following ongoing discussions between ESB and the Shannon Fisheries Preservation and Development Company Ltd, agreement was reached to establish the Shannon Fishery Partnership. The Partnership Group comprises of representatives from the following stakeholders; ESB, Shannon Fisheries Preservation and Development Co. Ltd (SFPDC), Inland Fisheries Ireland (IFI) and an independent Chairperson.

The waters involved in the Partnership are those areas of the Shannon catchment above Parteen Weir/ Ardnacrusha station over which ESB have fishing rights but excluding fisheries leased to Inland Fisheries Ireland.

The Annual Work Plan is developed in line with a rolling five-year Strategic Plan which is reviewed on an ongoing basis. It also seeks to work in partnership with others to utilise available resources to best assist in the rebuilding and protection of our fisheries.



The River Shannon catchment area including that of the estuary covers approximately 17% of the area of Ireland. It is the longest river in the British Isles and has a total main channel length of almost 400km, of which 25% is estuarine. The lakes of the catchment are naturally productive and can be generally classified as either semi-enriched (mesotrophic) or enriched (eutrophic). Much of the main river channel is lake-like in character reflecting its size, regulated flow and low gradient (falling just 20m over a distance of 200km south of Lough Allen). The largest of the Shannon lakes are Loughs Allen (35km²), Ree (105km²) and Derg (117km²), with the most important tributaries of the Shannon being the Boyle and Suck to the west and the Inny, Brosna, Little Brosna, Nenagh and Mulkear to the east.

Discharge on the River Shannon is regulated at Parteen Regulating Weir. Parteen Regulating Weir diverts water into a headrace canal supplying the 85MW Ardnacrusha generating station also allows a statutory compensation flow (10m³sec⁻¹), equal to the low summer flow before the Shannon scheme, to flow down the Old Shannon river channel.



The process for the implementation of works.

Objectives

1. To develop a sustainable, operational, collaborative structure, operating through partnerships and consensus.
2. To identify the needs of the Fishery, ensuring the conservation and sustainable yield of fish in line with prevailing scientific advice.
3. To develop and implement a rolling five-year strategic plan to incorporate fishery maintenance and enhancement.
4. To enhance recreational angling and eel fisherpersons' ability to input into the operation plans of the Shannon Fishery Partnership.
5. Ensure "buy in" from all stakeholders in the catchment in association with the Strategic Plan.

The 2021 Shannon Fisheries Partnership Report

ESB Habitat Works completed during 2021

ESB habitat works were completed at several Shannon Fisheries Partnership (SFP) areas during 2021. Some other sites which were outside the SFP area were also completed. Where works were either not completed or else were partially completed in 2021 (due to unplanned changes such as the weather (rainfall/river discharges) or prioritisation of other

ESB work, or where the progress of these works be slower than planned), it is hoped that these sites will be completed in 2022.

An outline of the various programmes of work that ESB Fisheries are involved with, and the time periods involved are shown in Table 1.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Task
												Silver eel Trap and Transport
												Juvenile eel Trap and Transport
												Tree/Shrub clearance (NPWS)
												Instream habitat works
												Electrical fishing surveys
												Construction of fishing stands, styles, footbridges
												Adult broodstock trapping
												Stripping broodstock
												Hatchery egg to fry stage
												Restocking juvenile salmon (unfed fry, parr)
												Smolt release
												Fish Counters (Ardnacrusa and Parteen)

Table 1. The annual work programmes completed by ESB staff during the year.

The specific areas of the Shannon catchment which have been selected for habitat restoration works, are those catchments which have been previously drained and which presently suffer from having a homogenous canalised type of habitat, with a capacity of supporting a limited number of fish species and life stages. The list of sites to be worked upon is also reviewed by the Shannon Fisheries Partnership Group which is a partnership arrangement made up of ESB Fisheries Conservation, Inland Fisheries Ireland (IFI) and the Shannon Fisheries Development Company. The catchments worked upon in 2021 included:

1. The Mulkear (Lower Shannon).
2. Cloghan Lake (Mid-Shannon)
3. McNamara's Lake (Lower Shannon).
4. Castleconnell (Lower Shannon).
5. The Nenagh River (L. Derg catchment).

Appropriate Assessments (AA) are carried out, the need for which originates from Article 6(3) of the EU Habitats Directive (Directive 92/43/ EEC). This considers whether a plan or project, alone or together with other plans and projects, is likely to have significant effects on any European Sites. This is in view of best scientific knowledge and the conservation objectives of the respective sites. European Sites are those identified as sites of European Community importance designated as Special Areas of Conservation (SAC) under the Habitats Directive or as Special Protection Areas (SPA) under the Birds Directive.

The first step of the AA process is to carry out a Screening for AA to establish whether, in relation to a particular plan or project, an AA is required. Article 6(3) states "Any plan or project not directly connected with or necessary to the management of the site but likely

to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

The provisions of the Habitats Directive have been integrated into the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). In accordance with the aforementioned legislation, ESB Fisheries undertakes Screening for Appropriate Assessment (AA) to assess, in view of best scientific knowledge and the respective conservation objectives for relevant European sites, if proposed works or activities, individually or in combination with other plans or projects would be likely to have significant effects on any European sites.

Each specific site work plan is drafted by IFI staff working in a partnership approach with ESB Fisheries Conservation staff. Where appropriate, the Office of Public Works (OPW) and the National Parks and Wildlife Service (NPWS) are notified of these works and a screening report for an Appropriate Assessment document is completed. Permission for access to the individual work sites are also requested from the local landowners and with the co-operation of the local angling clubs and other recreational riverine users.

Due to some of the selected areas having undergone arterial drainage during the past few decades, the individual plans aim to change the physical habitat from a drained homogeneous area towards re-creating a naturally heterogeneous habitat. Therefore, many stages of fish will be able to inhabit the newly formed areas and many species of fish will be able to populate a given stretch of river. All the areas being worked upon have a favourable water quality status to ensure the survival of the various fish population both during and after the habitat works.

The habitat work programme may be categorised into two different areas:

- (1) Instream work: This work involves the recreation of the riffle-glide-pool sequence that would normally be representative of a healthy un-drained river. However, in many drained rivers this riffle-

glide-pool sequence has been removed as part of the drainage process and the bed of the river has been altered and/or lowered. Thus, a homogeneous or 'canalised' river is what remains after the drainage work, which is unsuitable for a naturally balanced fish population. In general, the number of fish species occupying an area, and the number of individual fish is greatly increased if a variety of habitats are present. Instream works includes building stone vortex weirs and alternating deflector placement of random boulders, spawning gravels and rock armor bank protection. The timing of the works is especially important as spawning fish may be present during the late autumn to late spring months. Therefore, all instream works are scheduled for the period May to mid- September. The flood conveyancing capacity of each the rivers remains unaffected, as all in-river structures are designed and built to be submerged in high flow conditions without any damage to the structure or riverbank.

