ACTIVITY REPORT

OF THE

STANDING SCIENTIFIC COMMITTEE FOR EEL

2017

REPORT OF THE TECHNICAL EXPERT GROUP ON EEL TO THE NORTH-SOUTH STANDING SCIENTIFIC COMMITTEE ON INLAND FISHERIES (NSSSCIF)

May 2018

Disclaimer:	**This report includes data and analyses that are supplied by various agencies for the purposes of supporting the implementation of the Eel Management Plans in Ireland. The data will be subject to scientific review for the National Report to the EU in 2018.** **The data and analyses are part of an ongoing scientific assessment and are, therefore, preliminary and may be subject to change, updating or reanalysis. Some data may also be submitted for peer-review publication. The contents of this report should not be reproduced without the prior permission of the Standing Scientific Committee for Eel.**

Glossary of terms

Glass eel	Young, unpigmented eel, recruiting from the sea into continental waters. WGEEL consider the glass eel term to include all recruits of the 0+ cohort age. In some cases, however, also includes the early pigmented stages.
Elver	Young eel, in its first year following recruitment from the ocean. The elver stage is sometimes considered to exclude the glass eel stage, but not by everyone. To avoid confusion, pigmented 0+cohort age eel are included in the glass eel term.
Bootlace, fingerling	Intermediate sized eels, approx. 10–25 cm in length. These terms are most often used in relation to stocking. The exact size of the eels may vary considerably. Thus, it is a confusing term.
Yellow eel (Brown eel)	Life-stage resident in continental waters. Often defined as a sedentary phase, but migration within and between rivers, and to and from coastal waters occurs. This phase encompasses the elver and bootlace stages.
Silver eel	Migratory phase following the yellow eel phase. Eel characterized by darkened back, silvery belly with a clearly contrasting black lateral line, enlarged eyes. Downstream migration towards the sea, and subsequently westwards. This phase mainly occurs in the second half of calendar years, though some are observed throughout winter and following spring.
Assisted Upstream Migration	the practice of trapping and transporting juvenile eel within the same river catchment to assist their upstream migration at difficult or impassable barriers, without significantly altering the production potential (Bbest) of the catchment
Eel River Basin or Eel Management Unit	"Member States shall identify and define the individual river basins lying within their national territory that constitute natural habitats for the European eel (eel river basins) which may include maritime waters. If appropriate justification is provided, a Member State may designate the whole of its national territory or an existing regional administrative unit as one eel river basin. In defining eel river basins, Member States shall have the maximum possible regard for the administrative arrangements referred to in Article 3 of Directive 2000/60/EC [i.e. River Basin Districts of the Water Framework Directive]." EC No. 1100/2007.
River Basin District	The area of land and sea, made up of one or more neighbouring river basins together with their associated surface and groundwaters, transitional and coastal waters, which is identified under Article 3(1) of the Water Framework Directive as the main unit for management of river basins. The term is used in relation to the EU W F D.
Stocking	Stocking (not restocking) is the practice of adding fish [eels] to a waterbody from another source, to supplement existing populations or to create a population where none exists.
Trap & transport	Traditionally, the term trap and transport referred to trapping recruits at impassable obstacles and transporting them upstream and releasing them. Under the EMPs, trap and transport (or catch and carry) now also refers to fishing for downstream migrating silver eel for transportation around hydropower turbines.
EEL REFERENCE POINTS/POPULATION DYNAMIC	
B_0	The amount of silver eel biomass that would have existed if no anthropogenic influences had impacted the stock.
$B_{current}$	The amount of silver eel biomass that currently escapes to the sea to spawn.
B_{best}	The amount of silver eel biomass that would have existed if no anthropogenic influences had impacted the current stock.
ΣF	The fishing mortality rate, summed over the age-groups in the stock, and the reduction effected.
ΣH	The anthropogenic mortality rate outside the fishery, summed over the age-groups in the stock, and the reduction effected.
R	The amount of glass eel used for restocking within the country.
ΣA	The sum of anthropogenic mortalities, i.e. $\Sigma A = \Sigma F + \Sigma H$

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Executive Summary

Introduction

The EC Regulation (Council Regulation 1100/2007) for the recovery of the eel stock required Ireland to establish eel management plans for implementation from 2009. Under the EC Regulation, Ireland is also required to monitor the eel stock, evaluate current silver eel escapement and post-evaluate implemented management actions aimed at reducing eel mortality and increasing silver eel escapement. Each Member State is required to report to the Commission, initially every third year until 2018, and subsequently every six years.

The Irish Eel Management Plan submitted to the EU on the 9th January 2009 and accepted by the EU in June 2009 outlined the main management actions aimed at reducing eel mortality and increasing silver eel escapement to the sea. The first monitoring report was submitted by Ireland in June 2012 and this was accompanied by a scientific assessment report for the period 2009-2011. The second monitoring report (2012-2014) was submitted to the EU in June 2015 and the scientific assessment was included as an annex to that report.

The Irish Eel Management Plan outlines a national programme for sampling catch and surveys of local eel stocks. Appropriate scientific assessment will monitor the implementation of the plans. The Standing Science Committee for Eel (SSCE) was established by the Department of Energy, Communications and Natural Resources in March 2009 and appointed by the Minister. Consultation with the Department of Culture, Arts and Leisure in Northern Ireland ensures the co-operation with Northern Ireland agencies to cover the specific needs of the trans-boundary North Western International River Basin District eel management plan. The SSCE comprises scientific advisers drawn from the Marine Institute (MI), Inland Fisheries Ireland (IFI), The Loughs Agency, the Agriculture, Food and Biosciences Institute for Northern Ireland (AFBINI) and the Electricity Supply Board. Although the scientists are drawn from these agencies, the advice from the SSCE is independent of the parent agencies. The SSCE has also been supported by invited scientists from NUIG, AFBINI and NPWS.

The SSCE was required to compile an annual stock assessment and scientific advice report on the national eel monitoring plan and this also enables the three year report to the EU to be produced in a timely and accurate fashion. The compilation of the annual assessments also highlights any issues and problems which need to be resolved within the three year time frame.

International Advice; ICES - 2018

The International Council for Exploration of the Seas (ICES) is the primary source of scientific advice on the marine ecosystem to governments and international regulatory bodies that manage the North Atlantic Ocean and adjacent seas. The content of scientific advice is solely the Advisory Committees (ACOM) responsibility not subject to modification by any other ICES entity. ACOM has one member from each member country, under the direction of an independent chair appointed by the Council, and works on the basis of scientific analysis prepared in the ICES expert groups and the advisory process includes peer review of the analysis before it can be used as basis for the advice. In the case of eel, the relevant expert group is the joint EIFAAC/ICES/GFCM Working Group on Eel (WGEEL).

ICES considered the updated time-series of relevant stock status indices and issued advice for 2018:

"ICES advises that when the precautionary approach is applied for European eel, all anthropogenic impacts (e.g. recreational and commercial fishing on all stages, hydropower, pumping stations, and pollution) that decrease production and escapement of silver eels should be reduced to – or kept as close to – zero as possible."

Stock status

"The status of eel remains critical.

The annual recruitment of glass eel to European waters in 2017 remained low, at 1.6% of the 1960–1979 level in the "North Sea" series and 8.7% in the "Elsewhere Europe" series. The annual recruitment of young yellow eel to European waters was 24% of the 1960–1979 level. These recruitment indices remain well below the 1960–1979 reference levels, and there is no change in the perception of the status of the stock."

National Advice

There were no requests for advice in 2017.

Irish EMP Management Actions 2017

Under the EU Regulation (EC No. 1100/2007) four main management actions were included in the Irish Eel Management Plans aimed at reducing eel mortality and increasing silver eel escapement in Irish waters. These were a cessation of the commercial eel fishery and closure of the market, mitigation of the impact of hydropower, including a comprehensive silver eel trap and transport plan, ensure upstream migration of juvenile eel at barriers and improve water quality including fish health and biosecurity issues.

1. ***Reduction in Fishing***

   All regions confirmed a closure of the eel fishery for the 2017 season with no licences issued and the eel fishery, with the exception of L. Neagh, also remained closed in N. Ireland. Some illegal fishing was reported which led to some seizures of gear in the Shannon IRBD, the North West RBD and the Western RBD

   No dealers transport trucks were seized in 2017. Reliable trade (import/export) data remains unavailable to the SSCE.

   The Department of Communications, Climate Action and Environment tasked Inland Fisheries Ireland with setting up a network of scientific eel fisheries in collaboration with the former eel fishermen. A number of key locations were earmarked for surveys and a tender process was initiated with applications from interested parties. In 2016 and 2017 a series of yellow eel surveys were carried out in 5 lakes (Upper and Lower Lough Corrib, Lough Conn, Lough Ramor and Lough Muckno) and 2 transitional waters (Waterford Harbour and Munster Blackwater). The programme also consists of an elver monitoring survey and a silver eel fishery on the River Boyne and a glass eel survey of the Shannon Estuary. The purpose of the scientific fisheries is to increase the data and knowledge of eel in Ireland ahead of the 2018 EU review of our national eel management plan.

2. ***Hydropower Impact***

   Mitigation of hydropower involved a comprehensive trap and transport system for migrating silver eels on the Shannon, Erne and Lee, the targets for 2009-2011 were set out in the Eel Management Plans and these were subsequently modified on the Erne for the 2015-2017 period to allow for the transport of 50% of the annual silver eel production and a rolling target based on a 3-year basis allowing shortfalls in one year to be made up the following year. A long-term shortfall should not be carried forward indefinitely.

   The total quantity of silver eel released from the three catchments was 60,748 kg. The level of fishing mortalities was reported to be low.

In the **River Shannon** the trap and transport total of 16,737 kg represented 49% of silver eel production (using the escapement estimated adjusted to account for nights not fished) and,

therefore, exceeded the 30% target, the EMP requirement was met on the basis of the agreed (3 year rolling mean value) protocol.

In the **River Erne**, the trap and transport annual target (50% of silver eel production) for the River Erne was exceeded in the 2017 season. The quantity (43,469 kg) transported for safe release at Ballyshannon represented 63.2% of the estimated silver eel production (68,810 kg) for the river system for the season.

In the ***River Lee***, a total 542 kg were trapped and transported downstream of the Inniscarra dam. The total catch exceeded the annual target of 500 kg. The 3 year rolling average is below target due to the poor catch in 2016.

Improvements to the fishing efficiency of sites in the Shannon and Erne and new monitoring protocols have been developed over the last number of years to improve the T+T programme.

