

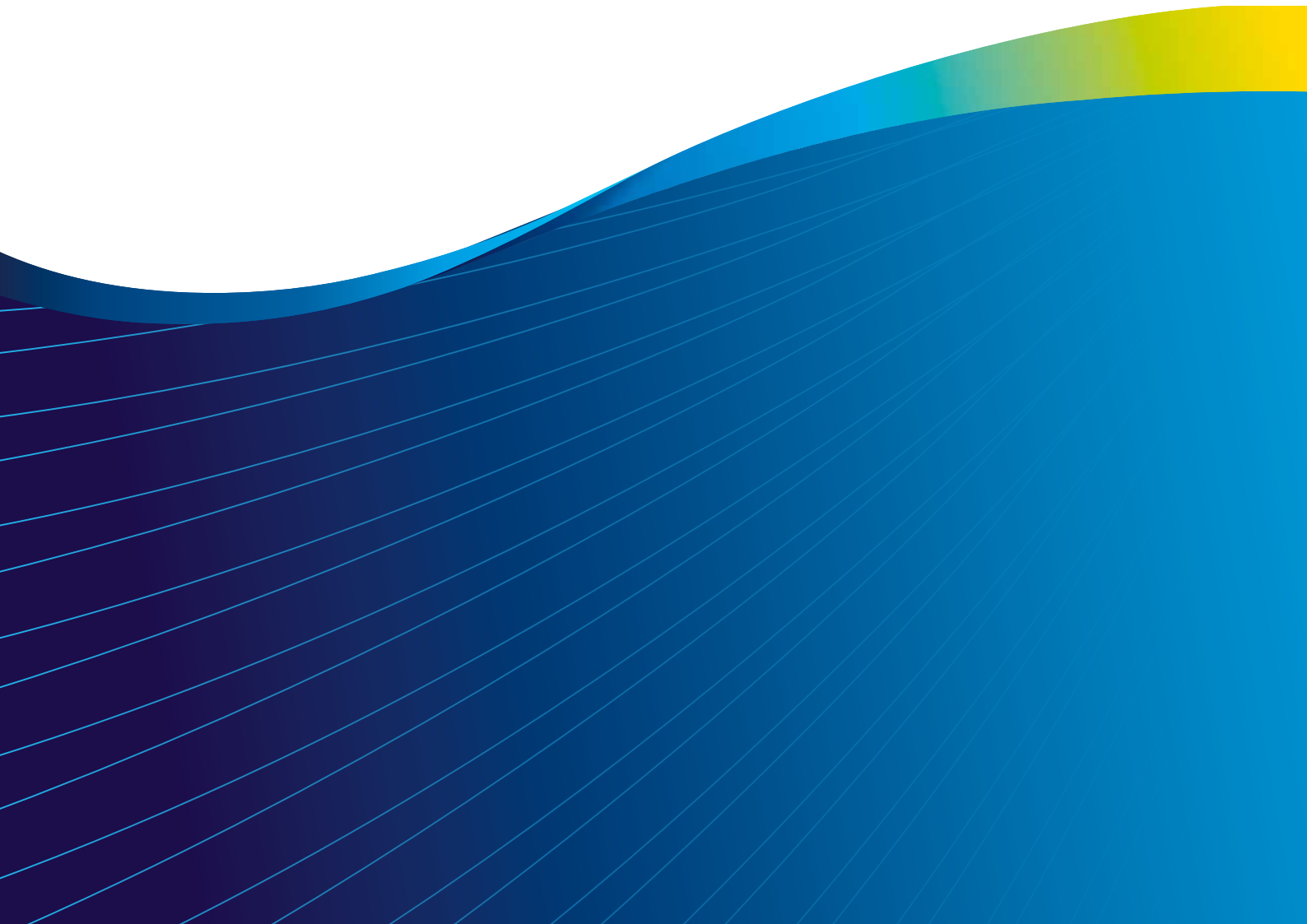


Energy for
generations

THE 2022 SHANNON FISHERIES PARTNERSHIP REPORT

(YEAR ENDING DECEMBER 2022)

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The 2022 Shannon Fisheries Partnership Report

Instream Work Program 2022

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2. The Ballyfinboy River.
3. The Breensford River.
4. Hind River.
5. Cross River.

Other ESB supported initiatives

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The Shannon Eel Management Programme

Habitat works outside the Shannon Fisheries Partnership

- McNamara's Lake (Lower Shannon).
- Castleconnell (Lower Shannon).
- The Mulkear (Lower Shannon).
- The Little Brosna (Mid-Shannon catchment).

IFI initiatives completed in 2021:

- Salmon Conservation Stamp Projects.
- IFI Sponsorship scheme.
- IFI support to other development plans.
- IFI developments on L. Derg.
- Biosecurity – Asian Clam.
- Fisheries enforcement
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Angling club initiatives:

- The Ormond Angling Club

The 2023 Shannon Fisheries Partnership Work Plan

The 2023 ESB habitats work plan

- The R. Suck
- The Nenagh River - Ollatrim catchment (L. Derg)
- Ballyfinboy (L. Derg)
- Castleconnell (Lower Shannon)
- Mulkear (Lower Shannon)
- Little Brosna - Camcor catchment (Mid-Shannon)
- Lecarrow River/Canal (L. Ree)
- Breensford River (L. Ree)
- McNamara's Lake (Lower Shannon)
- Cloghan Lake (Midlands)

Introduction

Following the successful implementation of the Partnerships previous work plans this report details our plans for 2023 and also reports on the work completed in 2022. 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 2023 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 the summer of 2010, following ongoing discussions between ESB and the Shannon Fisheries Preservation and Development Co 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.

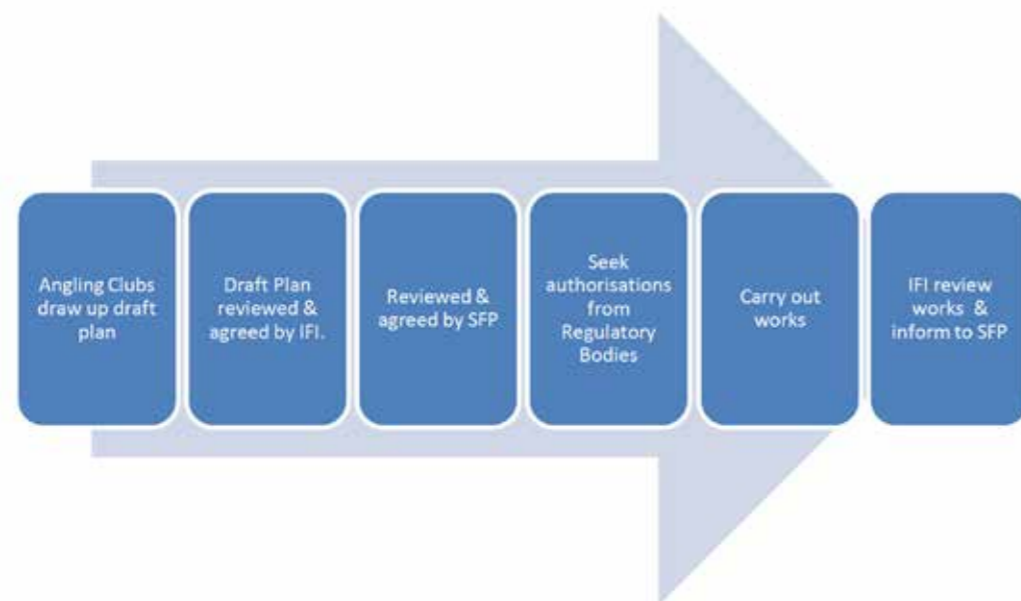
The Annual Work Plan is developed in line with a rolling five-year Strategic Plan which is reviewed on an ongoing basis. It also seeks to work in partnership with others to utilise available resources to best assist in the rebuilding and protection of our fisheries.