- (2) Riparian/bank side work: This work is carried out during the winter months as tree pruning is prohibited under law during the bird nesting season. Works include the removal of excess overhanging vegetation, where it causes excessive shade or 'tunnelling' of the river. Excessive tunnelling by riverbank vegetation prevents light entering the river and thereby reduces the instream productivity. An example of this would be that aquatic plants would be absent where excess riverbank shade exists. Their absence would decrease the source of food for aquatic insects and there would also be a reduction in the amount instream cover available for resident fish to hide and develop individual territories when necessary.

The final task would be to fence the riverbank areas with post and wire, although provision is occasionally made for cattle drinking areas (depending upon land use and the landowner's view). Cattle drinking areas aim to provide restricted access to the river (within a discrete area), whilst preventing cattle trampling an entire river bank area, which thereby may cause later erosion. Provision is made for access to the river by footpaths, gates, footbridges, styles etc., but only after the prior permission of the landowner. Fencing is to the farming Glás scheme standard where required.

ESB habitat works completed during 2021.

ESB habitat works were completed at several locations during 2021. The following sections shows a selection of photographs which along with some text helps to explain the wide variety, scale and quality or the work completed by ESB fisheries staff. Where works were either uncompleted or partially completed

in 2021 (due to unplanned changes such as the weather (rainfall/river discharges) or prioritisation of other ESB work, or where the progress of these works be slower than planned e.g., Covid 19 restrictions), these sites will be completed in 2022.

Mulkear

During 2021, routine maintenance of existing structures was carried out on the Mulkear. This included clearing footpaths and completing some

extensive repairs to previously constructed angling access points.



Two photographs of access points on the Mulkear river before clearance/repairs to the structures.



Newly erected structures on the bankside of the Mulkear River.



The non-native invasive 'Giant Hogweed' plant growing on the banks and footpaths alongside the Mulkear River.



ESB staff clearing footpaths alongside the Mulkear River.



ESB staff repairing gates alongside the Mulkear River.



An old footbridge structure and a barrier to fish migration identified on the Newport River (a tributary of the Mulkear), Co. Tipperary.

Cloghan Lake, Co. Offaly

Cloghan lake is located near Febane/Cloghan in Co. Offaly. In 2021, a wheelchair accessible fishing

stand was constructed by ESB Fisheries staff along with associated access.



A floating-pontoon type wheelchair accessible structure erected on Cloghan Lake, Co. Offaly in 2021.



Views of a floating-pontoon type wheelchair accessible structure erected on Cloghan Lake.

Nenagh River

During 2021 public access works were carried out by an ESB contractor along a short stretch of the Nenagh River, Tipperary. This section of river was also

re-fenced and gravel laid to allow for public access/viewing of the area.



Before and after photographs of sections of a footpath along the banks of the Nenagh River.



A new footpath being constructed along the banks of the Nenagh River.



New and old fencing sites alongside the new footpath being constructed along a section of bank on the Nenagh River.



A new fencing and footpath constructed alongside a section of the Nenagh River.



ESB staff erecting fencing and levelling ground alongside a section of the Nenagh River.

Other ESB Supported Initiatives

The Shannon Salmon Management Programme

River Shannon Salmon Breeding and Genetics Programme

The Parteen Salmon Breeding Programme was initiated in 1990 and is carried out under the supervision of NUI, Galway. The mass selection-breeding programme involves two main breeding lines (grilse or one-sea winter fish, and Multi-Sea Winter (MSW) fish), that have been held separately since the start of the Programme. These two fish types are bred and reared separately at the hatchery prior to release to the sea as smolts. The two main objectives of the programme were to:

- Use selective breeding to significantly increase the percentage of fish returning as MSW salmon.
- To increase the weight of both MSW and grilse salmon.

Grilse lines, which were specifically bred for an increased size and weight, have given the expected improvement in the selected trait for fish captured at sea and those returning to the hatchery. Once the selective breeding programme was initiated in 1990 the proportion of returning two sea-winter spring fish increased dramatically with up to 66% of all females being two sea-winter fish. However, for males the return rate was, and remains much lower, so much so that they are often in short supply for breeding purposes.

In summary, the River Shannon salmon breeding programme at Parteen since 1990 has:

- Established pedigreed grilse and two-sea winter lines of salmon returning to the River Shannon.
- Increased significantly the proportion of two sea-winter salmon in the return to the River Shannon and to the hatchery.
- Proved that selective breeding can increase significantly the size and weight of returning grilse.
- Provided hypotheses to explain the inheritance of maturation phenotypes in salmon.

- Shown that males grow faster than females at sea.
- Given an indication that females return to the coast earlier than males.
- Provided pedigreed salmon for breeding experiments and stimulated further genetic research on salmon.

Future breeding protocols will be aimed at increasing the genetic variability within the selected two sea-winter lines by crossing between year classes. Inevitably, some of the gains achieved so far will be reduced, but it will ensure the genetic health of the lines for the future.

The genetic sampling of all returning hatchery bred fish and the hatchery fish used in the brood stock programme continued in 2021. The sub-sampling of the fish classified as wild also continued but was restricted when compared with previous years. In respect to the former, a collection of samples, from which DNA can be retrieved, exist now for every fish returning to the hatchery between 2010 and 2021. The combination of this material, in addition to information on each individual's size, sex and age, including potentially information on individual parentage, make this a very valuable resource for research and ultimately for the management of the hatchery programme.

Salmon Rearing and Restocking

Parteen Hatchery

Parteen hatchery was constructed at Parteen Regulating Weir in 1959 and was extended in 1970. A phased refurbishment project was initiated in 1997 and the hatchery now has a capacity to incubate up to 4 million salmon ova with an upper limit of 400 pairs of salmon. The hatchery infrastructure has been improved further with the provision of a new water intake line and filtration system. In addition, a new food control sequence for feeding fish was added. Approximately 90,000 adipose fin-clipped smolt are released each year as part of the ranching programme. The main goal of the conservation hatchery is to assist the recovery of wild salmon populations upstream of Parteen and Ardnacrusha and secondly to increase knowledge of salmon using an educational centre. An educational centre located at the hatchery provides a resource for visiting school tours and other interested parties. Present management of the ESB hatchery has continued to be of a high standard (ISO 14001).

Over the past 30 years, surplus ova and juvenile salmon have been used at both national and international levels to help restore salmon stocks of the Rivers Erne, Lee, Deel and the Rhine, Meuse and Thames. In the past, large numbers of Shannon ova were supplied to outside agencies. The use of Shannon ova in these European salmon restoration schemes promotes international fisheries co-operation and Ireland's unique freshwater fisheries resource. However, in more recent times the Shannon hatchery stock have been used exclusively for the restoration of Shannon salmon stocks.

During 2021, the non-native invasive quagga mussel (*Dreissena rostriformis bugensis*) was found in the Shannon. The quagga mussel has spread from its native region in Ukraine during the last few decades through Western Europe and to North America. The species looks very like the zebra mussel that arrived in Ireland in 1994. Like the zebra mussel, the quagga mussel will cause pipe blockages, hull fouling and high densities on the bottom of lakes and rivers with ecological consequences.