For the **Shannon**, a mortality rate, used in previous years when no spillage took place at the hydropower dam, of 21.15% was applied to the 2017 data. The estimated silver eel mortality at the Ardnacrusha dam was 2.948t or 8.6% of production.

For the ***Erne***, the 2017/2018 the estimated mortality at the dams was 10.271t in the 2017/2018 migration period. It was estimated that the cumulative mortality represented 14.9% mortality of the total River Erne silver eel production or 40.5% of the migrating eels reaching the dams during the season. The mortality rates applied were determined in 2013/2014 and are as follows: Cliff HPS 0% (no flow or only spillage); 7.9% (Generation plus spillage) and 26.7% (Only generation), Cathaleen's Fall HPS: 0% (no flow or only spillage); 7.7% (spillage plus half generation load); 15.4% spillage plus full generation load); 27.3% (only generation).

3. Obstacles to upstream migration

Obstacles to migration in river systems are one of several factors influencing the decline in the European eel population. Obstacles impede eels from accessing and colonizing large parts of catchments, thus reducing upstream density and additional production of silver eels. The National Eel Management Plan identified that upstream migrating juvenile eels require modified passage through existing fish passes or any new obstacles to maximise escapement as traditional fish passes are not designed to accommodate eel passage. Barriers or potential obstacles which can be considered under this action include artificial structures such as weirs, hydro dams, fish passes, fish counter structures, millraces, road crossings/bridge aprons and forestry related operations. Over 47% of the available wetted habitat is above major hydropower barriers, although there will be a greater proportion of the potential silver eel production when the differences in relative productivity are taken into account.

IFI established a National Barriers Programme to advance the above remit and this will be in train over the period 2018 – 2021. To date 1,873 structures have been assessed covering 94 catchments in all river basin districts.

Assisted upstream migration of juvenile eel takes place at the ESB Hydropower Stations on the Shannon (Ardnacrusha, Parteen), Erne (Cathaleen's Fall), Liffey and Lee. This has been a long-term objective to mitigate against the blockage of the HPSs under ESB Legislation (Sec 8, 1935).

On the Erne and Shannon, elvers and bootlace eel were transported upstream from the fixed elver traps.

4. Improve Water Quality, fish health and biosecurity

The improvement of water quality in Ireland is primarily being dealt with under the workprogramme for the implementation of the Water Framework Directive (WFD). A detailed report on the results of the first cycle of WFD monitoring is not available to date (mid 2017).

In the interim period, the Environmental Protection Agency (EPA) compile statistics on water quality in Ireland, the most recent of which covers the period 2010-2012. For that period, 53% of rivers, 43% of lakes, 45% of transitional waters, 93% of coastal waters and 99% of groundwater were satisfactory at good or high status. Rivers monitored, using the biological Q value scheme, were in high or good condition along 73% of the monitored river channels.

There were 31 reported fish kills in 2016. This was an increase in numbers compared with 2015 (23) and 2014 (22).

Anguillicola crassus continues to spread and more than 70% of the wetted area is now infested. Since 2013, two swimbladder tissue health indices have been applied to samples of eels in order to monitor the degree of damage to the swimbladder due to infection of *Anguillicola crassus;* The Swimbladder Degenerative Index (SDI), (Lefebvre *et al.,* 2002) and the Length-Ratio Index (LRI), (Palstra *et al*., 2007). Despite the high rates of prevalence and intensity recorded during yellow eel surveys, these indices have reported, on average, slight to moderate damage in swimbladder tissue of eels captured in the Republic of Ireland.

Irish EMP Monitoring Actions

A close link between the management actions and eel-stock targets will be established by implementing a comprehensive monitoring and stock assessment programme. This will allow for a direct feedback to management based on response of the stock to management actions.

Silver Eel Assessment

Silver eels are being assessed by annual fishing stations on the Shannon, Erne, Burrishoole, Fane and Barrow catchments and a pilots study in the Boyne in 2017.

Shannon

The total T&T catch in the River Shannon was 16,737 kg, 10,393 kg at Killaloe representing 62% of the total catch and 6,341 kg at Athlone. Fishing stated in Athlone on the 1/09/2017 and continued until the 13/02/2018 in Killaloe. Silver eel production, was estimated to have been 34.139t. This low production level, which was comparable to the previous year, suggests that a collapse of the Shannon eel stock may be occurring though further years of monitoring would be needed to confirm such a trend.

Burrishoole

Silver eel trapping was continued in Burrishoole in 2017. The timing of the run was 15% migrating in August, 31% in September and 40% in October. 90% of the run was completed by

the end of October. The silver eel season in 2017 was characterised by the lack of any major floods or storm events. The eels migrated on small floods and flow rates were easy to manage. The total run amounted to a count of 2208 eels or a production/escapement of 390.8 kg. The eels in the run had a mean weight of 0.177 kg and was composed of 35.1% male eels.

Erne

The 2017 fishing season began on 01/09/17 and extended to 20/12/17. The total catches from the 6 fishing sites was 43.6t. The estimated production from the Erne system is 68.8t, with an estimated escapement of 58t, 84% of production escaping to sea.

Fane

Silver eel catches at the Fane Fishery were varied in 2017 with a total catch of 770 kg and 20 nights fished from September to December. Increasing rainfall levels early in the silver eel season led to large catches in September, which is unusual for this site. Forty percent of the total catch was captured over 2 nights on the 28th and 29th September. The catches then tapered off for the rest of the season coinciding with water levels that never rose above 1m for the season.

R. Barrow

Increasing rainfall levels early in the silver eel season led to large catches over 2 nights in September representing 57% of the overall catch. Catches then tapered off for the rest of the season coinciding with decreasing water levels. In total 24 nights were fished with a total weight of 273 kg.

Yellow Eel Assessment

Yellow-eel stock monitoring is integral to gaining an understanding of the current status of local stocks and for informing models of escapement, particularly within transitional waters where silver eel escapement is extremely difficult to measure directly. Such monitoring also provides a means of evaluating post-management changes and forecasting the effects of these changes on silver eel escapement. The monitoring strategy aims to determine, at a local scale, an estimate of relative stock density, the stock's length, age and sex profiles, and the proportion of each length class that migrate as silvers each year.

2017 Survey

Yellow eel surveys took place in 7 lakes, 3 transitional waters and 1 sub-catchment of the Barrow. The lakes surveyed were Lough Corrib (Upper and Lower), Lough Conn, Lough Cullin, Lough Muckno and Lough Ramor by IFI, and two lakes in Burrishoole (by MI). The transitional waters were Waterford Estuary, the Munster Blackwater Estuary (by IFI) and Lough Furnace in Burrishoole (by MI). A semi-quantitative electric-fishing survey was also undertaken in 3 sub catchments of the River Barrow (Tully, Pollmounty and Aughnavaud sub catchments) in order to determine the extent of eel distribution in the rivers around the main channel.

Of the lakes sampled in 2017 the lowest CPUE was in Lower Lough Corrib where 580 eels were caught in 320 net nights giving a CPUE of 0.90. The highest CPUE was in Upper lough Corrib where 1,882 eels were caught in 200 net nights giving a CPUE of 7.91. The majority of these eels

were caught in one bay in the lake coinciding with a new moon, however the majority of the eels were classified as yellow eels and not pre-silver or silver eels. A repeat survey of Munster Blackwater estuary resulted in similar results for the 2 years with 521 eels recorded in 2016 and 540 eels in 2017. A repeat survey in Waterford estuary resulted in 6,988 eels in 2016 and 6,756 eels in 2017.

Fyke surveys in Freshwater resulted in different results with a good number of eels present above Clondulane Weir on the Munster Blackwater River in contrast to the limited numbers in the estuary. In the Barrow low numbers of eels were found in Levitstown canal in contrast to the large numbers found in Waterford Harbour downstream.

The electric-fishing carried out this year focused on the Tully catchment in the middle section of the Barrow catchment and the Pollmounty and Aughavaud sub catchments which are found at the high water mark. Following an intensive survey of the Tully sub catchment no eels were recorded in the sub catchment, with only 1 individuals being recorded in the Pollmounty and 5 eels in the Aughavaud. This result builds on the evidence of recent years of reduced eel distribution in the sub catchments of the River Barrow.

Recruitment

The annual recruitment of glass eel to European waters in 2017 remained low, at 1.6% of the 1960–1979 level in the "North Sea" series and 8.7% in the "Elsewhere Europe" series. The annual recruitment of young yellow eel to European waters was 24% of the 1960–1979 level. These recruitment indices remain well below the 1960–1979 reference levels, and there is no change in the perception of the status of the stock. Recruitment in Ireland for the 2017 season showed a general drop in the recruitment levels compared to 2016, in spite of many of the elver traps receiving upgrades, new climbing media etc. The trend in Ireland is reflected of a lower recruitment rate for the rest of Europe for this year.

1 Introduction

1.1 EU Regulation

The EC Regulation (Council Regulation 1100/2007) for the recovery of the eel stock required Ireland to establish eel management plans for implementation in 2009. Under the EC Regulation, Ireland should monitor the eel stock, evaluate current silver eel escapement and post-evaluate implemented management actions aimed at reducing eel mortality and increasing silver eel escapement.

The Irish Eel Management Plan submitted to the EU on the 9th January 2009 and accepted by the EU in June 2009 outlined the main management actions aimed at reducing eel mortality and increasing silver eel escapement to the sea. The four main management actions were as follows;

- a cessation of the commercial eel fishery and closure of the market
- mitigation of the impact of hydropower, including a comprehensive trap and transport plan to be funded by the ESB
- to ensure upstream migration of juvenile eel at barriers
- to improve water quality

Under the EC Regulation (EC No. 1100/2007), each Member State shall report to the Commission initially every third year until 2018 and subsequently every six years. The most recent, was submitted before 30th June 2015, addressing the following;

- monitoring
- the effectiveness and outcome of the Eel Management Plans
- contemporary silver eel escapement
- non-fishery mortality
- policy regarding enhancement/stocking

1.2 Standing Scientific Committee on Eel 2010 - 2017

The Irish Eel Management Plan outlines a national programme for sampling catch and surveys of local eel stocks. Appropriate scientific assessment and monitoring by the Fisheries Boards and the Marine Institute will monitor the implementation of the plans. In the Irish plan, provision was made for the establishment of a Scientific Eel Group (SEG) which was established by the Department of Energy, Communications and Natural Resources in March 2009. The SEG in 2009 was nominated by the Dept. of Communications, Energy and Natural Resources and appointed by the Minister and comprises scientific advisers drawn from the Marine Institute (MI), Central Fisheries Board (CFB), The Loughs Agency, the Electricity Supply Board and the Agriculture, Food and Biosciences Institute for Northern Ireland (AFBINI). Consultation with the Department of Culture, Arts and Leisure in Northern Ireland ensures the co-operation with Northern Ireland agencies to cover the specific needs of the trans-boundary North Western International River Basin District eel management plan.