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.

Parteen Regulating Weir diverts water into a headrace canal supplying the 85MW Ardnacrusha generating station and 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.



A section of the Lower River Shannon which is regulated at Parteen Regulating Weir.



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 2022 Shannon Fisheries Partnership Report

The River Shannon An T'Sionainn

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 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 and 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.

Ardnacrusha generating station, constructed between 1925 and 1929, harnesses the 10,400km² of the catchment area upstream. During the 1930's, Ardnacrusha supplied almost 90% of the electricity needs but today it accounts for less than 3% of the Republic of Ireland's requirement. However, the ability to generate electricity at short notice when electricity demand suddenly increases makes it very important generation asset.

ESB controls the fishing rights of the entire River Shannon and the role of the maintenance and preservation of the entire fishery resources is undertaken by ESB Fisheries Conservation. The River Shannon fisheries are managed in co-operation with:

- Inland Fisheries Ireland (IFI)
- The Department of Communications, Climate Action and Environment
- The Marine Institute

In addition to the above agencies, both angling and community groups are becoming increasingly involved. ESB extends this strong co-operative approach to the management of the Shannon fisheries with Inland Fisheries Ireland staff and the Shannon Fisheries Partnership Group. ESB also utilises the services of the Marine Institute.



A view of the Ardnacrusha station navigation lock.

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 (Ardnacrusha and Parteen)

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



IFI drone footage showing the 'Island Field' and 'Barrack Lane' stretches of the Lower Shannon Fishery.

ESB habitat works completed during 2022.

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 2022 included:

1. The Mulkear (Lower Shannon).
2. McNamara's Lake (Lower Shannon).
3. Castleconnell (Lower Shannon).
4. The Nenagh River (Ollatrim tributary).
5. The Little Brosna (Camcor tributary)
6. The Ballyfinboy River
7. The Breensford River.
8. Lecarrow River
9. Hind River
10. Cross River

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 'Acres' scheme standard where required.

ESB habitat works were completed at several locations during 2022. The following sections shows a selection of photographs which along with some text helps to explain the wide variety, scale and quality of the work completed by ESB fisheries staff. Where works were either uncompleted or partially completed in 2022 (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, these sites will be completed in 2023.

Mulkear

During 2022, 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. A swing gate along with upgrading signage were also completed.

McNamara's Lake

McNamara's Lake has been extensively upgraded by ESB staff over the past decade. The 2022 work

programme included general maintenance of the area and the erection of new signage were needed.

Cloghan Lake, Co. Offaly

Angling access works were completed throughout Castleconnell during 2022. 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 2022 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 (Beats 5 and 6).

IFI staff completed repairs to angling infrastructure within the Castleconnell area in 2022.



Damage from an oil spill reported on the 3rd of January on the Castleconnell fishery.



IFI repairs to a fishing stand located at the Pumphouse, Castleconnell.

Nenagh River

During 2022 public access works were carried out by an ESB contractor along a short stretch of the Nenagh River, Tipperary. This section of the Ollatrim

River was re-fenced and new swing gates erected. Selective pruning was also carried out.

The Little Brosna (Camcor River)

During 2022, two areas near Birr town were worked upon. The first of these was upstream of

Birr town where rock armour and some fencing were added to a section of riverbank that had been eroded.



Rock armour along a short section of riverbank and new fencing erected.



An ESB Fisheries tracked machine working on the banks of the Camcor River.



New fencing alongside a footpath on the banks of the Camcor River.





New fencing alongside a footpath on the banks of the Camcor River.

The second section of river worked upon was at Clareen where there was re-instatement of rock armour along with erection of fencing and swing gates along a riverside footpath.



A newly built livestock drinking area on the Camcor River.



The Ballyfinboy River

A section of the Ballyfinboy River in Co. Tipperary was worked upon in 2022. The works included rock armour for badly eroded riverbanks, removal of largescale blockages of deadwood and in river trees, the provision of cattle drinking areas (rather than full access for livestock to the river. Random boulders

were placed in the previous homogeneous channel to provide cover for fish and help for the creation of territories. The final task was the provision of livestock fencing to the ACRES (Agri Climate Rural Environment Scheme) standard.



A short section of rack armour being built on the Ballyfinboy River.



A short section of rack armour being built on the Ballyfinboy River.





A short section of rack armour being built on the Ballyfinboy River.



Newly erected fencing long the banks of the Ballyfinboy River.



A random boulder placed into the Ballyfinboy River.



Ground being levelled and the refilling of the riverbank after the placement of bankside rock armour.



Vegetation growing along the banks of the Ballyfinboy River.



Selective removal of willow trees along the Ballyfinboy River.



Areas of the Ballyfinboy River where large in-stream blockage shown were removed.



Stone fill being used for the creation of a livestock drinking area.



A large in-stream partial blockage prior to its removal in the Ballyfinboy River.



A random boulder being placed into the Ballyfinboy River.

The Breensford River

During 2022, ESB staff carried out instream and bankside work along a section of the Breensford River. The bankside work programme included selective removal of bankside trees and the strimming and

general maintenance of the existing access pathways. The selective clearance of shrubbery and trees allows for access by anglers and the general public, whilst also allowing natural light to enter the river.



A selection of sites on the Breensford River where selective clearance of bankside vegetation is required.



A site where a livestock access point for drinking water is required.



A site where random boulders and a stone weir and scour pool is required.

The River Shannon Salmon Programme

With the initiation of the River Shannon Salmon Management Programme in 1990, ESB has been proactive in the conservation of the salmon population of the River Shannon. Prior to the Shannon Scheme, the river was renowned as a producer of large multi-sea winter salmon and grilse. With the advent of the hydroelectric scheme, there was a significant reduction of the spawning and nursery habitat in the Old River Shannon channel. In 1959, a Borland-MacDonald fish-lock was constructed at Ardnacrusha and a hatchery unit was constructed at Parteen Regulating Weir. Mitigation measures involved the restocking of the Shannon catchment with annual releases of juvenile salmon produced at this hatchery. However, although the Shannon scheme caused major changes for salmon in the river, the impact of extensive drainage schemes, water regulation and canalisation, intensive farming, afforestation and water pollution have also impacted negatively. Increased marine and coastal exploitation levels since the 1960's followed by the incidence of Ulcerated Dermal Necrosis (UDN), and more recently decreasing marine survival have also added to the reduction in numbers of self-sustaining stocks of salmon (Figure 1).



A section of the Ardnacrusha tailrace.



Angling on the 'Longshore' area of the Lower River Shannon.



The 'Longshore' area of the River Shannon where the Ardnacrusha tailrace enters the Old River Shannon.

The overall purpose of the programme is to assist the recovery of wild salmon populations in the cascade catchment area, provide reared smolt to support the recreational fisheries in the Lower Shannon and to protect the biodiversity and ecological productivity of wild salmon populations in the Shannon catchment.

The more specific objectives of the programme were:

- To ensure that the maximum possible number of salmon enter the cascade catchment annually to spawn.
- To investigate fish passage issues for adult and juvenile migrating salmon. Specific areas to be investigated were:
 1. The efficiency rate of the Borland MacDonal fish lift located in Ardnacrusha.