Thus the presence of the quagga mussel is likely to lead to a further surge in fouling and may have additional impacts on water quality and the ecological integrity of Irish aquatic ecosystems.

Production of Ova, Unfed Fry, Parr and Smolt

Juvenile salmon restocking of the Upper Shannon catchment was carried out in 2021. The Little Brosna and Big Brosna rivers were restocked with unfed fry autumn parr during April 2021. A total of 623,575 unfed fry were released into the Big Brosna). As many wild salmon spawn within the Lower Shannon catchment area (particularly the tributaries of Lough Derg), there have been no release of hatchery juvenile salmon within the 'Lower' Shannon area for many years.

Date of release	Multi-Sea-Winter	Salmon type	
		Grilse	
April 13th	32,242		Fin clipped and tagged
April 12th		61,788	Fin clipped

Table 2. The number of salmon smolts released from Parteen hatchery in 2021.

A total of 94,030 fin-clipped salmon smolts were released using a fish pump from Parteen hatchery. These comprised both multi sea-winter (MSW) smolt

and grilse (one sea- winter fish), during April 2021 (Table 2).

Adult Salmon Census for 2021

The number of salmon are normally assessed entering the Upper Shannon catchment using two automatic infra- red Vaki 'Riverwatcher' units located at the upper exit point of the Borland fish lift located at Ardnacrusha generating station and on the Parteen Regulating Weir fish pass. An upstream adult salmon trap is also situated on one of the pools of the Parteen Regulating Weir fish pass which is used to collect ranched salmon for the period late September to December. Due to the breakdown of both the Ardnacrusha and Parteen Weir fish counters, there was no 2021 counter data.

The adult salmon trap operated for the period 28th September to the 22nd of December with free passage allowed for all fish before and after this period. The monthly capture of hatchery and wild salmon is shown in Figure 1. A total of 262 salmon were intercepted of which 56 were wild. The return of adult salmon to the River Shannon from 2000-2019 is shown in Figure 2.

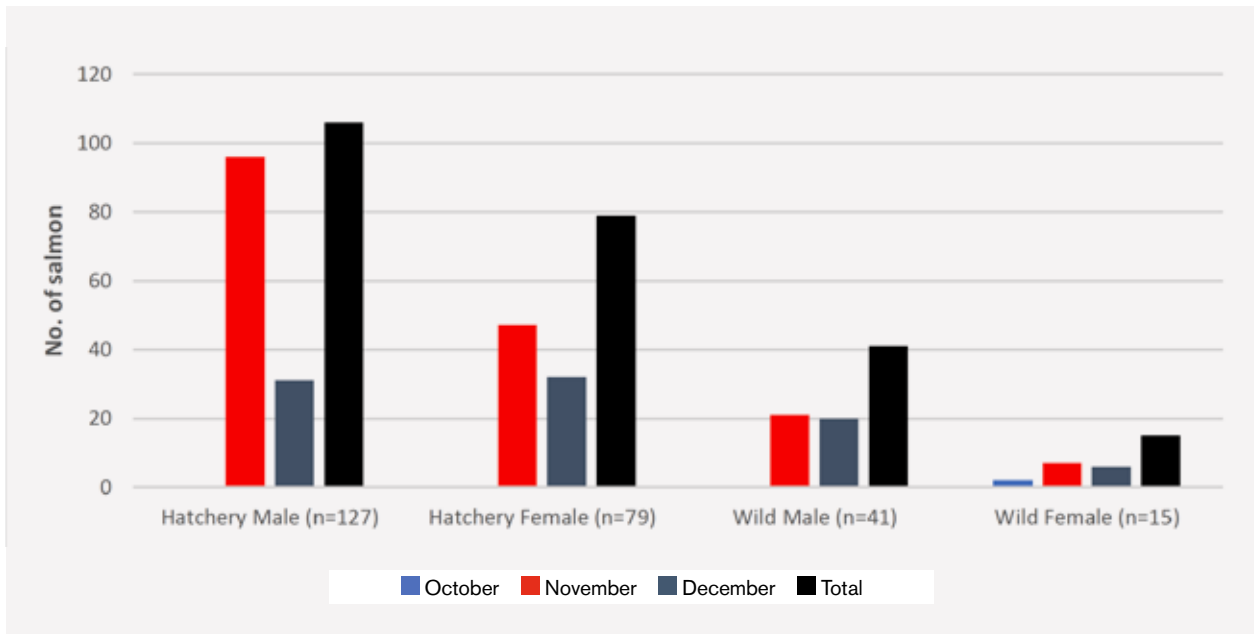


Figure 1. The number of salmon (N=262), that were captured each month during 2021 using the adult salmon trap located at Parteen Regulating Weir.

Both fish passes operated fully during the year. It should be noted that at present, it appears nationally and internationally as if very low marine smolt survival

rates are having a serious negative effect upon Irish salmon populations.

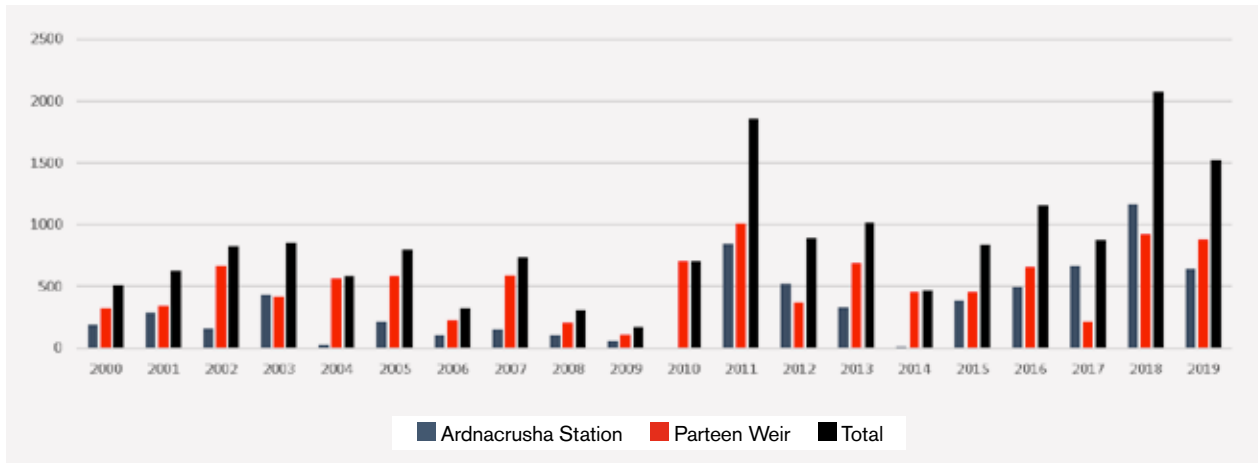


Figure 2. The number of ascending adult wild salmon through (a) Ardnacrusha and (b) Parteen Regulating Weir on the Lower Shannon catchment for the period 2000 to 2019. No Shannon census data was available for the 2020-2021.