In 2010, the SEG was reconstituted as a Standing Scientific Committee for Eel under Section 7.5 (a) of the 2010 Inland Fisheries Act (Appendix 1). The purpose of the committee is to provide independent scientific advice to guide IFI in making the management and policy decisions required to ensure the conservation and sustainable exploitation of the Ireland's eel stocks. IFI shall request the SSCE to provide an annual report on the status of Eel stocks for the purpose of advising IFI on the sustainable management of these stocks. IFI may also request the SSCE to offer scientific advice on the implications of proposed management and policy decisions on eel or seek advice on scientific matters in relation to eel. All scientific advice provided by SSCE will be considered as independent advice by IFI. Although the scientists are drawn from the agencies, the advice from the SSCE is independent of the parent agencies.

1.2.1 Terms of Reference

The EC Regulation (Council Regulation 1100/2007) for the recovery of the eel stock required Ireland to establish eel management plans for implementation in 2009. Under the EC Regulation, Ireland should monitor the eel stock, evaluate current silver eel escapement and post-evaluate implemented management actions aimed at reducing eel mortality and increasing silver eel escapement.

1. The SSCE shall carry out an appropriate assessment of eel stocks (juvenile, brown and silver) in accordance with the EU Regulation and with reference to the monitoring schedule as laid out in the National Eel Management Plan, for each Eel Management Unit and transboundary plan.

The appropriate assessment using internationally accepted best scientific practice should address the following issues:

(a) where possible update the historical silver eel production estimates
(b) estimate contemporary silver eel escapements

(c) establish and advise on biological reference points for monitoring changes in the brown eel stocks due to implementation of management actions, changes in recruitment etc.
(d) review and update long-term data series, such as annual recruitments, silver eel time series

The appropriate assessments for all fishery districts, River Basin Districts and transboundary plans shall take account different habitat types, lakes, rivers and transitional waters.

2. Oversee the updating of the national eel database and quality control of the data.

3. The SSCE shall complete and annual scientific assessment of the implementation of the management measures identified in the National EMP.
   These should include:
   a) Level of fishing, including IUU fishing (illegal, unreported, unregulated)
   b) Escapement estimates for Erne & Shannon
   c) Turbine mortalities and bypass efficiencies
   d) Quantities of silver eels trapped and transported on the Erne, Shannon & Lee
   e) Evaluation of the quality of the released silver eels
   f) Improvements to upstream migration
   g) Reviewing water quality indices collated under the Water Framework Directive

4. Update the national stock assessment framework in line with EU reporting requirements on an annual basis and assess the level of contemporary silver eel escapement with respect to the EU 40% target. Use a framework to facilitate extrapolation from data rich catchments to those with little or no data.

5. Assess possible stocking strategies as a useful tool to aid in the recovery of the stock. Where appropriate include the stocking option as an input to the stock assessment framework.

6. Compile an annual stock assessment and scientific advice report at the end of each year.

1.3 Meeting Activities

The SSCE met four times in 2017/2018 to monitor and report on the 2017 survey year and to prepare for the 2018 reporting to the EU on the progress in implementation of the EMPs;

30th January 2017	Galway
8th May 2017	Ballyshannon
10th April 2018	Galway
24th April 2018	Galway

1.4 Technical Expert Group on Eel 2018

It should be noted that with the formation in 2017 of the North-South Standing Scientific Committee on Inland Fisheries, the SSCE was discontinued in August 2017. A new Technical

Expert Group on Eel (TEGE) was established in April 2018 which will cover the next reporting cycle on eel (Appendix 2).

2 International Advice from ICES

2.1 Introduction to ICES Advice

The International Council for Exploration of the Seas (ICES) is the prime source of scientific advice on the marine ecosystem to governments and international regulatory bodies that manage the North Atlantic Ocean and adjacent seas. The ICES Council has delegated its advisory authority to the Advisory Committee or ACOM. ACOM has established the mechanisms necessary to prepare and disseminate advice subject to a protocol satisfying the following criteria:

Objectivity and integrity;
Openness and transparency;
Quality assurance and peer review;
Integrated advice – based on an ecosystem approach;
Efficiency and flexibility;
National consensus;

Therefore, ACOM is the sole competent body in ICES for scientific advice in support of the management of coastal and ocean resources and ecosystems. It designs strategies and processes for preparation of advice, manage advisory processes, and create and deliver advice, subject to direction from the Council. The content of scientific advice is solely ACOM's responsibility not subject to modification by any other ICES entity. ACOM has one member from each member country under the direction of an independent chair appointed by the Council ACOM works on the basis of scientific analysis prepared in the ICES expert groups and the advisory process include peer review of the analysis before it can be used as basis for the advice. In the case of eel, the relevant expert group is the Joint EIFAAC/ICES/GFCM Working Group on Eel (WGEEL).

2.2 ICES Advice on Eel 2017

European Eel throughout its natural range (reproduced from the *ICES Advice 2017,*

DOI: 10.17895/ices.pub.3440) (November 2017)

Advice

ICES advises that when the precautionary approach is applied for European eel, all anthropogenic impacts (e.g. recreational and commercial fishing on all stages, hydropower, pumping stations, and pollution) that decrease production and escapement of silver eels should be reduced to – or kept as close to – zero as possible.

Stock status

The status of eel remains critical.

The annual recruitment of glass eel to European waters in 2017 remained low, at 1.6% of the 1960–1979 level in the "North Sea" series and 8.7% in the "Elsewhere Europe" series. The annual recruitment of young yellow eel to European waters was 24% of the 1960–1979 level. These recruitment indices remain well below the 1960–1979 reference levels, and there is no change in the perception of the status of the stock.

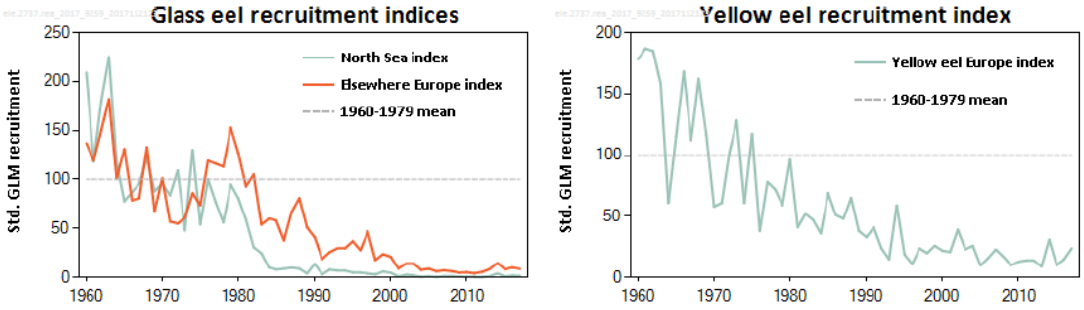

Figure 1 European eel. Left panel: indices, geometric mean of estimated (GLM) glass eel recruitment for the continental "North Sea" and "Elsewhere Europe" series. The GLM (predicting recruitment as a function of area, year and site) was fitted to 43 time-series, comprising either pure glass eel or a mixture of glass eels and yellow eels and scaled to the 1960–1979 geometric mean. The "North Sea" series are from Norway, Sweden, Germany, Denmark, the Netherlands, and Belgium. The "Elsewhere" series are from UK, Ireland, France, Spain, Portugal, and Italy. Right panel: Geometric mean of estimated (GLM) yellow eel recruitment trends for Europe. The GLM (predicting recruitment as a function of year and site) was fitted to 14 yellow eel time-series and scaled to the 1960–1979 arithmetic mean.

Stock and Exploitation Status

Table 1 European eel. State of the stock and fishery relative to reference points.

	Fishing pressure				Stock size			
		2014	2015	2016		2015	2016	2017
Maximum Sustainable Yield	F_{MSY}	?	?	? Undefined	MSY $B_{trigger}$	⊗	⊗	⊗ Below possible reference points
Precautionary Approach	F_{pa}, F_{lim}	?	?	? Undefined	B_{pa}, B_{lim}	⊗	⊗	⊗ Below possible reference points
Management plan	F_{MGT}	–	–	– Not applicable	B_{MGT}	–	–	– Not applicable
Qualitative evaluation	-	?	?	? Unknown	Recruitment	→	→	→ Highly impaired recruitment

Catch Options

Total landings and effort data are incomplete and therefore ICES does not have the information needed to provide a reliable estimate of total catches of eel. Furthermore, the understanding of the stock dynamic relationship is not sufficient to determine/estimate the impact any catch (at the glass, yellow, or silver eel stage) would have on the reproductive capacity of the stock.

Basis of the Advice

The basis for the advice is the Precautionary Approach.

A management framework for eel within the EU was established in 2007 through an EU regulation (EC Regulation No. 1100/2007; EC, 2007), but there is no internationally coordinated management plan for the whole stock area, which extends beyond the EU. The objective of the EU regulation is the protection, recovery, and sustainable use of the stock. To achieve the objective, EU Member States have developed Eel Management Plans (EMPs) for their river basin districts, designed to allow at least 40% of the silver eel biomass to escape to the sea with high probability, relative to the best estimate of escapement that would have existed if no anthropogenic influences had impacted the stock. ICES has evaluated the conformity of the national management plans with EC Regulation No. 1100/2007 (ICES, 2009, 2010) and progress in implementing EMP actions (ICES, 2013a, 2013b). The EU Member States produced progress reports in 2012 and 2015. The 2015 reports have not been post-evaluated at the time of writing this advice.

The EC Regulation of 2007 (EC, 2007), establishing measures for the recovery of the stock of European eel, has not been evaluated by ICES for its conformity with the precautionary approach and has for this reason not been used as the basis for the advice.

Quality of the Assessment

An eel data call was issued for the first time in 2017, which has substantially improved the coverage and completeness of the data being reported to the WGEEL. However, data on fisheries and other anthropogenic impacts remain incomplete.

The advice is based on two glass eel recruitment indices and a yellow eel recruitment index. The indices are based on data from fisheries and scientific surveys and form the longest and most reliable time-series that constitute an index of abundance. The current advice is based on the fact that the indices used by ICES are still well below the 1960–1979 levels.