2. Smolt passage through a Kaplan turbine located at Ardnacrusha was independently assessed based upon the results of a Heisey Tag test in 2004. The survival rate of smolt migrating during the annual Ardnacrusha salmon smolt generation protocol has been calculated at 89.4%
 3. To increase understanding of salmon populations using micro tagged batch releases of salmon parr, an extensive electrofishing programme and continued restocking of both unfed fry and parr.
- To involve as many statutory and community groups as possible in the execution of the programme.
 - An instream and bank side habitat development programme will be applied to selected catchments.

- Since 1991, all hatchery reared smolt have been adipose fin-clipped and selected breeding lines have been micro tagged, thus allowing the separation of reared, wild, grilse and multi sea-winter adult salmon. The restocking programme since 1991 has moved to large scale unfed fry planting with the retention of a number of unfed fry for smolt production the following year. These unfed fry plantings are evaluated using electric fishing equipment. The performance of these unfed fry has generally been good compared to the first baseline survey (1990-1992).

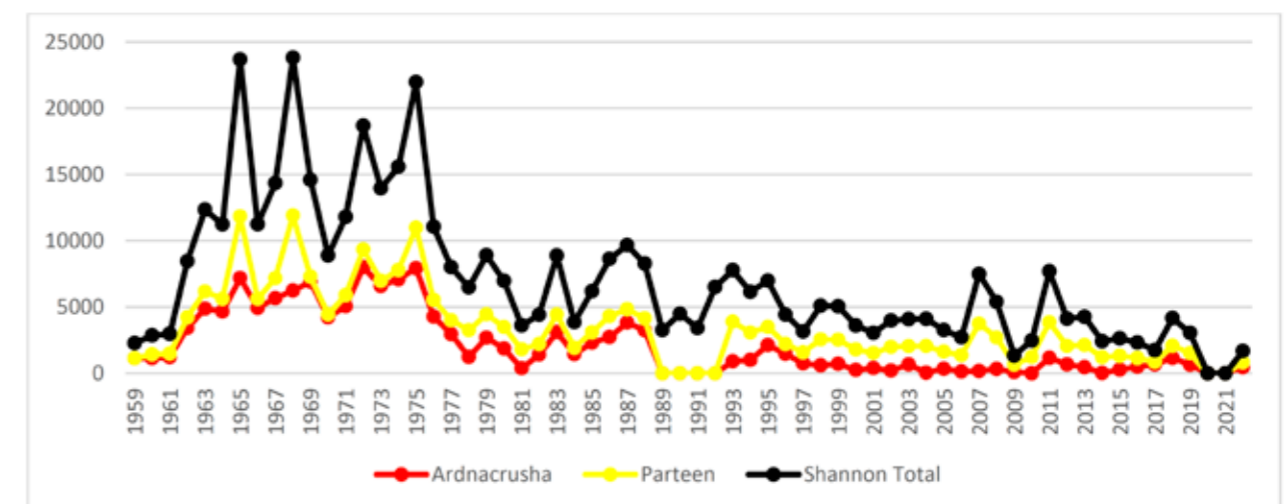


Figure 1. The number of ascending adult salmon through Ardnacrusha and Parteen Regulating Weir on the Lower Shannon catchment for the period 1960 to 2022.

River Shannon Salmon Hatchery and ranching activity

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 2022. 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 2022. 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.



A view of the lower section of the navigation lock in Ardnacrusha station.



A view of the boom located below Ardnacrusha station.



A view of the Ardnacrusha navigation lock looking upstream.



A view from the innermost section of the Ardnacrusha navigation lock.

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.

Production of juvenile hatchery reared salmon

Due to a lack of stock arising from a loss of circa 100,000 first feeding fry stock, there was no juvenile salmon restocking of the Upper Shannon catchment in 2022.

Date of release	Finclipped and tagged	Salmon type	
		Finclipped	
April 8th	30,455		Fin clipped and tagged
April 8th		60,240	Fin clipped

Table 2. The number of salmon smolts released from Parteen hatchery in 2022.

A total of 90,695 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 2022 (Table 2).

Characteristics of hatchery broodstock collected at Parteen during 2022

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 One-Sea Winter (1SW) or grilse, whereas salmon larger than these are considered to be MSW salmon. Using these designation characteristics, of the 2022 hatchery returns, just 7 females and

1 male were MSW fish. A total of 276 wild and 617 hatchery salmon entered the salmon trapping facility located at the Parteen regulating Weir fish pass. This trap which is used for collecting broodstock (hatchery salmon are retained for breeding purposes and wild fish are released above the trap), was used from the 3/10/22 and was removed on the 20/12/22.

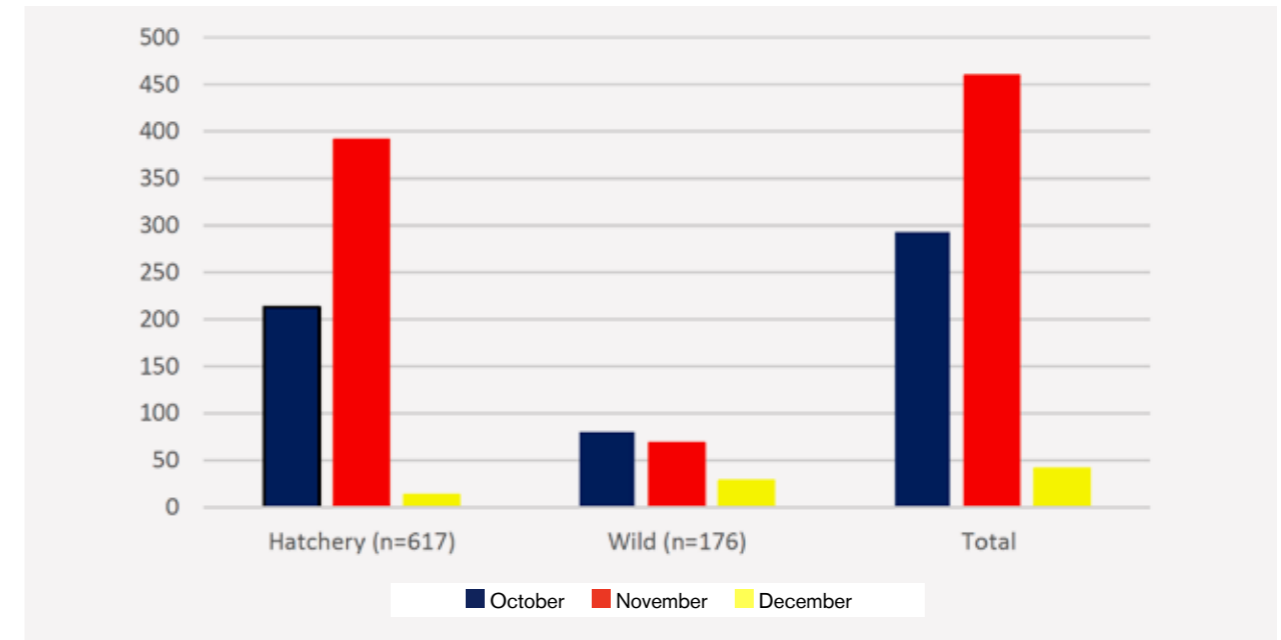


Figure 2. The monthly number of adult salmon removed from the fish pass trap located at Parteen Weir in 2022.

	Wild	Hatchery	Total
October	147	17	164
November	457	231	688
December	13	28	41
	617	276	893

Table 3. The monthly number of adult salmon either removed from the fish pass trap (hatchery salmon) or else released above the trap (wild salmon) located at Parteen Weir in 2022.



An upstream view of Ardnacrusha station and headrace canal.

Adult Salmon Census for 2022

The number of salmon are assessed entering the Upper Shannon catchment using two automatic infra-red Vaki 'Riverwatcher' units. These are located at the upper exit point of the Borland fish lift in 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 hatchery salmon for the period late September to December. During 2022, a service level agreement was entered into with Inland Fisheries Ireland for the ESB fish counter maintenance, service

and also the production of census data reports. These are now available on both the IFI and ESB Fisheries websites.