A comparison with more recent years is shown in Table 3.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014#	2015	2016	2017#	2018	2019	2020	2021
Ardnacrusha Station	190	286	157	433	25	216	102	150	105	62	-	848	523	328	10	385	493	665	1161	638	-	-
Parteen Weir	320	343	670	422	563	583	224	589	203	112	706	1011	371	689	457	455	660	210	920	883	186	15
Total	510	629	827	855	588	799	326	739	308	174#	706	1859	894	1,017	467#	840	1,153	875	2081	1521	186	15

Table 4. The number of wild salmon ascending the R. Shannon from 2000-2021. Full census data is only available for 2009-2021.

The Ardnacrusha census data for 2009, 2014 and 2017 were partial counts or were not counted (2020 and 2021).

Trout and sea lamprey movements are normally recorded on the Vaki Riverwatcher, which is situated on the upper side of the Borland-MacDonald fish lock at Ardnacrusha station. However, during 2020 and 2021 both fish counter were non-operational and no census data was recorded. Three species of lamprey occur in the Shannon catchment namely the Brook, River and Sea lampreys. Brook lampreys are widely distributed throughout the catchment being routinely recorded in Shannon ESB operated catchment electrofishing surveys. The anadromous sea and river lampreys appear to be confined mainly to the Lower River

Shannon. Movements of both river and sea lampreys are normally recorded at Ardnacrusha and Parteen Regulating Weir where they ascend through the fish-lock and fish pass. However, it is thought that many lamprey ascend through the Ardnacrusha fish lock and the Parteen Weir fish pass without being counted as they move through the stainless-steel bars which hold the infra-red scanning units rather than between the scanning units. During 2021, adult sea lamprey were again observed within the lower sections of the Parteen fish pass and in the lower reaches of the Kilmastulla River.

Characteristics of hatchery broodstock collected at Parteen during 2021

Identical Grilse and MSW (Multi-Sea Winter) designation characteristics are used for Parteen, Carrigadrohid and Ballyshannon hatcheries. These characteristics are that females up to 71cm and males up to 84cm are considered to be One-Sea

Winter (1SW) or grilse, whereas salmon larger than these are considered to be MSW salmon. Using these designation characteristics, of the 2021 hatchery returns, just 20 females were MSW fish, whereas no males MSW salmon.

Performance of the Shannon Fisheries

Recreational salmon fisheries of the Shannon

The main salmon recreational fisheries are located on the Old River, between Parteen Weir and Limerick City. The most famous of these is the Castleconnell fishery. Up to 2016, the Lower River Shannon operated on a catch and release system for all wild salmon, whereas a bag-limit operated for hatchery salmon. For 2021 the River Shannon was open for 'catch and release' of salmon. It was 'open' for trout and coarse fishing.



An isolated oil spill on the Groody River, the cause of which was investigated by IFI staff during January 2021.

Fisheries Protection and Regulation

For the 2021 season, Inland Fisheries Ireland (IFI) staff were engaged by ESB Fisheries Conservation to provide fishery protection services on the Lower Shannon and Mulkear Rivers. IFI is also responsible for the Shannon's 'Managed Fisheries' (which include the Suck, Brosna, Little Brosna, Camlin and Inny Catchments). Some on-the-spot fines were issued for minor offences in both fisheries and several nets were seized. IFI staff responded to several calls about illegal fishing and successful prosecutions were taken.

ESB is committed to working with all Government Agencies including An Garda Síochána, Local Authorities, Environmental Protection Agency and the National Parks and Wildlife Service and Angling Groups in seeking to educate and identify those at risk of damaging the fishery environment.



Eggshell Lamprey tiles at Annacotty Weir on the Mulkear River.



An illegal net recovered from the Lower Shannon during 2021.



An adult salmon (62cm) removed from an illegal net recovered on the Lower Shannon 2021.



An IFI fisheries protection patrol on the Ardnacrusha tailrace during April 2021.



An IFI fisheries protection patrol 'dragging' the Ardnacrusha tailrace for illegal nets during 2021.

The Shannon Eel Management Programme

The National Eel Management Plan and the ESB / NUIG Scientific Programme

The River Shannon is Ireland's largest river, and its extensive lake ecosystem offer some of the country's best eel habitat. It has been the focus of much of the eel population studies in Ireland to date.

In 2021/22 conservation eel fishing was conducted at three sites, two at Athlone, and one at Killaloe (Figure 3). Fishing began on 30th August 2021 at Athlone and 7th September 2021 at Killaloe. Fishing ceased at Athlone on 12th December 2021, but continued at Killaloe until 12th February 2022. A total of 16,626 kg of eels were caught at Athlone (15,727 kg at the Jolly Mariner site and 899 kg at the Yacht Club site), and a further 2,125 kg were caught at Killaloe, giving an overall trap and transport catch of 18,751 kg (Figure 4). The overall trap and transport capture in 2021/22 is similar to captures from the previous 3 years (2020/21 = 21,229 kg, 2019/20 = 11,853 kg, 2018/19 = 16,411 kg).



Figure 3. A map of the Shannon catchment showing the silver eel conservation fishery sites and the release point location below Parteen Regulation Weir.

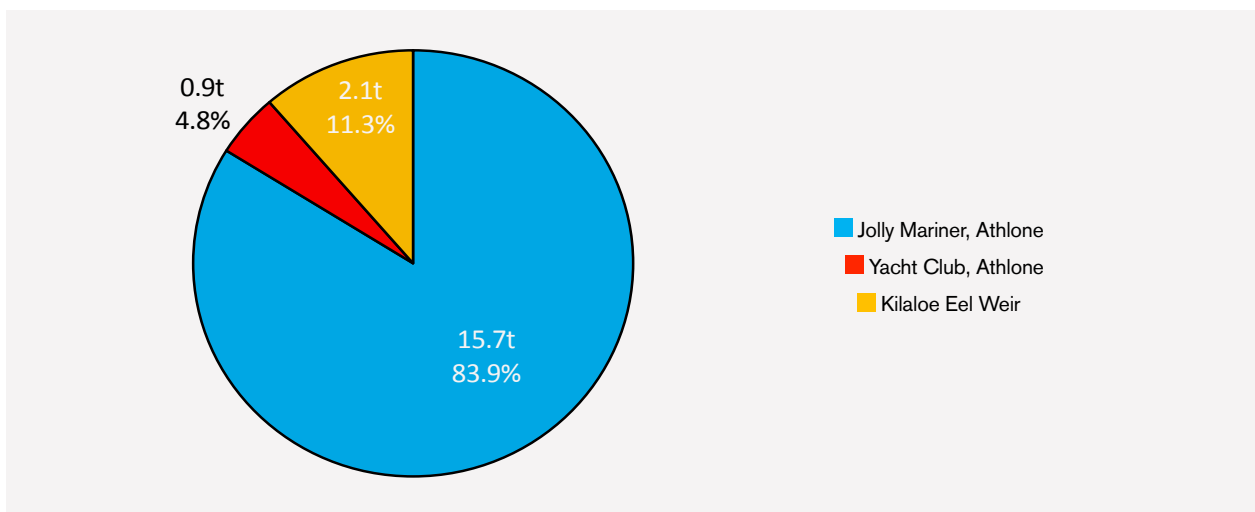


Figure 4. Proportions of the River Shannon trap and transport catch obtained by each fishing crew in the 2021/22 season.