Total landings and effort data are incomplete. There is a great heterogeneity among the time-series of landings because of inconsistencies in reporting by, and between, countries, as well as incomplete reporting. Changes in management practices have also affected the reporting of commercial, non-commercial, and recreational fisheries.

Issues relevant for the advice

In September 2008, and again in 2014, eel was listed in the IUCN Red List as a critically endangered species.

The assessment and management of the fisheries and non-fisheries mortality factors are carried out by national and regional authorities. Fisheries take place on all available continental life stages throughout the distribution area, although fishing pressure varies from area to area, from almost nil to heavy overexploitation. Illegal, unreported, and unregulated (IUU) fishing is known to occur. The non-fishing anthropogenic mortality factors can be grouped as those due to (a) hydropower, pumping stations, and other water intakes; (b) habitat loss or degradation; and (c) pollution, diseases, and parasites. In addition, anthropogenic actions may affect predation mortality, e.g. conservation or culling of predators.

Environmental impacts in transitional and fresh waters, which include habitat alteration, barriers to eel passage, deterioration in water quality, and presence of non-native diseases and parasites, all contribute to the anthropogenic stresses and mortality on eels and also affect their reproductive success. It is anticipated that the implementation of the Water Framework (WFD) and the Marine Strategy Framework (MSFD) directives may result in improvements to the continental environment and that this may have a positive effect on the reproductive potential of silver eel.

ICES notes that stocking of eels is a management action in many eel management plans, and that this stocking is reliant on a glass eel fishery catch. There is evidence that translocated and stocked eel can contribute to yellow and silver eel production in recipient waters, but evidence of contribution to actual spawning is missing due to the general lack of knowledge of the spawning of any eel. Internationally coordinated research is required to determine the net benefit of restocking on the overall population, including carrying capacity estimates of glass eel source estuaries as well as detailed mortality estimates at each step of the stocking process.

When stocking to increase silver eel escapement and thus aid stock recovery, an estimation of the prospective net benefit should be made prior to any stocking activity. Where eel are translocated and stocked, measures should be taken to evaluate their fate and their contribution to silver eel escapement. Such measures could be batch marking of eel to distinguish groups recovered in later surveys (e.g. recent Swedish, French, and UK marking programmes), or implementing tracking studies of eel of known origin. Marking programmes should be regionally coordinated.

A management framework for eel within the EU was established in 2007 through an EU Regulation (EC Regulation No. 1100/2007; EC, 2007), but there is no internationally coordinated management plan for the whole stock area.

The framework required EU Member States to report on progress in 2012, 2015, and 2018. In 2012, many EU Member States did not completely report stock indicators (22 of 81 EMPs did not report all biomass indicators, and 38 did not report all mortality indicators), and there are differences in the approaches used to calculate reported stock indicators. A complete reporting of verified indicators covering the distribution area of the European eel is required for a full assessment of the stock. The 2015 reports have not been evaluated by ICES.

Reference Points

The EC Regulation (EC, 2007) sets an escapement limit of at least 40% of the silver eel biomass relative to the best estimate of escapement that would have existed if no anthropogenic influences had impacted the stock.

Recruitment at the 1960–1979 level is regarded as an un-impaired recruitment level.

ICES has advised the EU CITES Scientific Review Group on reference points for the eel stock that could be used in developing, and reviewing, an application for a non-detriment finding (NDF), under circumstances of any future improvement of the stock (ICES, 2015a). These reference points were developed specifically using CITES guiding principles for NDF.

Basis for the assessment

Table 3 European eel. Basis of the assessment.

ICES stock data category	3 (ICES, 2016).
Assessment type	Trend analysis.
Input data	Glass eel and yellow eel recruitment indices.
Discards and bycatch	Not included.
Indicators	None.
Other information	Landing statistics, while improved by the Data call in 2017, remain incomplete and reporting inconsistent. Stock indicators are incomplete from eel management units/countries in the EU and from non-EU states. There is no international legislative requirement to collect and provide data for the entire stock area.
Working group	Joint EIFAAC/ICES/GFCM Working Group on Eels (WGEEL; ICES, 2017).

Information from stakeholders

Data on recruitment collected by stakeholders are included in the assessment where appropriate.

History of advice, catch and management

Table 4 European eel. History of ICES advice.

Year	ICES advice *	Predicted catch corresponding to the advice *	TAC *	ICES catch **
1999	A recovery plan	-		
2000	No fishery and a recovery plan	0	-	-
2001	-	-	-	-
2002	No fishery and a recovery plan	0	-	-
2003	All anthropogenic mortality as close to zero as possible and a recovery plan	-	-	-
2004	-	-	-	-
2005	-	-	-	
2006	All anthropogenic mortality as close to zero as possible and a recovery plan	-	-	-
2007	All anthropogenic mortality as close to zero as possible and a recovery plan	-	-	-
2008	All anthropogenic mortality as close to zero as possible	-	-	-
2009	All anthropogenic mortality as close to zero as possible	-	-	-
2010	All anthropogenic mortality as close to zero as possible	-	-	-
2011	All anthropogenic mortality as close to zero as possible	-	-	-
2012	All anthropogenic mortality as close to zero as possible	-	-	-
2013	All anthropogenic mortality as close to zero as possible	-	-	-
2014	All anthropogenic mortality as close to zero as possible	-	-	-
2015	All anthropogenic mortality as close to zero as possible	-	-	-
2016	All anthropogenic mortality as close to zero as possible	-	-	-
2017	All anthropogenic impacts as close to zero as possible	-	-	-
2018	All anthropogenic impacts as close to zero as possible	-		

* There has never been a TAC for this stock.

** Catch estimates considered too incomplete to be presented.

History of catch and landings

Reported catches are considered too incomplete to give a reliable indication of the level of total catches; they are therefore not presented. Recreational landings are likewise considered too incomplete to be presented but are believed to be of a similar order of magnitude to the commercial landings.

Summary of the assessment

Table 5 European eel. Recruitment indices – geometric means of estimated (GLM) recruitment for glass eel in the continental "North Sea" and "Elsewhere Europe", and recruitment of yellow eel in Europe. The glass eel GLM (predicting recruitment as a function of area, year and site) was fitted to 43 time-series, comprising either pure glass eel or a mixture of glass eels and yellow eels and scaled to the 1960–1979 geometric mean. The yellow eel GLM (predicting recruitment as a function of year and site) was fitted to 14 yellow eel time-series and scaled to the 1960–1979 arithmetic mean. These indices are updated on an annual basis and, as they are presented in relative terms, these updates may change the historical values.

Year	Glass eel recruitment		Yellow eel recruitment
	Elsewhere Europe	North Sea	Europe
1960	137	209	178
1961	119	118	187
1962	150	180	185
1963	182	225	158
1964	101	117	61
1965	131	78	115
1966	79	87	168
1967	81	96	112
1968	133	122	162
1969	68	88	116
1970	101	96	58
1971	57	84	61
1972	55	109	102
1973	61	48	128
1974	86	130	61
1975	74	54	117
1976	119	100	38
1977	116	77	78
1978	113	56	72
1979	153	95	59
1980	127	81	96

Year	Glass eel recruitment		Yellow eel recruitment
	Elsewhere Europe	North Sea	Europe
1981	93	59	41
1982	105	31	52
1983	54	25	47
1984	60	10	36
1985	58	8	69
1986	38	9	51
1987	67	10	48
1988	81	9	65
1989	51	4	38
1990	41	14	33
1991	19	3	41
1992	26	8	24
1993	30	7	15
1994	30	7	59
1995	37	5	19
1996	28	5	11
1997	47	4	24
1998	18	3	20
1999	24	6	26
2000	21.3	4.7	22
2001	9.1	1	21
2002	14.3	2.6	39
2003	14.5	2	23
2004	7.8	0.6	26
2005	8.9	1.2	10
2006	6.3	0.5	16
2007	7.2	1.3	23
2008	6.3	1.3	17
2009	4.8	0.9	10
2010	5.3	0.7	13
2011	4.2	0.5	14
2012	5.6	0.4	14
2013	8.6	1.2	9
2014	14.9	4	31
2015	8.2	0.9	10
2016	10.2	1.8	15
2017	8.7	1.6	24

Sources and references

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ICES. 2017. Report of the Joint EIFAAC/ICES/GFCM Working Group on Eels (WGEEL), 3–10 October 2017, Kavala, Greece. ICES CM 2017/ACOM:15. 99 pp.

3 National Advice

There were no requests for advice in 2017.

4 Management Actions – a scientific assessment

4.1 Introduction

There are four main management actions included in the Irish Eel Management Plans aimed at reducing eel mortality and increasing silver eel escapement in Irish waters. These are a cessation of the commercial eel fishery and closure of the market, mitigation of the impact of hydropower, including a comprehensive silver eel trap and transport plan, ensure upstream migration of juvenile eel at barriers and improve water quality including fish health and biosecurity issues.

Every three years, each Member State must submit details of;

- monitoring,
- effectiveness and outcome of Eel Management Plans
- contemporary silver eel escapement
- non-fishery mortality
- Policy regarding enhancement/stocking

4.2 Management Action No. 1 Reduction of fishery to achieve EU target

4.2.1 Introduction

The target set for the Irish Eel Management Plan 2012-2014 was to have zero fishing mortality and reduce illegal capture and trade to as near zero as possible.
In May of 2009 Eamon Ryan, Minister for Communications, Energy and Natural Resources passed two Bye laws closing the commercial and recreational eel fishery in Ireland. The byelaw which prohibited the issuing of licenses was continued. However, on expiry of Bye law C.S. 312 of 2012, a new byelaw was required to prohibit the fishing for eel, or possessing or selling eel caught in a Fishery District in the State for a further period until June 2018.

- Bye-Law No 858, 2009 prohibits the issue of eel fishing licences by the regional fisheries boards in any Fishery District.
- Bye-law No C.S. 303, 2009 prohibits fishing for eel, or possessing or selling eel caught in a Fishery District in the State until June 2012. (revoked).
- Bye-law No C.S. 312, 2012 prohibits fishing for eel, or possessing or selling eel caught in a Fishery District in the State until June 2015. (revoked).
- Bye-law No C.S. 312, 2015 prohibits fishing for eel, or possessing or selling eel caught in a Fishery District in the State until June 2018.

It should be noted that since EU Commission ratification of the Ireland/UK NWIRBD transboundary plan in March 2010, the fishery in the NI portion of the Erne was closed from April 2010.

Following a public consultation in June 2015, Minister McHugh signed a new byelaw (C.S. 319/2015) on the 23rd November 2015 prohibiting fishing for eel, or the possession or sale of eel caught in Ireland (Appendix 3).