After a hiatus of circa two years, the census work commenced upon the Shannon at the two sites. The Ardnacrusha census data began from the 5th July onwards and the Parteen Weir site commenced on the 3rd May. The Parteen Weir located adult salmon trap operated for the period 28th September to the 23rd 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 3.

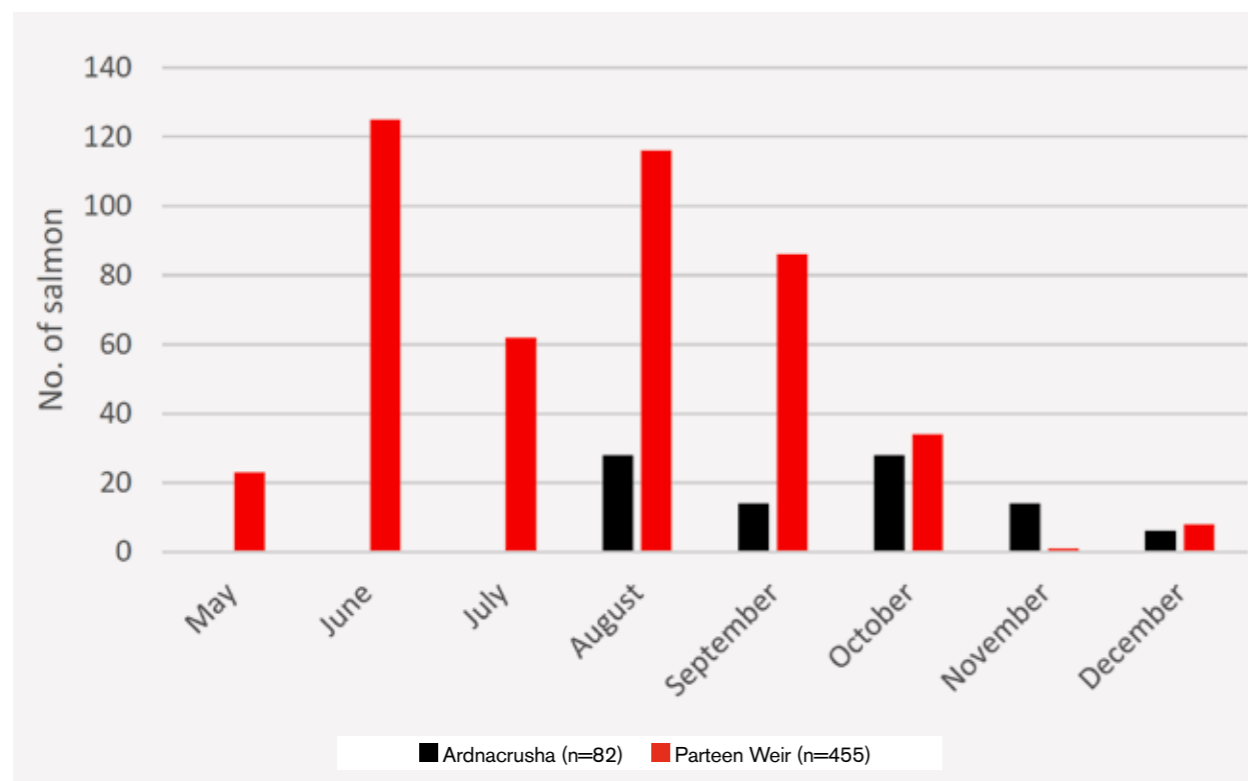


Figure 3. The number of salmon (N=537), that ascended Ardnacrusha fish lift and Parteen Weir fish pass each month during 2022.

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

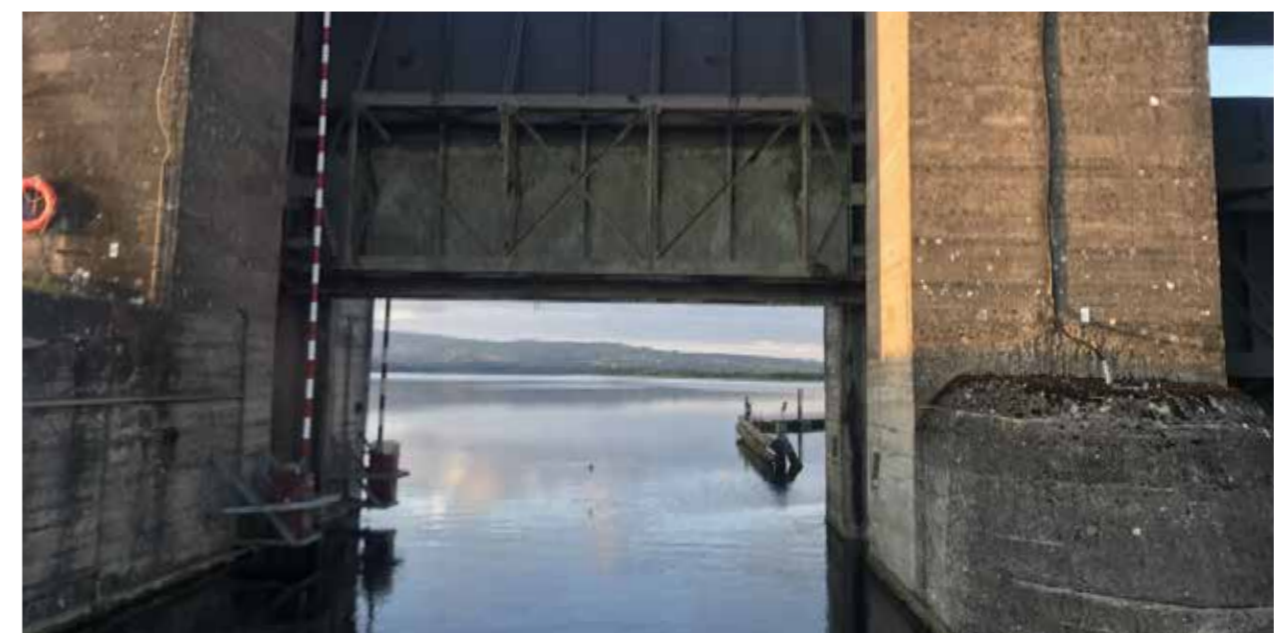
rates are having a serious negative effect upon Irish salmon populations. A comparison with more recent years is shown in Table 4.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014#	2015	2016	2017#	2018	2019	2020	2021	2022
Ardnacrusha Station	190	286	157	433	25	216	102	150	105	62	-	848	523	328	10	385	493	665	1161	638	-	-	379
Parteen Weir	320	343	670	422	563	583	224	589	203	112	706	1011	371	689	457	455	660	210	920	883	-	-	655
Total	510	629	827	855	588	799	326	739	308	174#	706	1859	894	1,017	467#	840	1,153	875	2081	1521	-	-	537

Table 4. The number of wild salmon ascending the R. Shannon from 2000-2022. 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).



The regulating gates at the entry point to the Ardnacrusha headrace canal.



The navigation gate at the entry point from the Ardnacrusha headrace canal into Parteen regulating Weir.

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 R. Shannon operated on a catch and release system for all wild salmon, whereas a bag-limit operated for hatchery salmon. For 2022, the River Shannon was open for 'catch and release' of salmon. It was 'open' for trout and coarse fishing.



A breach of coarse fish byelaws on the Lower Shannon in 2022.



A view of a section of the Castleconnell Fishery in February 2022.