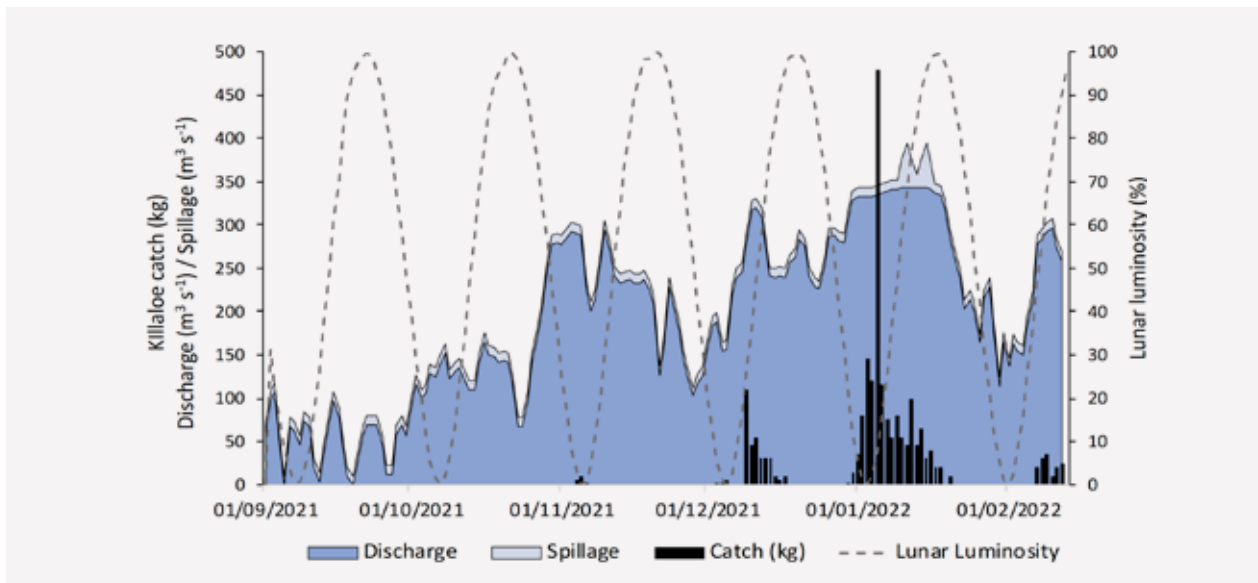


Figure 5. The seasonal variation in daily catches at the Killaloe eel weir during the 2021/22 fishing season together with variation in discharge via Ardnacrusha and as spillage to the Old River Shannon channel.

Daily catch rates at Killaloe are shown in Figure 5, along with variation in discharge along the old river channel and the headrace canal leading to Ardnacrusha hydropower station. Discharge was variable during the season with little spillage. Highest catches were recorded during the new moon in early January 2022, which coincided with a period of relatively high discharge.

Production and escapement figures for the River Shannon are summarised in the flow diagram (Figure 6). Production of 23,903 kg is estimated by the trap and transport catch at Killaloe using the fishing efficiency rate of 29.2%, together with the catch from the two Athlone sites. This fishing efficiency rate at Killaloe is based on Mark-Recapture experiments ($n = 14$) conducted by NUIG from 2016/17 – 2019/20. In total 18,751 kg (78.4% of production) was moved beyond the hydropower station through trap and transport. Of the 5,152 kg that moved beyond Killaloe weir, it is estimated that 418 kg (8.1%) migrated via the Old River Channel. This is determined by the amount of spillage to the Old River Channel, using a regression model based on historical telemetry studies of route selection. An estimated 21.15% mortality (1,001 kg) at Ardnacrusha hydropower station of the 4,734 kg that entered the headrace, leaves 3,733 kg progressing downstream. This gives an escapement of 22,902 kg, or 95.8% of production. Current and annual figures for production and escapement for the Shannon are shown in Table 4.

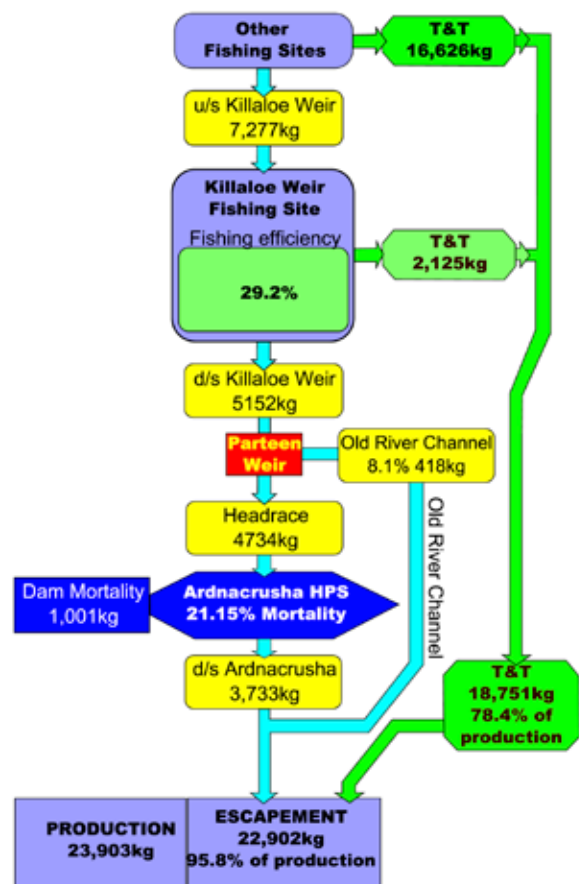


Figure 6. A summary of the analysis of silver eel production and escapement in the River Erne during the 2021/22 eel migration season.

Year	Production (kg)	Escapement (kg)	% of Production
2021/22	23,903	22,902	95.8
2020/21	66,631	37,810	91.0
2019/20	38,028	33,189	87.3
2018/19	32,850	29,613	90.9

Table 4. Production and escapement estimations on the River Shannon in 2021/22, and corresponding values for 2020/21, 2019/20, 2018/19

The Shannon Juvenile Eel Programme

ESB have been capturing upward migrating juvenile eel at several Lower Shannon locations for many decades. In recent times, efforts have been concentrated at Ardnacrusha station and Parteen Regulating Weir. The three Parteen Regulating Weir and three Ardnacrusha located juvenile eel traps were put into service on the 15th March 2021.

Fishing activity ceased at all sites on the 8th September. A total catch of 102.4kg were captured and transported during 2021 (Table 5). This compares to a total of 1,172.6kg, 13.4kg and 1,402.5kg for 2020, 2019 and 2018. The catches of juvenile eel (40.3kg) at Parteen Regulating Weir were a mixed catch of fingerling eel and elver. All catches of juvenile eel are released into the Shannon catchment above Ardnacrusha station and Parteen Weir. The results of the 2021 elver catches again show the Shannon catch to be in decline (along with the European trend). The trapping of juvenile eel will continue in 2022. The Ardnacrusha elver traps have been extensively refurbished over the period 2017-2020.