4.2.2 Action 1a: Report closure of fishery

All management regions confirmed a closure of the eel fishery for the 2017 season with no commercial or recreational licences issued (Appendix 4). In the transboundary region, there were no licences issued and no legal fishery in the Foyle and Carlingford areas in 2017.

The eel fishery, with the exception of the strictly managed L. Neagh, also remained closed in N. Ireland in 2017.

4.2.3 Reports of illegal fishing activity

Ireland:

For the complete modelling of silver eel escapement, information is required on the levels of illegal fishing and illegal catch. Therefore, this information is required on an annual basis. A questionnaire was circulated to the IFI Regions and the Loughs Agency (Appendix 4), summarised into Table 4.1. Some illegal fishing was reported which led to some seizures of gear in the Shannon IRBD, the North West RBD and the Western RBD (Table 4.1).No seizures of eel dealers transport trucks have been reported and no illegal activity was reported in relation to the silver eel trap and transport programmes. It is likely, however, that some illicit eel sales may have occurred in the Shannon IRBD given the level of seizures of gear over the last few years. The poor quality of the export data currently available to the SSCE makes it difficult to determine the level of illegal catch. There were no instances of seizures of illegal or undocumented eel shipments.

Transboundary:

No illegal activity was reported for the areas of the NWIRBD and Carlingford under the jurisdiction of the Loughs Agency.

No other information was available at report time.

4.2.4 Action 1b: Recreational Fishery

The legislation prohibits the possession of eel caught in Ireland and this extends to cover recreational angling. There was no legal recreational catch and rod angling for eel. Bycatch during angling for other species was on a catch and release basis, although the level of damage and mortality of released eels is unknown but could be high.

4.2.5 Action 1c: Diversification of the Fishery

The Department of Communications, Climate Action and Environment tasked Inland Fisheries Ireland with setting up a network of scientific eel fisheries in collaboration with the former eel fishermen. A number of key locations were earmarked for surveys and a tender process was initiated with applications from interested parties. In 2016 and 2017 a series of yellow eel surveys were carried out in 5 lakes (Upper and Lower Lough Corrib, Lough Conn, Lough Ramor and Lough Muckno) and 2 transitional waters (Waterford Harbour and Munster Blackwater). The programme also consists of an elver monitoring survey and a silver eel fishery on the River Boyne and a glass eel survey of the Shannon Estuary. The purpose of the scientific fisheries is to increase the data and knowledge of eel in Ireland ahead of the 2018 EU review of our national eel management plan.

Table 4-1: Details of illegal activity within the regions and transboundary Northern Ireland, 2017.

	ERBD	LOUGHS AGENCY RoI/NI	NWRBD	SHRBD	SERBD	SWRBD	WRBD
Silver T&T programme	No	No	Yes	Yes	No	Yes	No
Illegal trading related to T&T	No	No	No	No.	No	No	No
Estimated level of illegal fishing	Low	None	Low	Medium	None	None	Low
Number of gear seizures	0	0	3	3	0	0	1
Gear types seized	-	-	13 fyke nets	21 fyke net	-		1 fyke net
Number of eel dealer interceptions	0	0	0	0	0	0	0
Estimated tonnage on board:	-	-	-	-	-	-	-
Declared origin of cargos:	-	-	-	-	-	-	-

4.3 Management Action No. 2. Mitigation of hydropower

4.3.1 Action 2a: Trap and Transport

The targets were set for the trap and transport system in the Irish Eel Management Plan 2009-2011 and these were subsequently modified, following the experience of the three year programme, for the 2012-2014 and 2015-2017 periods as follows:

***Shannon*:** Trap and transport 30% of the annual production (unchanged)

***Erne*:** Trap and transport 50% of the annual silver eel production. A rolling target based on a 3-year basis allowing shortfalls in one year to be made up the following year. A consistent long-term shortfall could not be carried forward indefinitely.

***Lee*:** Trap and transport 500 kg of the annual escapement (unchanged)

4.3.1.1 2017 Trap and Transport Results

The total amounts of silver eel trapped and transported in each of the three rivers in 2017 are presented in Table 4.2. The separate detail sheets of the amounts transported from each site on each date are presented as an Appendix to this report (Appendix 5).

In the **River Shannon** the trap and transport total of 16,737 kg represented 49% of silver eel production (using the escapement estimated adjusted to account for nights not fished) and, therefore, exceeded the 30% target, the EMP requirement was met on the basis of the agreed (3 year rolling mean value) protocol.

In the **River Erne**, the trap and transport annual target (50% of silver eel production) for the River Erne was exceeded in the 2017 season. The quantity (43,469 kg) transported for safe release at Ballyshannon represented 63.2% of the estimated silver eel production (68,810kg) for the river system for the season.

In the **River Lee**, in the 2017/2018 season a contract fishing crew fished for potential silver eels from 16th of August to 1st of September 2017. As per previous seasons, this involved the use of fyke-nets in the reservoirs above the ESB hydroelectricity generating dams Inniscarra HPS and Carrigadrohid HPS. However, in this season the fishing was mainly undertaken in the lower Inniscarra Reservoir. Only one night test fishing took place in the lower section of the Carrigadrohid Reservoir. The poor result in this test fishing (3 kg catch from 20 fyke-nets, 23/8/17) and the aim of the crew to catch a target of 500 kg lead to the decision to focus fishing entirely on the lower section of the Inniscarra Reservoir. The total fishing effort was 940 net-nights and all of these were in the Inniscarra Reservoir except for 20 net-nights.

The total catch for the season was 542 kg and all were released below the hydro dams. A total of 284 eels, representing the full catches for 3 nights were examined by NUIG researchers and the length frequency of these is presented in Figure 4-1. A higher proportion of small eels, including those classified as either male or yellow were observed than in recent years. However, the reasons for this are not clear. It may represent different fishing locations, selected by the new crew, or a shift in population structure. It is possible that improved upstream passage of small yellow eels via the Inniscarra Dam's Boreland-type fish lift may be improving recruitment to the cascade catchment. However, further annual monitoring is needed to establish if the size frequency seen in 2017 represents a significant shift in eel population structure.

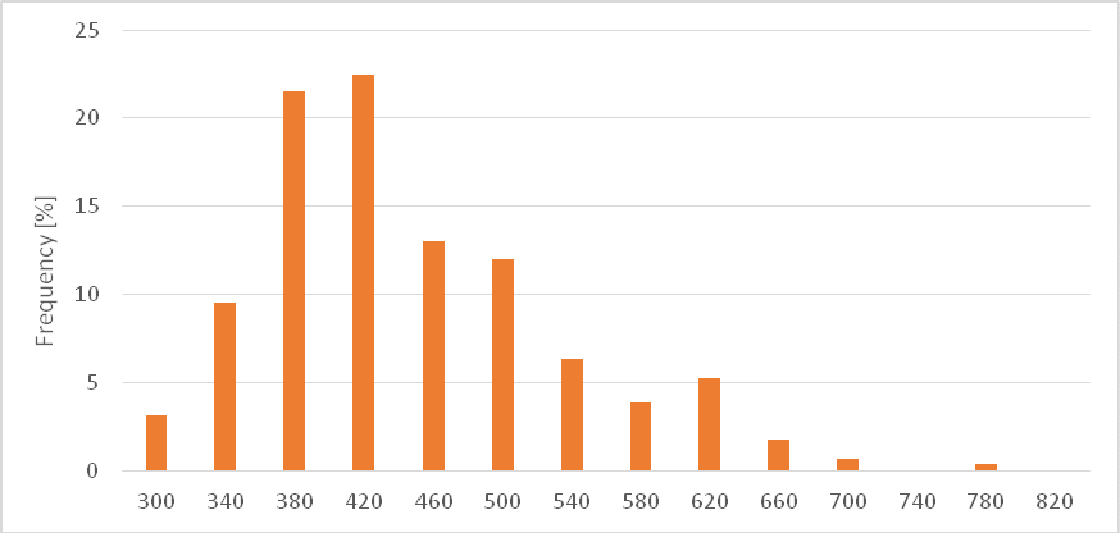

Figure 4-1 Size frequency distribution (TL mm) of eels (n = 284) examined from Inniscarra Reservoir (August 2017).

The sampled 2017 eels, which were considered to be representative of the seasons, catch included 72.9% assessed as potential spawners (pre-silver or silver). These were mostly pre-spawners and the percentage of potential spawners varied from 69% to 75% in the three nights catches examined. In terms of biomass, 81.5% of the released eels were classified as potential spawners. All eels were released downstream of Inniscarra and thus any not to out-migrate in the following autumn / winter months could use the main channel River Lee or its lower tributaries (e. g. River Bride or River Shournagh) for further growth and maturation.

Table 4-2: Total amounts (t) of silver eel trapped and transported in the Shannon, Erne and Lee, 2009-2017, and the success relative to the targets set in the EMPs. Note change of target on the Erne in 2012.

Catchment	Year	T&T Target	Amount Transported (kg)	Relation to target	Status	3 yr. Running Average
R. Shannon	2009	30% of run	23,730	31%	Achieved	31%
R. Shannon	2010	30% of run	27,768	40%	Achieved	36%
R. Shannon	2011	30% of run	25,680	39%	Achieved	37%
R. Shannon	2012	30% of run	24,228	36%	Achieved	38%
R. Shannon	2013	30% of run	22,561	28%	Not achieved	34%
R. Shannon	2014	30% of run	26,438	37%	Achieved	34%
R. Shannon	2015	30% of run	19,957	28%*	Flood estimate	31%
R. Shannon	2016	30% of run	16,711	43%	Achieved	36%
R. Shannon	2017	30% of run	16,737	49%	Achieved	40%
R. Erne	2009	22t†	9,383	43%	Not achieved	
R. Erne	2010	34t	19,334	57%	Not achieved	47%
R. Erne	2011	39t	25,405	65%	Not achieved	59%
R. Erne	2012	50% of run	34,660	51%	Achieved	51%
R. Erne	2013	50% of run	39,319	54%	Achieved	53%
R. Erne	2014	50% of run	48,126	66%	Achieved	57%[1]
R. Erne	2015	50% of run	43,706	56%	Achieved	59%
R. Erne	2016	50% of run	38,264	61%	Achieved	61%
R. Erne	2017	50% of run	43,470	63%	Achieved	60%
R. Lee	2009	0.5t	79	16%	Not achieved	16%
R. Lee	2010	0.5t	278	56%	Not achieved	36%
R. Lee	2011	0.5t	731	146%	Achieved	73%
R. Lee	2012	0.5t	230	46%	Not achieved	83%
R. Lee	2013	0.5t	824	165%	Achieved	119%
R. Lee	2014	0.5t	670	134%	Achieved	115%
R. Lee	2015	0.5t	527	105%	Achieved	135%
R. Lee	2016	0.5t	44	9%	Not achieved	83%
R. Lee	2017	0.5t	542	108%	Achieved	74%

[1] The rolling average was calculated excluding 11,000 kg set aside for elver mortality mitigation.