Fisheries Protection and Regulation

For the 2022 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 the 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.



An IFI kayak fisheries protection patrol on the Lower Shannon.



Sea Lamprey observed spawning below Annacotty Weir on the Mulkear and another climbing the weir above Annacotty.

The River Shannon Silver Eel Trap and Transport Programme

The Shannon River basin district (Figure 4), includes an area of about 18,000 km², mostly in the lowland central area of the Republic of Ireland but with a small part (6 km²) of the upper River Shannon basin extending across the border to Northern Ireland. It has been estimated that there are more than 1,600 lakes, totalling about 440 km² surface area, though the majority are less than 0.5 km², and about 16,000 km of river channel in the river basin district.

The River Shannon, which discharges to a Shannon estuary, drains an area of approximately 11,700 km², upstream of Limerick. The total water surface area is about 4,100 km² but the ten larger lakes represent 90% of the total lake area. Most of the lakes are shallow and mesotrophic to eutrophic. The three largest, Loughs Allen (35 km²), Ree (105 km²) and Derg (117 km²), are in a series of lakes through which the main river channel flows. The gradient is remarkably low, with the river rising at about 152 m above sea level and then flowing southwards with only a 12 m drop in altitude over 185 km, before finally descending more rapidly to sea level. The principal rivers flowing to the Shannon estuary are the River Feale (1153 km², 34.6 m³·s⁻¹), River Maigue (1075 km², 15.6 m³·s⁻¹), and River Fergus (881 km², 25.7 m³·s⁻¹).

The Ardnacrusha generating station (86 MW), is located 3 km upstream of the tidal limit of the river at Limerick city and it harnesses 10,400 km² of the catchment area upstream. The Ardnacrusha station is equipped with three vertical shaft Francis turbines

and one vertical shaft Kaplan turbine operating under an average head of 28.5 m. A 12.6 km headrace canal supplies the power station with the up to 400 m³·s⁻¹ water supply needed for maximum generation levels. A 2.4 km long tailrace canal returns the station discharge back to the River Shannon. The Parteen Regulating Weir, located at the head of the headrace canal, serves to divert the main flow of the River Shannon to the power station. A storage reservoir immediately upstream of the regulating weir provides supplementary impounded water. A statutory 10 m³·s⁻¹ compensatory flow must be discharged to the main river channel. Since the 1980's the bulk of this water passes through a 600 kW turbine located at the Parteen Regulating Weir, and the remainder feeds into a fish pass. In times of high water, when Ardnacrusha is drawing its maximum load, and the level of Lough Derg rises above 33.56 m, excess water is allowed down the river channel through any or all the set of three 18 m undershot gates located at the Parteen Regulating Weir. This process is referred to as "spillage". The mean annual flow of the River Shannon at Killaloe, located 3 km upstream of the regulating weir, is 186 m³·s⁻¹. Flows may be as low as 10-15 m³·s⁻¹ in dry summers or over 700 m³·s⁻¹ in major floods. River flow patterns are also locally controlled at other weirs located in the middle and upper catchment, for navigation and alleviation of flooding. The principal ones are located at the outlets of Loughs Allen and Ree and in the river channel at Rooskey, Tarmonbarry and Meelick.



An evening view of the Killaloe Eel Weir on the River Shannon.

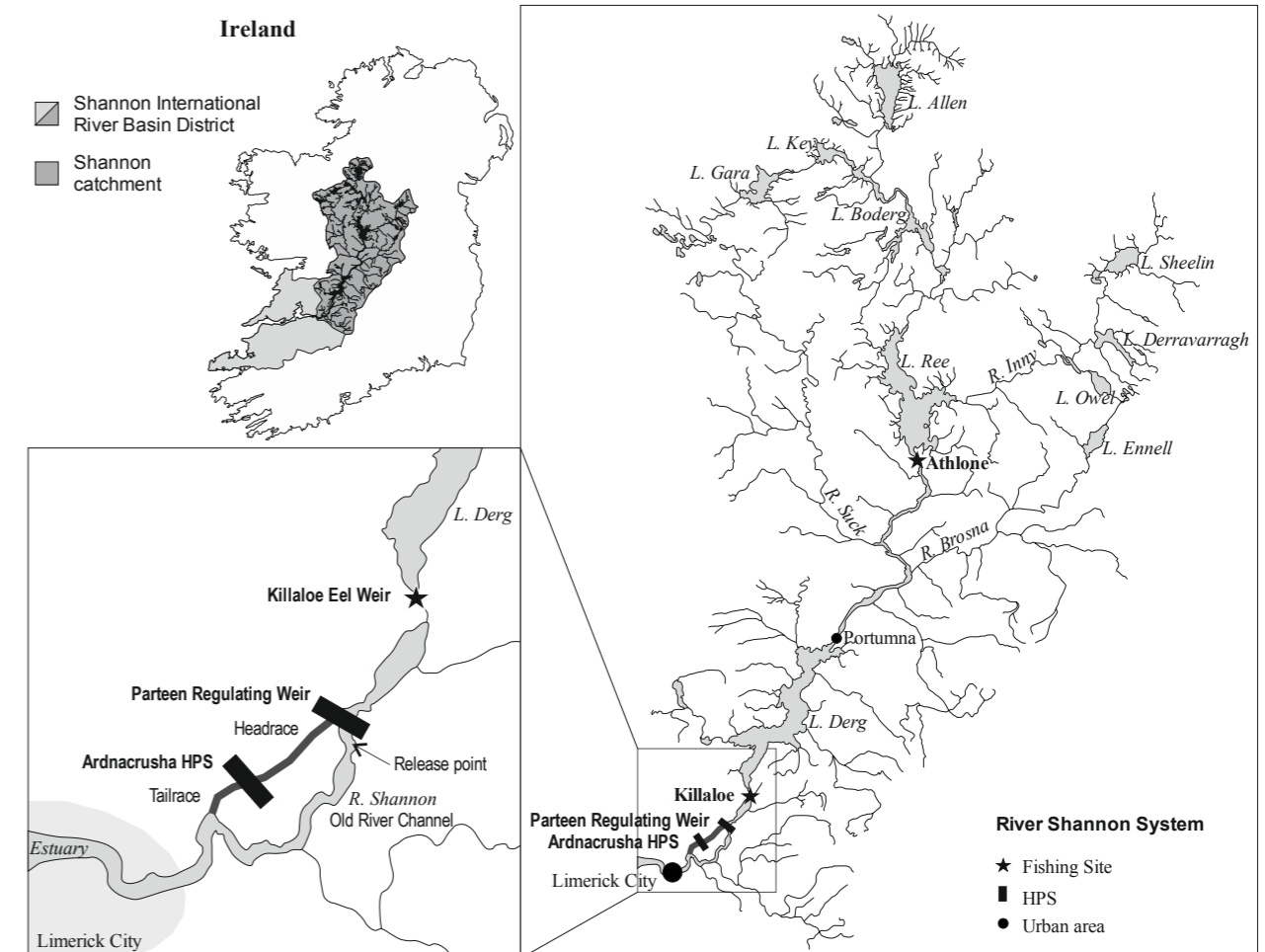


Figure 4. Map of River Shannon catchment with conservation fishing sites, release point and Ardnacrusha Hydro Station indicated.

In 2022/23 season, conservation eel fishing was conducted at three sites: two at Athlone, and one at Killaloe (Figure 4). Fishing began on the last week of August 2022 at Athlone and the 19th October 2022 at Killaloe. Fishing ceased at Athlone on 28th December 2022 but continued at Killaloe until 24th January 2023. A total of 12,912 kg of eels were caught at Athlone (11,878 kg at the Jolly Mariner site and 1,034 kg at the Yacht Club site), and a further 7,017 kg were caught at Killaloe, giving an overall Trap and Transport catch of 19,929 kg (Figure 5). The overall Trap and Transport capture in 2022/23 is comparable with captures from the previous 2 years (Figure 6).