The refurbishments included;

- The provision of increased water supplies at a variety of differing locations to the old Ardnacrusha elver ramp trap. Water from existing discharge points were also diverted and now discharge close to, or onto the ramp area. This increased discharge helps attract juvenile eel to the main trapping area.
- The provision netting at all sites to deter avian predators.
- A walkway was added to allow easy access to the large ramp area. This will also allow regular servicing/maintenance of the site.
- The replacement of the older matt climbing substrate with a new bristle type of matt substrate. These bristle matts are of varying spacing intervals which therefore facilitate juvenile eels of varying length and climbing abilities to access the traps.
- New elver traps were added at two locations. These were designed to allow for differing bristle matt spacing sizes to reflect the different sizes/ages of the upward migrating juvenile eel.

	Parteen Weir			Ardnacrusha		
	Old trap (fish pass)	New trap (fish pass)	Middle bank	Large trap	Fish pass trap	Mechanical workshop trap
March (15/3/2021)	0	0	0	0	0	0
April	0	0	0	0	0	0
May	0.54	0.04	0.01	3.06	0	0
June	11.82	2.74	0.65	4.55	0.05	0
July	17.41	0.53	1.95	31.96	2.3	3.4
August	3.67	0.72	0	16.01	0.27	0.04
September (18/9/2021)	0.2	0	0	0.2	0	0
Total catch	33.64	4.03	2.61	55.78	2.62	3.44

Table 5. The catch of juvenile eel at the three ESB operated locations for 2021. The entire catch of 103.4kg were released into the Shannon catchment above Parteen Regulating Weir and Ardnacrusha Generating Station. These catches represent both elver and larger juvenile or 'bootlace' eel (particularly those captured at Parteen Regulating Weir).

Habitat works outside the Shannon Fisheries Partnership

- McNamara's Lake (Lower Shannon).
- Castleconnell (Lower Shannon).
- The Mulkear (Lower Shannon)

McNamara's Lake

McNamara's Lake has been extensively upgraded by general maintenance of the area and the erection

of ESB staff over the past few years. In 2020, there was bird nesting boxes.



An ice-covered surface on McNamara's Lake in January 2021.



A temporarily flooded angling structure upon McNamara's Lake in March 2021.



The footpath and maintained grassed margin along with the larger non-maintained wild meadow area located outside of the fence.



Views of McNamara's Lake showing access to the floating Pontoon angling stand and footpath in June 2021.



Views showing the main road access point McNamara's Lake in June 2021.



Views showing the main road access point and car park at McNamara's Lake.

Castleconnell

Habitat improvement and angling access works were completed throughout Castleconnell during 2021. Work was carried out along the riverbanks where some selective clearance was undertaken. The spraying of emerging Giant Hogweed with glyphosate was undertaken by the Castleconnell Fishery Association (CFA). Giant hogweed is one of the first plants to emerge and in 2021 the CFA had persons (courtesy of the Castleconnell CE scheme), committed to the program for the months of April and May. The best return from this selective spraying is during the early months before other growth catches

up. Volunteers from the CFA also 'adopted' a stretch of river to identify straggler plants and spray them in later months. Around June/July the CFA sprayed the other highly invasive non-native plant, the Himalayan Balsam, which was present but not as pervasive. This was mainly done at the bottom of the fishery (Beat 5 and 6).

A new footbridge and associated footpath over a small side stream known locally as 'Conway's Canal' were constructed in 2021. Photographs showing this completed work are included.



The new footbridge over 'Conway's Canal' in Castleconnell.



ESB sign cleaning in Castleconnell.



A fenced footpath area leading to the new bridge over 'Conway's Canal' in Castleconnell.



Views of the swing-gate and fencing beside 'Conway's Canal' in Castleconnell.



Views of the swing-gate and fencing beside 'Conway's Canal' in Castleconnell.



A fenced footpath area leading to the new bridge over 'Conway's Canal' in Castleconnell.



The new footbridge over 'Conway's Canal' in Castleconnell.



A new swing gate and fenced area near adjacent to 'Conway's canal'.



A newly fenced area along the bank of 'Conway's canal'.

IFI initiatives completed in 2021

Stands and structures

Detailed plans were developed for the 2021 Operations Development Programme and Outdoor Recreation (ORIS) programmes, involving a suite of works from repairs to existing angling infrastructure, starting the planning/scoping for addressing fish passage concerns, planning for in-stream rehabilitation projects and updating signage in key angling venues. Specific sites and type of works were itemised, and associated resource and costing compiled.

- Structures were repaired/replaced at a number of locations in the following catchments:
- River Suck (various locations from Ballinasloe to Castlerea)
- Tusk and Strokestown lakes (North Roscommon)
- Boyle River
- Inny River (between Ballymahon and Ballinalack and at Finea)
- Brosna River at Clara
- Hind River (Lough Ree catchment)
- Cross River (Bealnamullia)
- Slevin's and McEvoy's Lake (Mullingar)

A lot of work went into designing galvanised footbridges as modular structures which can be bolted together on-site, as a more sustainable and longer lasting solution in flood prone areas. Design engineers were engaged, and the design is currently being signed off on by a structural/civil engineer. Inland Fisheries Ireland completed a lot of their footbridges in 100% recycled plastic, including substructures and decking components.

The table below summarises the stands and structures works completed in 2021 by Inland Fisheries Ireland. A series of photographs highlights the types of structures dealt with.

The 2021 Shannon Fisheries Partnership Report

River/Lake	Location general	type of structure	stile	footbridge	stand	gates	catwalk (m)
SUCK	Dolans Fields	1 footbridge; 1 stile	1	1			
SUCK	Coreen Ford	2 stiles + 1 footbridge	2	1			
Suck	Poolboy	footbridges	2	4			
Suck	Poolboy	stiles	1				
Suck	Derrycahill	Footbridges		4			
SUCK	Derrycahill D/S	stiles	4				
SUCK	Ballyforan	footbridges		3			
SUCK	Mt Talbot U/s	stairs	1				
SUCK	Mt Talbot U/S	stiles	5				
SUCK	Mt Talbot U/S	stiles	8				
SUCK	Mt Talbot U/S	footbridge		1			
L.Conney	Tulsk	footbridge and double fishing stand			2		8
Loughanduff	Strokestown	double angling stand			1		
L.Patrick	Tulsk	double fishing stand			2	1	
L. Clogher	Croghan	double angling stand + catwalk			1		10
R.Boyle	Boyle	footbridges	2	4	3		10
R.Boyle	D/S L.Gara	footbridges and stiles	2	2			
Lough Lea	Lough Lea	footbridge + fencing		1			
River Hind	Hind River	Footbridges		2			
Shiven	Islandcase br	Stiles	5				
Killian R (Suck)	Killian	Stiles	2			1	
Hind	Derrydonnel Br	footbridge and stiles	2	4			
Lough Acalla	Right of carpark	Walkway + stile	1	1			
Lung River	Ballaghdaheen	footbridge		1			
Lower Annagh Lake	Drumshanbo	timber jetty			1		
Inny River	Finea Bridge	mooring/stand					70
River Suck	Islandcase br	stile + step over	1				
River Brosna	Bolart Br	stiles and footbridges	10	4			
Ballinafid	Ballinafid Lake	walkway maintenance					60
Slevins Lake	Slevins Lake	stands - maintenance			2		
River Suck	Muckenagh	stile	1				
River Suck	Shiven River	stile	1				
Hind River	Lisadern Bridge	stiles and footbridges	3	3			
Lung River	Agulastia Br	stiles and footbridges	1	4			0
Lough Derg	Tuamgraney	footbridge		1			
Lough Derg	Twomilegate	footbridge		1			
Total			55	42	12	2	55

Table summarising stands and structures work in the Shannon by IFI during 2021.