*percentage of run is an estimated figure as there was no fishing during Storm Desmond

† The yellow eel fishery was operating in the Northern Ireland sections of the Erne in 2009

4.3.1.2 Improvements to T+T programme

One of the main hydropower mitigation measures is the ESB silver eel T& T and during 2017/2018 the EMP targets were exceeded on the Rivers Lee, Shannon and Erne. Research has been undertaken on this topic by NUIG with a view to improving the capture efficiency at key sites on the Rivers Erne and Shannon and this will be continued in the next two years. Results to date indicate that the efficiency of Killaloe eel weir has been significantly improved by a major refurbishment of the fishery structures, including replacement of older manually operated net lifting equipment with new electrical lifting systems. Nets are now lifted individually, rapidly emptied and set again during nights on which multiple lifts are required. Weir maintenance and monitoring protocols have also been improved and the objective is to reduce eel numbers and biomass proceeding to the Ardnacrusha dam.

Improved scientific monitoring protocols for silver eels are being developed, with a view to providing better and fishery independent population estimates. In 2017/2018 this included more use of Didson acoustic camera surveys. Analysis of these results, including from Clonlara on the Ardnacrusha Headrace Canal that may lead to improved knowledge of silver eel route selection at Parteen Weir, is still in progress. In addition, new mathematical models are being developed for assessment of silver eel production and spawner biomass escapement on the River Erne. This is being undertaken by a postgraduate student, Eamonn Lenihan, at NUIG, under direction of Drs Kieran McCarthy and Colin Lawton.

4.3.2 Action 2b: Quantify Turbine Mortality

4.3.2.1 Shannon

A steady increase to exceptionally high discharge conditions in the River Shannon during the 2017/18 period of silver eel migration influenced the seasonal pattern and route selection behaviour. An unusual feature of the regulated discharge was the extent of spillage at the Ardnacrusha dam, approximately equal to the quantity used by a single turbine, and the outage of one of the four turbines during the entire eel migration. High discharge (often >400m3s-1) resulted in increasing spillage at Parteen weir as the season progressed. Since the proportion of the migrating eels passing via the Ardnacrusha that used the dam spillway was not known it was decided to adopt a precautionary approach and assume that all of them passed the dam via turbines. A mortality rate, used in previous years when no spillage took place at the hydropower dam, of 21.15% was applied. In the 2017/18 season the estimated silver eel mortality at the Ardnacrusha dam was 2.948t or 8.6% of production

4.3.2.2 Erne

During the 2017/2018 silver eel migration season the discharge in the lower River Erne was more typical than in the previous year and nocturnal electricity generation was not generally interrupted due to low water levels. Spillage levels were very low for the entire 2016/17 season.

For the 2017/2018 season mortality rates that were applied were as follows: Cliff HPS 0% (no flow or only spillage); 7.9% (Generation plus spillage) and 26.7% (Only generation), Cathaleen's Fall HPS: 0% (no flow or only spillage); 7.7% (spillage plus half generation load); 15.4% spillage plus full generation load); 27.3% (only generation).

It was estimated that the cumulative mortality represented 14.9% mortality of the total River Erne silver eel production or 40.5% of the migrating eels reaching the dams during the season. The estimated mortality at the dams was 10.271t in the 2017/2018 migration period.

4.3.3 Action 2c: Engineered Solution

Upstream migration

Significantly improved elver trapping facilities at Cathaleen's Fall dam on the River Erne and at Ardnacrusha and Parteen weir in the Shannon catchment are also part of the on-going development of engineered solutions to the problems experienced by eels at Irish hydropower dams.

4.3.4 Action 2c: Other solutions

Light deflection experiments, a follow-up to 2015/2016 season research, were initiated by NUIG at Killaloe. However, sustained high discharge prevented completion of the work which has been postponed to next autumn/winter. No further update available.

4.4 Management Actions No. 3. Ensure upstream migration at barriers

Under the National Eel Management Plan, objective 7 requires the evaluation of upstream colonisation: migration and water quality effects. Lasne and Laffaille (2008) found that while eels are capable of overcoming a wide array of obstacles the resulting delay in migration can have an impact on the eel distribution in the catchment. Knowledge of what constitutes a barrier for eels (at different life stages) will assist in the estimation of eel population densities and escapement for future management plan reviews. The EU Habitats Directive (Directive 92/43/EEC) and Water Framework Directive (2000/60/EC) both require the assessment of barriers to fish migration.

4.4.1 Action 3a: Existing barriers (inc. small weirs etc.)

4.4.1.1 IFI Programme of river continuity / barrier surveys:

IFI has identified the need for a national geo-referenced database of barriers in rivers and streams and has been progressing this process in pilot studies since 2013. In 2017 IFI was tasked by the Department of Housing, Planning, Community and Local Government (DHPCLG), with accelerating this process as a management measure under the Water Framework Directive Second Cycle of actions and measures and to undertake a series of tasks at a national level.

These tasks include:

- Development of a barrier assessment tool consistent with current EU best practise
- Comprehensive programme of barrier survey and risk assessment in line with available resources
- Database storage of a national inventory of barriers for the purpose of interrogation and prioritising barriers for mitigation
- Prioritisation of structures for mitigation and a schedule of proposed works to be undertaken during the third cycle River basin Management Plan
- Production of guidance documents on structural mitigation options and permissions/surveys required for barrier mitigation

IFI established a National Barriers Programme to advance the above remit and this will be in train over the period 2018 – 2021.

Other programmes contributing to the Irish national database on barriers are:

- the IFI involvement in the EU H2020 AMBER project
  www.fisheriesireland.ie/Fisheries-Research/the-amber-project.html
- The Eel Monitoring Programme is examining all structures within the Eel Index Catchments of the Fane and the Kells Blackwater.
- the University College Dublin study on the EPA-funded Reconnect project http://www.ucd.ie/reconnect/
- the OPW-IFI study on riverine enhancement in drained rivers – the EREP study https://www.opw.ie/en/media/Environmental%20River%20Enhancement%20Programme%20Annual%20Report%202015.pdf
- the IFI's Habitats Directive and Red Data Book Fish programme with a component examining the impact of large weirs on the migration of diadromous Annex II fish species https://www.fisheriesireland.ie/extranet/fisheries-research-1/habitats/1440-habitats-directive-and-red-data-book-fish-species-summary-report-2016.html

4.4.1.2 Update

During 2017 the IFI barriers investigations undertook and completed:

- Catchment-wide barrier survey on the Barrow catchment (> 300 barriers recorded)
- Catchment-wide survey on the lower Inny basin (Shannon catchment) 35 barriers recorded

In both studies the IFI's Level I survey protocol was used, with data collection on-site using the drop-down menus on ruggedized laptops. To date 1,873 structures have been assessed covering 94 catchments in all river basin districts (Table 4-3)

Table 4-3 Structures assessed by IFI to date

River Basin District	Number of catchments assessed	Number of structures assessed
Eastern	9	322
South Eastern	13	897
South Western	13	78
Shannon	14	259
West	21	173
North Western	19	60
Neagh Bann	5	84
Total	**94**	**1873**

4.4.2 Action 3b: New potential barriers

There is no new information since the 2012 report, '*Guidelines for Small Scale Hydro Schemes*'.

4.4.3 Action 3c: Assisted migration and stocking

Assisted upstream migration takes place at the ESB Hydropower Stations on the Shannon (Ardnacrusha, Parteen), Erne (Cathaleen's Fall), Liffey and Lee. This has been a long-term objective to mitigate against the blockage of the HPSs under ESB Legislation (Sec 8, 1935). On the Erne and Shannon, elvers and bootlace eel are transported upstream from the fixed elver traps. These programmes outlined in the EMP were continued in 2017. The catches shown in Tables 7.1-7.2 were transported upstream. On the Erne, the distribution of elvers throughout the catchment is by cross-border agreement between the ESB, IFI and DCAL.

4.5 Management Action No. 4 Improve water quality

4.5.1 General water quality – Compliance with the Water Framework Directive

The improvement of water quality in Ireland is primarily being dealt with under the workprogramme for the implementation of the Water Framework Directive (WFD). The objective of the Water Framework Directive (WFD) is to protect all high status waters, prevent further deterioration of all waters and to restore degraded surface and ground waters to good status by 2015 (www.wfdireland.ie). The first cycle of the WFD ran from 2009 – 2015, and the second cycle runs from 2016-2021 (www.catchments.ie). National regulations for implementing the directive were put in place in 2003. A major monitoring programme began in Dec 2006, to inform the first cycle of the WFD. The WFD reporting and monitoring runs on a six year cycle. A detailed report on the results of the first cycle of WFD monitoring is not available to date (mid 2017). In the interim period, the Environmental Protection Agency (EPA) compile statistics on water quality in Ireland, the most recent of which covers the period 2010-2012 (Bradley *et al*., 2015). For that period, 53% of rivers, 43% of lakes, 45% of transitional waters, 93% of coastal waters and 99% of groundwater were satisfactory at good or high status. Rivers monitored, using the biological Q value scheme, were in high or good condition along 73% of the monitored river channels. This was up 4% from the last monitoring period (2007-2009), and includes an overall increase in high status sites. Serious pollution of rivers reduced to 17 km from 53 km since last reporting period. There was a 5% reduction (10 lakes) in the high or good status categories, and a corresponding increase in the moderate or worse status category compared to 2007-2009.

Before the publication of the interim reports, much of the monitoring data is available through the www.catchments.ie data portal, including the monitoring data for the period 2010-2015. The extended results for the period 2010-2015 are roughly similar to those reported for 2010-2012 (Bradley *et al*., 2015). Most rivers, lakes and coastal waters are classified as having good status, and most transitional waters are classified as moderate (Table 4-4, Figure 4-2). The results from 2010-2015 are fairly similar to those recorded in 2007-2009, with 45% of surface waters being classified as having good ecological status (Table 4-5, Figure 4-3).