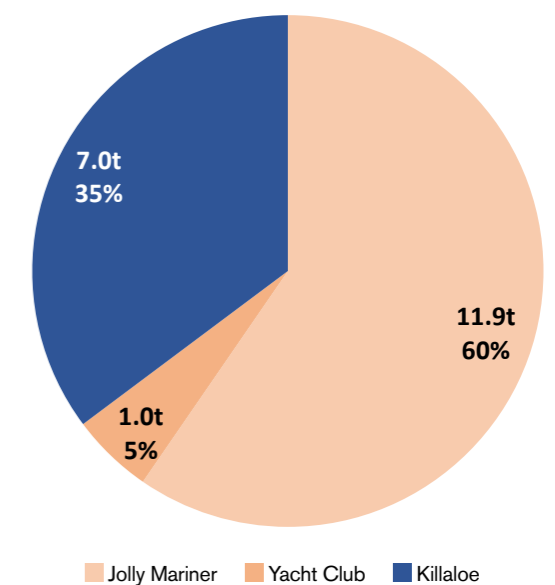


Figure 5. Proportions of the River Shannon Trap and Transport catch obtained by each fishing crew in the 2022/2023 season.

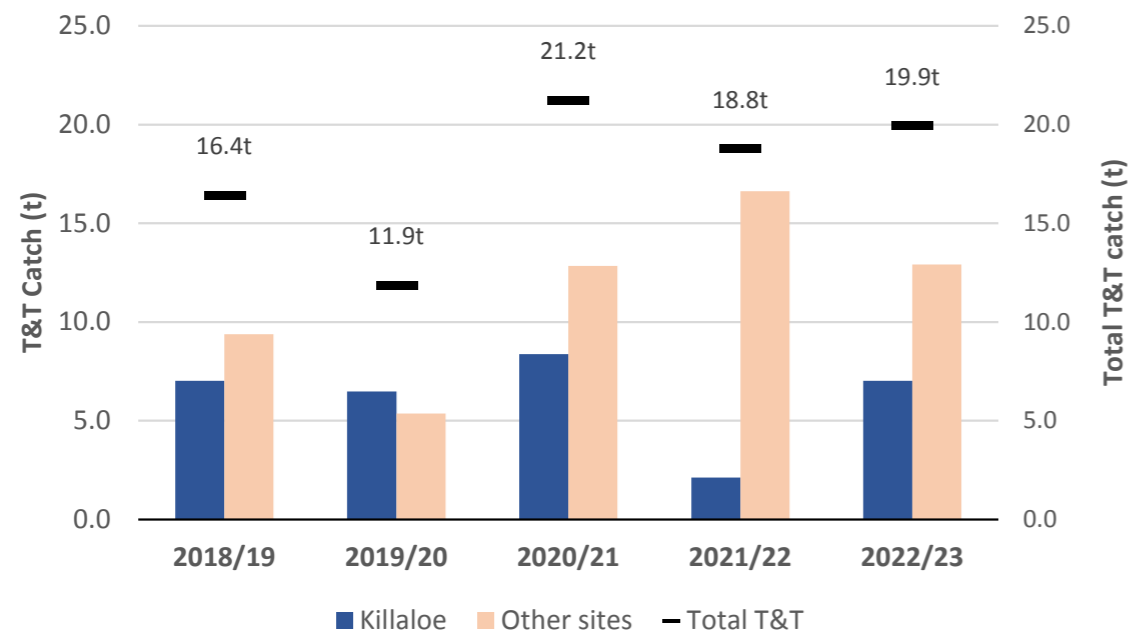


Figure 6. The total Shannon Trap and Transport Program silver eel catches, released in five subsequent years, along with proportion of Killaloe and other sites catch contributions.

Daily catch rates at Killaloe are shown in Figure 7, along with variation in discharge and spillage. Discharge was variable during the season with little spillage. Highest catches were recorded during the

last moon quarter in November 2022, and in January, which coincided with a period of relatively high discharge.

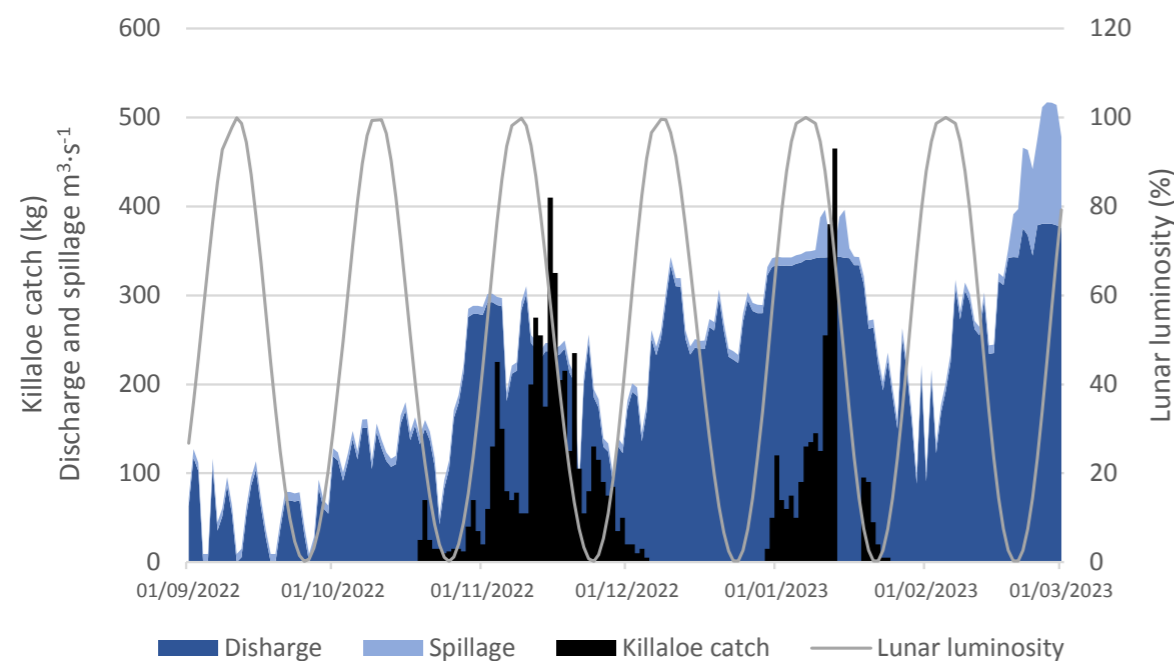


Figure 7 Variation in daily catches at the Killaloe fishing site, in relation to the lunar cycle, discharge and spillage during the 2022/2023 season.

Production and escapement figures for the River Shannon are summarised in the flow diagram (Figure 9). Production of 33,629kg 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 conducted by the University of Galway from 2016/17 – 2019/20. In total 19,929kg (53.9% of production) was moved beyond the hydropower station through trap and transport. Of the 17,014kg that moved beyond Killaloe weir, it is estimated that 1,344kg (7.9 %) 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 downstream route selection. An estimated 21.15% mortality (3,314 kg) at Ardnacrusa hydropower station of the 15,670 kg that entered the headrace, leaves 12,356 kg progressing downstream. This gives an escapement of 33,629 kg, or 91.0 % of production.

The estimates of production and escapement as shown in Table 6, together with trap and transport quantities for the last five years are comparable except for the 2021/22 season, where production was 13 t lower. The value of escapement as a percentage of production remains high, ranging from 86.8% to 95.8%.