Replacement of a boardwalk at Finea Bridge, River Inny.



The Listowel team carried out a structures survey during the month of January and a report was completed for repairs for 2021.



Vegetation clearance from a footbridge in the Co. Clare region.



Repairs to stiles on the River Feale, County Kerry.



Repairs and maintenance to the angling stands at the mudflats, Carrick-on-Shannon.



Temporary footbridge at Reddan's Quay, Tuamgraney.



Temporary footbridge at Reddan's Quay, Tuamgraney.



Further replacements of stiles and footbridges on the Boyle River, Boyle, County Roscommon.



A new stile and footbridge at Ballinalack, River Inny.

**MOUNT TALBOT
DEVELOPMENT
2021**

Works on angler access at Mount Talbot, River Suck in 2021.



The replacement of existing strictures on the Boyle River at Cuppinagh Bridge.



The replacement of existing strictures on the Boyle River at Cuppinagh Bridge.



The replacement of existing strictures on the Boyle River at Cuppinagh Bridge.



A new step-over, footbridge and walkway on the River Inny at Abbeyshrule.



A new step-over, footbridge and walkway on the River Inny at Abbeyshrule.



A replacement footbridge on the Rive Lung.



Structures completed in the mid-Suck catchment.



Structures completed in the mid-Suck catchment.



New stand at Lough Patrick, Tusk.



New stand at Lough Patrick, Tusk.



New angling stand on Clogher lake, Croghan, Co. Roscommon.



New steel footbridge at Poolboy, Ballinasloe.

Riverine Restoration Projects

Sheelin riverine restoration

In 2020, Inland Fisheries Ireland, in association with the Lough Sheelin Trout Preservation Association (LSTPA) identified several river sub-catchments in the Lough Sheelin area which were in need of riverine restoration works. At the time, IFI identified seven key rivers which required restoration work to help address impacts from various activities, including drainage and agriculture. Seven detailed specifications were developed for the following rivers in 2020:

- Maghera River
- Halfcarton Stream
- Mountnugent River
- Dromone River
- Maghera River
- Kildorrrough River
- Pound River

These works included re-establishing in-stream features, including pools, gravels and the reinstating of a thalweg. Specifications also included wider ecosystem work including fencing, installation of solar pumps and drinkers and riparian management. The Office of Public Works (OPW) worked with both IFI and the LSTPA to undertake elements of the project and completed in-stream restoration works on the Dromone River during the summer of 2021. In-stream restoration works on a further two rivers in 2022. In 2021, IFI were successful in receiving funding through the Farm Biodiversity fund. A total of 184,000 was received to work on the riparian elements on these seven rivers. This includes fencing, pruning/thinning, installation of cattle drinking troughs and the installation of solar pumps. The landowner agreements, Natura Impact Assessments and various elements of the permissions process was completed during 2021. Planning permission for the remaining sites is expected to be completed in mid-2022.



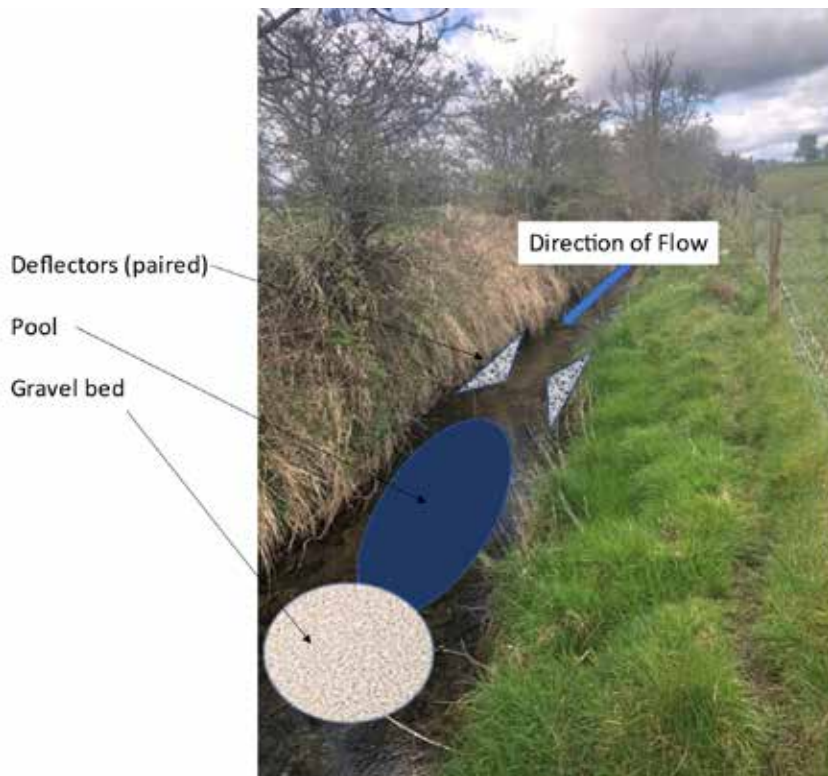
In-stream restoration works on the lower section of Drumone River in 2021, funded by OPW.