The Irish EPA data (summarised above) refer to water bodies within seven RBD's (Eastern, Neagh Bann, North Western, South Eastern, Shannon, South Western and Western). The Neagh Bann, Shannon and North western RBD's are transboundary, in that there are portions of them in Northern Ireland. Only a very small portion of the Shannon RBD is in Northern Ireland, while the Neagh Bann RBD is not included in the Irish Eel Management reports. Therefore, the implementation of the WFD in the Northern Irish part of the North western RBD is also of interest in this report, as it is the major international RBD which is considered in this eel management report. The status classification for 2015 for surface waters in NWiRBD shows that 46% are at good or better status. This can be broken down to 46% of rivers, 25% of lakes, and 33% of transitional and coastal water bodies (by numbers) at good or better (NIEA 2015).

Table 4-4: Status of Irish surface waters for the period 2010-2015. Data accessed from https://www.catchments.ie/data (April 2017).

Status of Irish Waters	High	Good	Moderate	Poor	Bad
River	10%	46%	25%	18%	0%
Lake	11%	35%	33%	12%	8%
Transitional	13%	19%	49%	15%	5%
Coastal	23%	56%	16%	5%	0%

Table 4-5: Trend in surface water quality over the first cycle of the WFD monitoring program. Data accessed from https://www.catchments.ie/data (April 2017).

Period	High	Good	Moderate	Poor	Bad
SW 2007-2009	13%	44%	27%	14%	1%
SW 2010-2012	14%	44%	26%	15%	1%
SW 2010-2015	11%	45%	27%	17%	1%

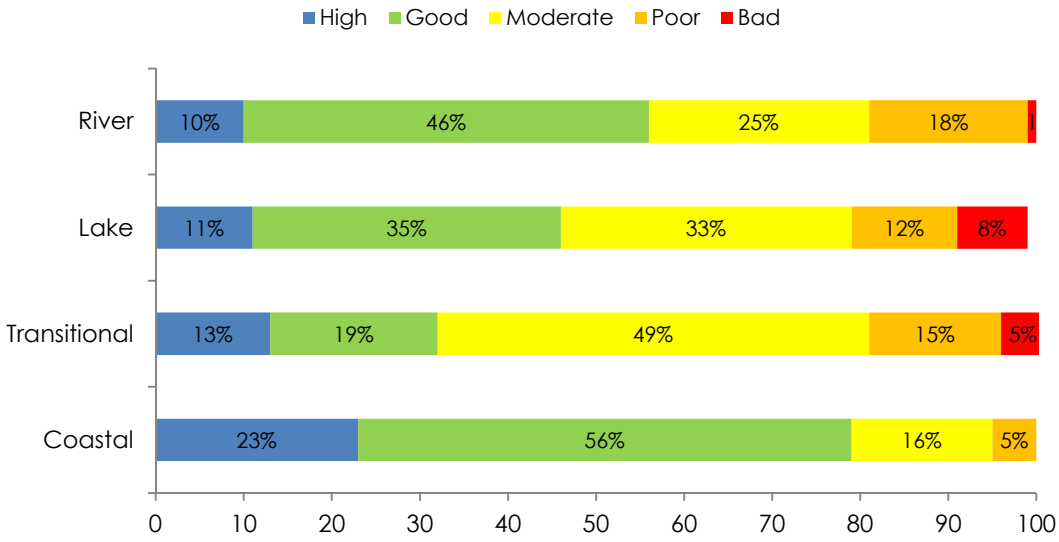

Figure 4-2 Status of Irish surface waters for the period 2010-2015. Data accessed from https://www.catchments.ie/data (January 2018)

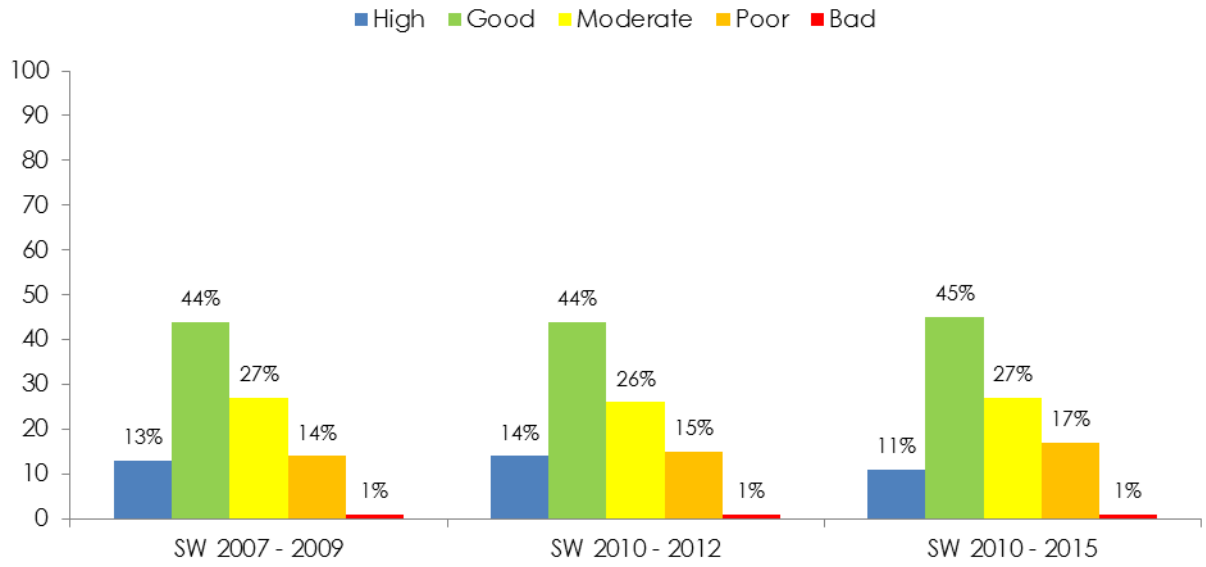

Figure 4-3 Trend in surface water quality over the first cycle of the WFD monitoring program. Data accessed from https://www.catchments.ie/data (January 2018).

4.5.2 WFD monitoring – fish

Inland Fisheries Ireland is responsible for delivering the fish monitoring element of the WFD in Ireland. Eel are included in the WFD (fish) monitoring of rivers, lakes and transitional waters. Summary reports are available for all sites surveyed (www.wfdfish.ie). The most recent of these summary reports is the report for 2016 (Kelly *et al.*, 2017). In 2016, a comprehensive fish surveillance monitoring programme was conducted, with 197 river sites, 19 lakes and 11 transitional waters successfully surveyed throughout the country (Table 4.6). Eel are ubiquitous across all sites, and were found in 94% of lakes surveyed, 35% of river sites and 87.5% of transitional water sites.

Table 4-6: Interim assessment of Irish water bodies according to fish metrics, measured in 2014 as part of the WFD monitoring program carried out by Inland Fisheries Ireland (Kelly *et al.*, 2015).

Period	Waterbody	No. of sites surveyed	High	Good	Moderate	Poor	Bad
2014	Rivers	68	3%	38%	25%	2%	0%
	Lakes	27	5%	11%	6%	3%	2%
	Transitional water	7	0%	3%	3%	0%	1%

4.5.3 Fish Kills

National fish kills are reported in the IFI annual reports and published online.

http://www.fisheriesireland.ie/Corporate/corporate-publications.html

There were 31 reported fish kills in 2016 (Table 4-7). This is an increase on numbers recorded for 2015 (23) and 2014 (22).

Table 4-7 Fish kill data 2007 - 2016

Year	No of Fish Kills
2007	22
2008	34
2009	16
2010	34
2011	31
2012	10
2013	52
2014	22
2015	23
2016	31

4.5.4 Eel Contaminants

No new data for 2017

4.5.5 *Anguillicola crassus* – epidemiology

The swimbladder parasite, *Anguillicola crassus*, was first detected in Ireland in the Waterford Harbour in 1997 (McCarthy *et al*., 1999) and later in the Erne System (Evans and Matthews, 1999). The introduction of the parasite into the Republic of Ireland was most likely through the eel trade. Transport of live eels and potentially contaminated water was commonplace into and out of commercial eel fisheries areas. Since that time, the parasite has spread prolifically across the country and currently infestations are to be found in at least 75% of the wetted area of the Republic of Ireland (Becerra-Jurado *et al*., 2014), with only small coastal catchments and a few areas in the north west and south west of the country remaining parasite-free. On average, across yellow and silver eel populations sampled, percentage prevalence of the parasite is between 60-80% with mean infection intensities of between 4-6 worms per eel. Infection of a system begins with low prevalence and intensity values which quickly expand. Within just a few years, values increase to those reminiscent of a system infected for several years. Prevalence and intensity can often fluctuate for many years afterwards until the infestation becomes established, after which time, the percentage prevalence and intensity of infection will often remain quite stable. In 2011, Lough Ballynahinch and Lough Inchiquin both showed very low prevalence of the parasite (13% and 1%, respectively). These were noted as some of the lowest prevalence values gained to date. However, on resampling both lakes in 2015, the prevalence had increased to higher levels (86% and 13%, respectively). This indicates that the parasite is continuing to spread within catchments.

4.5.6 Swimbladder Damage

Since 2013, two swimbladder tissue health indices have been applied to the retained samples of eels in order to monitor the potentially increasing degree of damage due to infection - The Swimbladder Degenerative Index (SDI), (Lefebvre *et al*., 2002) and the Length-Ratio Index (LRI), (Palstra *et al*., 2007). Despite the high rates of prevalence and intensity recorded during surveys, these indices have reported, on average, slight to moderate damage in swimbladder tissue of eels captured in the Republic of Ireland. The reasonably low degree of swimbladder damage may be a result of, 1) the high dependency of *A. crassus* on specific temperature ranges to complete its entire life cycle and 2) the ability of eels to regenerate tissue damage in times of low parasite infection rates. These elements are currently the focus of an on-going research study by the IFI's Eel Monitoring Programme.

4.5.7 Prevalence of *Anguillicola crassus* update for 2017

The percentage prevalence of *A. crassus* in 2017 varied from 73% in Lough Ramor and Lough Cullin up to 79% in Lough Muckno. The prevalence in a freshwater river system of the Munster Blackwater was 56%. The parasite prevalence in the Barrow silver eels ranged from 56% in 2015 to 69% in 2017. The two indices of swimbladder damage indicate slight to moderate damage.

5 Silver Eel Assessment, 2017

(refers to Ch. 7.2.1 of the National EMP Report, 2008)

5.1 Introduction

The Council Regulation (EC) No 1100/2007 sets a target for silver eel escapement to be achieved in the long-term - 40% escapement of silver eels compared to the pristine level of escapement (pre 1980's). Ireland is therefore required to provide an estimate of contemporary silver eel escapement. The Regulation also requires post-evaluation of management actions by their impact directly on silver eel escapement. Quantitative estimates of silver eel escapement are required both to establish current escapement and to monitor changes in escapement relative to this benchmark. Furthermore, the sex, age, length and weight profile of migrating silver eels are important for relating recruitment or yellow eel stocks to silver eel escapement. Quantifying migrating silver eel between September and December, or even January/February the following year, annually is a difficult and expensive process but it is the only way of ultimately calibrating the outputs of the assessments.