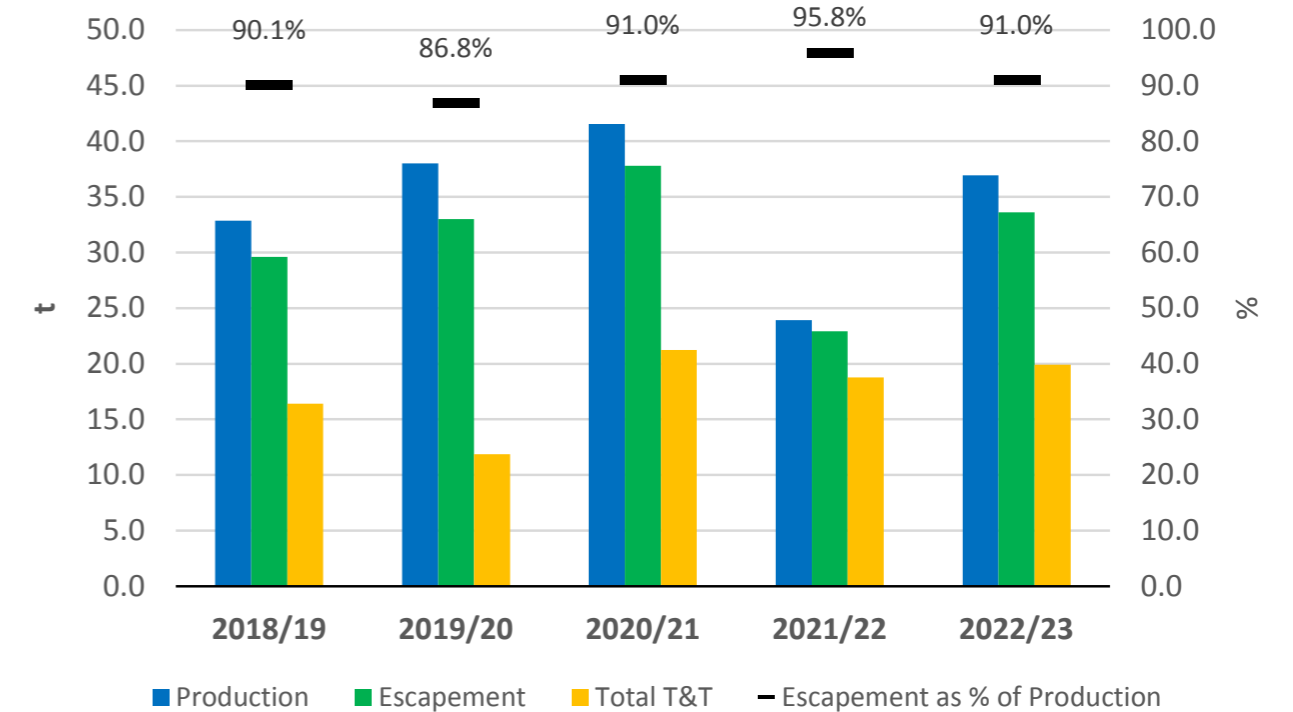


Figure 15. Estimates of production and escapement, together with trap and transport quantities and escapement as a percentage of production values, in the last five subsequent years.

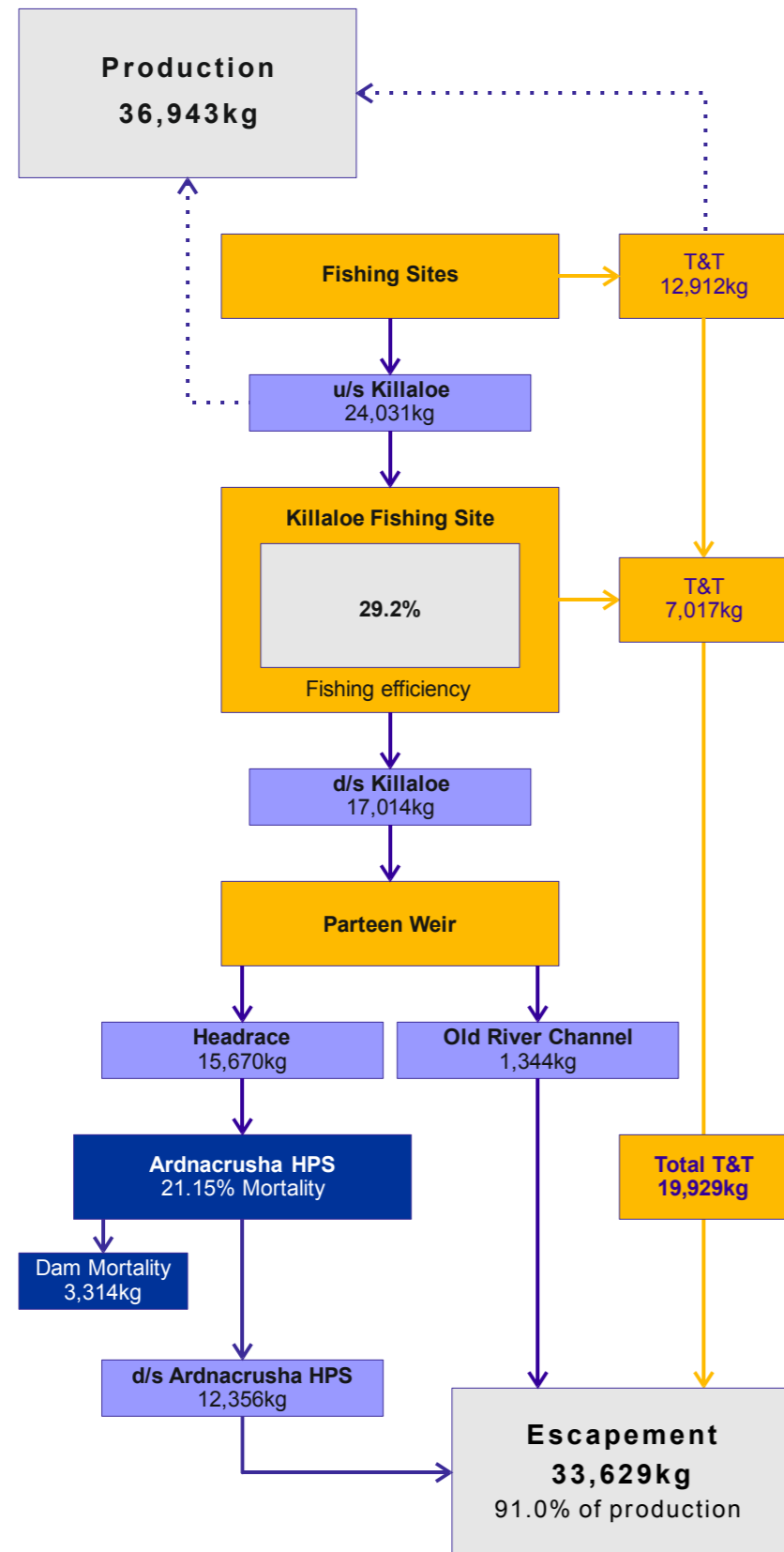


Figure 9 A summary of the analysis of silver eel production and escapement in the River Shannon during the 2022/2023 eel migration season.

Year	Production (kg)	Escapement (kg)	% of Production
2022/2023	33,629	33,692	91.0
2021/22	23,903	22902	95.8
2020/21	41,548	37,810	91.0
2019/20	38,028	33,011	86.8
2018/19	32,850	29,613	90.9

Table 6. Production and escapement estimations on the River Shannon in 2022/23, and corresponding values for the previous four seasons.