Dysart riverine restoration

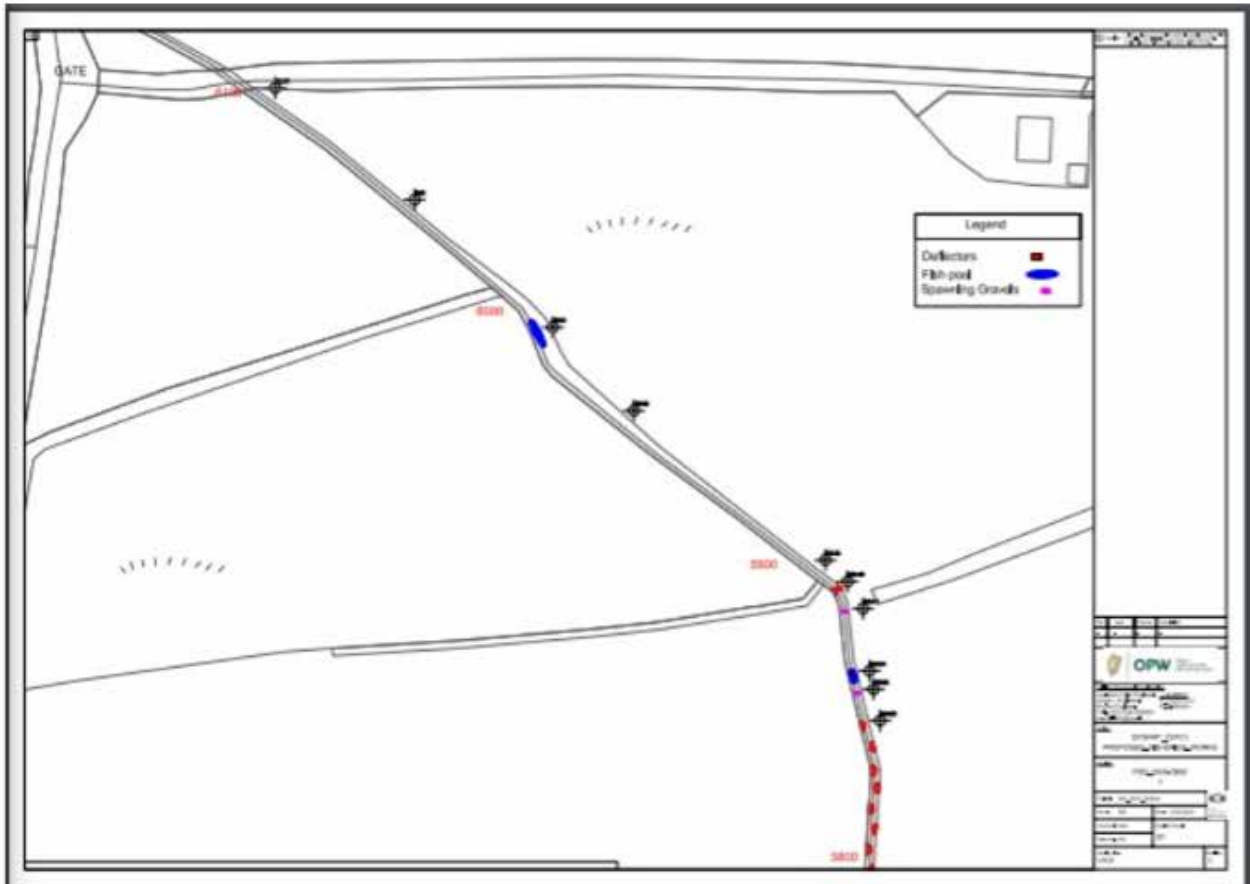
Inland Fisheries Ireland staff liaised with the Office of Public Works (LSTPA) and the Lough Ennell trout anglers to devise a riverine restoration plan for parts of the Dysart River (Lough Ennell catchment). Personnel from the Office of Public Works and Inland Fisheries Ireland visited the site in May 2021 and carried out detailed surveys of the channel. A series of geo-located points where structures were considered appropriate were identified and agreed. The overall aim of this project is to create habitat suitable for adult spawning and the subsequent growth and development of juvenile fish. This entails the creation of pools for migrating fish to rest and use for refuge as they move into the area to breed. The provision of suitable substrates in which to spawn is also an important feature of the project. Riffles, glides and pools are also vital as habitat for the early life stages of brown trout and the current project also aims to provide these.

Paired deflectors are suggested rather than the previously used weirs. These provide the necessary scour and variation in flow dynamics to maintain small pools while at the same time allowing for conveyance to be maintained for drainage purposes. Gravel of an appropriate size range is also proposed at the tail end of pools to provide suitable spawning substrates (See Brew & Gilligan 2019). The repetition of this sequence of habitat structures forms the principal theme of this plan

The successful outcome of this project will be to improve the fisheries potential and carrying capacity of this stretch of river. Future analysis of trout stock in this channel will indicate whether these outcomes have been achieved.



A typical paired deflector/pool/Gravel Sequence - As envisaged for the current project on the Dysart River



Part of the plan drawn up by OPW for riverine restoration work on the Dysart River, showing the locations for pools, deflectors and/or gravel.

Upper River Suck riverine restoration

In late 2021, Inland Fisheries Ireland staff assisted the Lough O'Flynn and District Anglers Association with a Midland Fisheries Fund application to look at the design and planning elements for riverine restoration works on key river systems in the Upper Suck region. The club were successful in securing funding to develop plans for the Upper River

Suck, Termon River, Francis River and Island River and to complete the AA Screening, Computer Aided Design (CAD) and Health and Safety related (PSDP) elements for the works. In 2021, walkover surveys were completed on the Francis River and Termon River. Once the plans are completed for all rivers, the various planning elements will be completed and works will be completed once funding is secured.



Sites surveyed on the Francis and Termon River (upper River Suck) by (IFI) in 2021.



Sites surveyed on the Francis and Termon River (upper River Suck) by (IFI) in 2021.

Support to clubs and organisations

Inland Fisheries Ireland staff supported clubs with designing and administering projects under various IFI funding streams during 2021. Many were ongoing projects from 2020 and a number of the projects involved detailed planning and screening in advance of physical instream works. These projects included:

- Glone River (riparian improvement and stock control).
- Magheragh River (Sheelin catchment) (Instream enhancement and riparian work).
- Creggy and Tang River (lower Inny) (in-stream enhancement planning phase).
- Island, Francis and Termon Rivers (Castlerea) (in-stream enhancement planning phase).
- Kilpatrick River Enhancement (Lough Owel catchment).
- Tudenham River Enhancement (Lough Ennell catchment).



- Ballynacarrigy River Enhancement (Inny catchment).
- Dysart River Enhancement (Lough Ennell catchment).
- Francis River Castlerea (planning for in-stream enhancement and riparian improvements).
- Ongoing support was provided to organisations involved with projects on the:
 - Kilucan River and Cavetown (in-stream enhancement and angler access).
 - Francis River, Castlerea (in-stream enhancement).
 - River Suck Athleague (all-access angling stand).
 - MOU area (Lough Sheelin) for seven in-stream enhancement plans.
 - Lough Bran (Leitrim) angler access enhancement.



Installation of solar pumps and fencing on the River Glone in 2021, as part of the Glone Heritage groups Midland Fisheries Fund project.

The 2022 Shannon Fisheries Partnership Work Plan

The 2022 ESB Work Plan

For 2022 the following catchments will be worked upon:

1. Mulkear,
2. Castleconnell,
3. Nenagh,
4. Tomany River (Abbey River),
5. McNamaras Lake,
6. Little Brosna: (Breaghmore and the Camcor tributaries),
7. Cloghan Lake,
8. Breensford River,
9. 'Julies' Harbour and Lecarrow River,
10. Hind River,
11. Cross River,
12. Ballyfinboy River.

Notes

Notes

ESB Fisheries Conservation Section
Electricity Supply Board, Ardnacrusha, Co. Clare,
Republic of Ireland

Tel: +353 61 345589