The River Shannon Juvenile Eel Trap and Transport 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 16th March 2022.

Fishing activity ceased at all sites on the 12th September. A total catch of 656.43kg were captured and transported during 2022 (Table 7). This compares to a total of 102.4kg, 1,172.6kg, 13.4kg and 1,402.5kg for 2021, 2020, 2019 and 2018. The catches of juvenile eel (96.7kg) 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 2022 elver catches again show the Shannon catch to be in decline (along with the European trend). The trapping of juvenile eel will continue in 2023. The Ardnacrusha elver traps have been extensively refurbished over the period 2017-2020. These 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 extra 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	1.05	0.29	0	7.27	0.28	0
May	11.7	0.12	0	462.88	3.91	0
June	43.16	1.41	0	23.67	0	0.93
July	31.72	3.45	0	50.42	0.52	3.23
August	3.61	0	0	13.25	0	2.16
September (18/9/2021)	0.19	0	0	0.93	0	0.28
Total catch	61.43	5.27	0	141.52	4.71	6.60

Table 7. The catch of juvenile eel at the three ESB operated locations for 2022. The entire catch of 656.43kg 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).



A view of the Shannon silver eel release site located at Parteen salmon hatchery located on the lowermost section of the Kilmastulla River. This was redesigned and constructed in 2022.

IFI led Initiatives completed during 2022

Stands and structures

Repairs and maintenance to Inland Fisheries Ireland's angling infrastructure throughout the Shannon region continued apace during 2022. As well as assigning resources from existing teams, three seasonal staff were taken on to assist with works. Repairs were carried out on:

- The River Suck & sub catchments
- River Inny
- River Brosna
- Strokestown and north Roscommon lakes
- River Lung
- Lough Allen
- Lough Patrick (Multyfarnham)
- Slevins Lake (Mullingar)
- Dromgorman Lake (Leitrim)

A number of structures were replacements for old timber structures which were removed over the last number of years. Replacement footbridges were mostly constructed from recycled plastic boards. In some locations, galvanised steel structures were used. The stiles were mostly constructed from aluminium, but in some cases recycled plastic was also used.

A major upgrade of the decking areas at the flagship wheelchair accessible match facility at Donamon (River Suck) took place in 2022. Timber decking was removed from fifteen angling pegs and associated catwalks and were replaced with glass reinforced plastic (GRP). A new wheelchair accessible section was constructed adjacent to the wheelchair accessible toilet block and made provision for close proximity for particular groups, without affecting the international match pegs. A selection of photos of some of the works is also presented below.



Before and after photos of new footbridge on the River Shiven (Suck catchment)



Photo shows a new stile erected on the R. Inny near Multyfarnham.



New footbridge access at the River Lung, near Lough Gara.



New bridge being constructed at River Suck, Ballinasloe East



New GRP surface on the existing all-access angling stands at Donamon.



Selection of photographs of works underway and completed at Lough Dooneen, North Roscommon.

Fishing stand at Lough Duff and associated catwalk.



Work at Poolboy, Ballinasloe (Lower River Suck).

Riverine Restoration Projects

Sheelin Riverine Restoration

The Lough Sheelin EIP project, which covered seven river subcatchments around Lough Shgeelin, was completed in 2022. The project involved the enhancement of riparian areas, to help mitigate impacts from climate change and to provide important buffer areas from nutrient enrichment. The total quantities of works complete were:

- 6,705m of fencing completed.
- 11 solar pumps fitted.
- 47 cattle drinkers including all associated pipework (6,668m).
- 7,275 m tree/shrub pruning.



New footbridge access at the River Lung, near Lough Gara.



Fencing work on the Pound (left) and Halfcarton (right) Rivers.



Shear work on the Finaway River (left) and Kildorrough River (right).



Fencing on the Finaway River, November 2022.



Drone footage of fencing (EIP) on the Mount Nugent River.



Double solar panel on the Halfcarton River (EIP).



Solar pump on a precast concrete base and the pump insertion on the Pound River.

Francis River (Upper Suck catchment) Riverine Restoration Project

A major riverine restoration project was completed on the Francis River (upper River Suck catchment) in 2022. Works were designed to improve habitat conditions and water quality in areas impacted by historical drainage schemes. Instream restoration works involved the insertion of spawning gravels, creation of pools and the reinstating of thalweg in over widened stretches. Riparian works involved the erection of fencing, closing off of stock access with the provision of stock drinkers and solar pumps.

Following detailed design and planning for riverine enhancement in late 2021/early 2022, approximately 6km of fencing works and 3.5km of instream works was completed by year end. A total of 4 solar pumps, two nose pumps and 13 drinkers were installed as part of the project. Pre-works electrofishing was carried out by IFI at three separate locations along the Francis River. Post-works e-fishing surveys will be carried out in 2023 and 2024.



Before, after work photographs taken on the thalweg below Cloonard Bridge (Upper Francis River).



Sequence of gravel shoals and pools above Cloonard Bridge (Upper Francis River).



Before and after photos of gravel and thalweg at the upper stretches of the Francis River.



Before and after photos of gravel and thalweg at the upper stretches of the Francis River.



Reinstating a thalweg, insertion of gravel and creation of pools at Cloonard Bridge (Francis River).

Before and after photos of gravel and thalweg at the upper stretches of the Francis River.



Fencing and solar pump installation at Ballindrumlea (Francis River).

Support to clubs and organisations

Support was provided to a number of angling clubs and development associations on existing Midland Fisheries Fund (MFF) projects and for expressions of interest for the 2023 funding call. Support was provided to:

- Lough O'Flynn & District Anglers (design and planning for riverine restoration work in the upper Suck region)
- Coosan & Ballykieran Anglers (design and planning for riverine restoration works on the Tang/Dungolman River)
- Lough Ennell anglers (completion of riverine restoration works on the Tudenham and Kilpatrick Rivers and design of further works on three Ennell sub-catchments)

- Lough Sheelin anglers (progressing the Maghera riverine restoration project)
- Glore Heritage Association (completion of riparian works on the Glore River)
- Aughrim Development Association (in-stream restoration works on the Aughrim River)
- Athleague Tidy Towns (installation of all-access angling stand at Athleague, River Suck catchment)

Many of these projects are completing riverine restoration project permission and planning. Some, such as the Glore and Tudenham projects, completed works in 2022. New all-access angling stands were erected on the River Suck at Athleague.



A drone taken photograph of the area Parteen weir, the headrace and Lough Derg.

Angling Club Initiatives

The Ormond Angling Club

In 2020 with the provision of funding from 'Leader' the Ormond Angling Club installed a fish counter at Ballyartella Weir on the Nenagh River. A trash barrier was provided and placed immediately above the Vaki Riverwatcher fish counter by the OPW as there were continuing problems with debris.

However, the maintenance and continued operation of the fish counter remains problematic.

Other works include partnering with ESB and IFI on Nenagh River instream habitat works and occasional local clean-up (litter/debris) initiatives.

The 2023 Shannon Fisheries Partnership Report

The 2023 ESB habitat Work plan

The following list of ESB work sites have been prioritised for 2023:

1. The Lower R. Suck – Shannonbridge to Ballinasloe section (Mid-Shannon catchment).
2. The Nenagh River (Lough Derg catchment).
3. The Ballyfinboy River (Lough Derg catchment).
4. Little Brosna (Camcor) (Mid-Shannon catchment).
5. Castleconnell (Lower Shannon catchment).
6. The Mulkear (Lower Shannon catchment).
7. Lecarrow canal/river (Lough Ree catchment)
8. The Breensford (Lough Ree catchment)
9. McNamara's Lake (Lower Shannon catchment)

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