Silver eels are being assessed by annual fishing of index stations on the Erne, Shannon, Burrishoole, Barrow and Fane catchments (Table 5-1). A pilot study was carried out on the Boyne in 2017. Figure 5.1 shows the sampling locations in 2017.

There are three monitoring objectives in relation to silver eels:

1. Synthesise available information into a model based management advice tool.
2. Estimate silver eel escapement (in collaboration with ESB, NUIG, Marine Institute)
3. Estimate silver eel escapement indirectly using yellow eels.

In Ireland escapement and mortality is independently calculated for two hydro regulated catchments by the National University of Ireland Galway (Shannon, Erne), for the Burrishoole system by the Marine Institute and for the Fane system by Inland Fisheries Ireland. The Fane is the only east coast catchment currently being monitored for silver eels. An assessment site on the River Barrow in the South East river basin district has been

monitored since 2014 however as it does not have 5 years of data it is not included in current assessment.

Table 5-1: The locations where silver eel escapement will be assessed.

Catchment	Priority	2015	2016	2017	Method
Erne	High	√	√	√	Coghill net / Mark-recapture
Shannon	High	√	√	√	Coghill net / Mark-recapture
Burrishoole	High	√	√	√	Trap
Fane	High	√	√	√	Coghill net / Mark-recapture
Barrow	High	√	√	√	Coghill net / Mark-recapture
Boyne				√	Trial Site/River Fyke

The locations identified in the 2009 National Management Plan that have been excluded from the current programme shown in Table 5-1 are the Waterville site where it was proposed to use a resistivity fish counter to determine silver eel escapement. This will be re-evaluated once there is clear evidence of this technology being suitable for silver eel. The other site excluded from the programme is Lough Mask. This site was fished in 2010 and it was found to be difficult due to the geology of the region. With the suspension of the Galway Fishery on the outflow of the Corrib catchment any further work on Lough Mask has also been postponed with the redistribution of resources to the east coast.

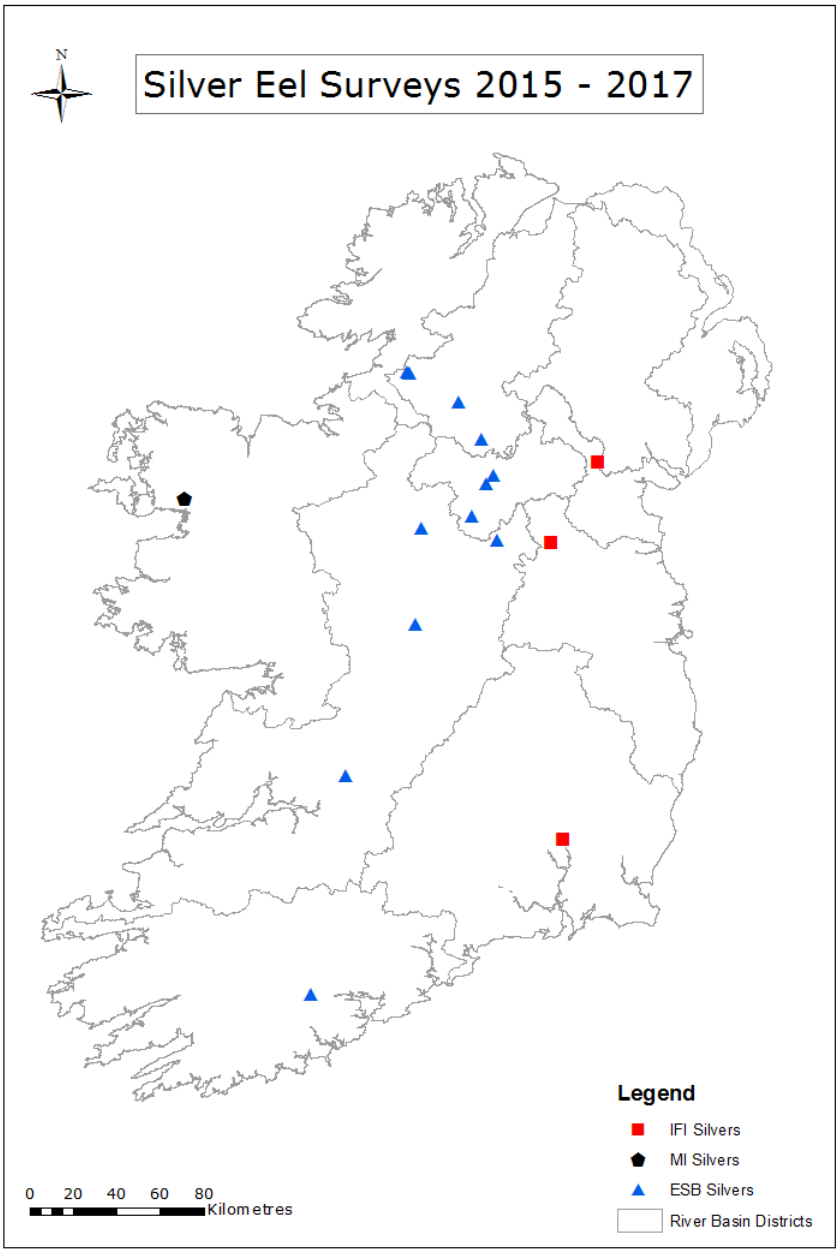

Figure 5-1: Silver eel monitoring locations, 2015 - 2017.

5.2 Shannon

The Shannon, Ireland's largest river, and its lake ecosystems include some of the country's best eel habitats. It is one of the better-known river systems in Europe in respect to eel population studies, due to long-term fishery records, on-going research and monitoring of the trap and transport programme (e.g. MacNamara and McCarthy, 2013). National University of Ireland (NUIG) monitored the silver eel fishing activity and conducted scientific research, which formed the basis for calculation of production and escapement rates of the river system. The eel research workers from the National University of Ireland (NUIG) monitored silver eel fishing activity at conservation fishing sites and they conducted research at Killaloe Eel Weir, which formed the basis for calculation of production and escapement rates of the river system.

5.2.1 Catch

The annual monitoring of the Shannon silver eel populations and T&T was undertaken by NUI Galway researchers in conjunction with ESB Fishery Conservation staff. Conservation fishing on the River Shannon involved three contracted crews. These were located at Athlone (two crews fishing near the Athlone Yacht Club and near the Jolly Mariner Marina) and at the Killaloe eel fishing weir (Figure 5-2). The Athlone crews fished from 01/09/17 to 15/12/17. Fishing at Killaloe, a nationally important silver eel monitoring index site, extended from 25/09/17 to 13/02/18. All catches, except for some used in mark-recapture studies at Killaloe, contributed to the silver eel trap and transport (T&T) programme. The relative contributions of the three crews are indicated in Figure 5-3. As is usual, the Killaloe weir (62%) was the most important silver eel source, followed by the Jolly Mariner crew (30%) and the least productive Athlone Yacht Club crew (8%). The total quantity transported and released below Parteen weir was 16.737t.

The total T&T catch in the River Shannon was 16,737 kg, 10,393 kg at Killaloe representing 62% of the total catch and 6,341 kg at Athlone (Figure 5-3). As in previous years, the variation in daily catches at the Killaloe eel weir have been monitored by NUIG in relation to lunar cycle, discharge and other environmental factors. In Figure 5-4 some of these results are summarised, with particular reference to discharge patterns. During this season an added complication in terms of prediction of downstream migration route selection by eels was the occurrence of significant spillage at Ardnacrusha Dam in addition to spillage occurring at the more usual location via Parteen weir.

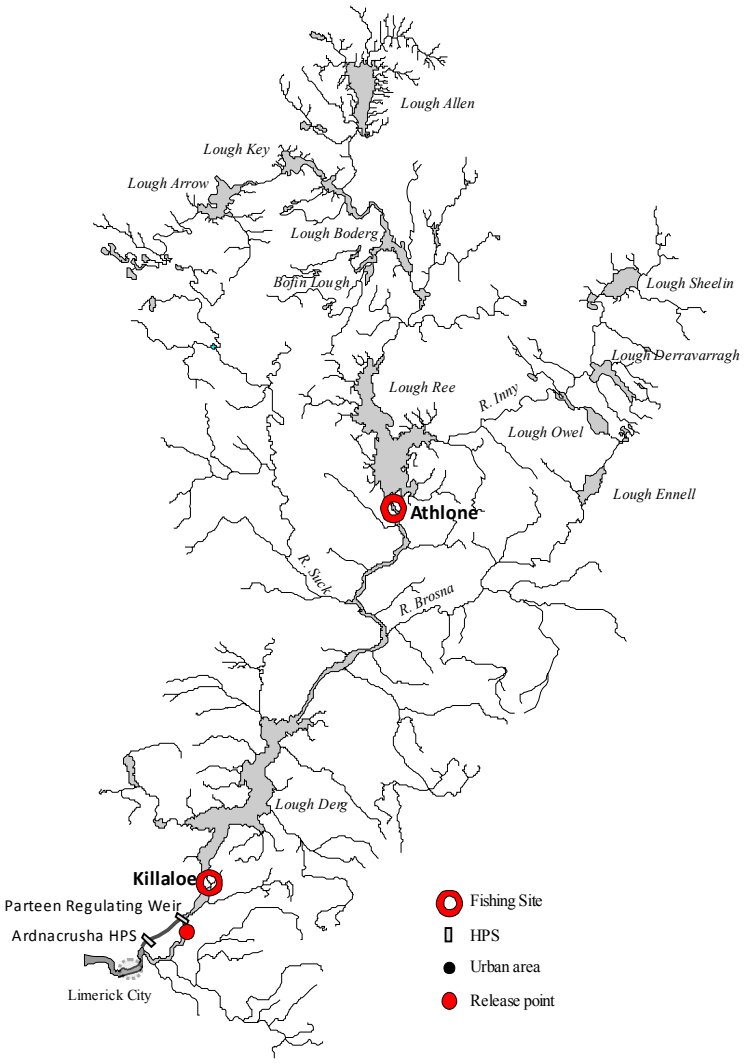

Figure 5-2 The River Shannon catchment area with fishing sites and silver eel release point indicated

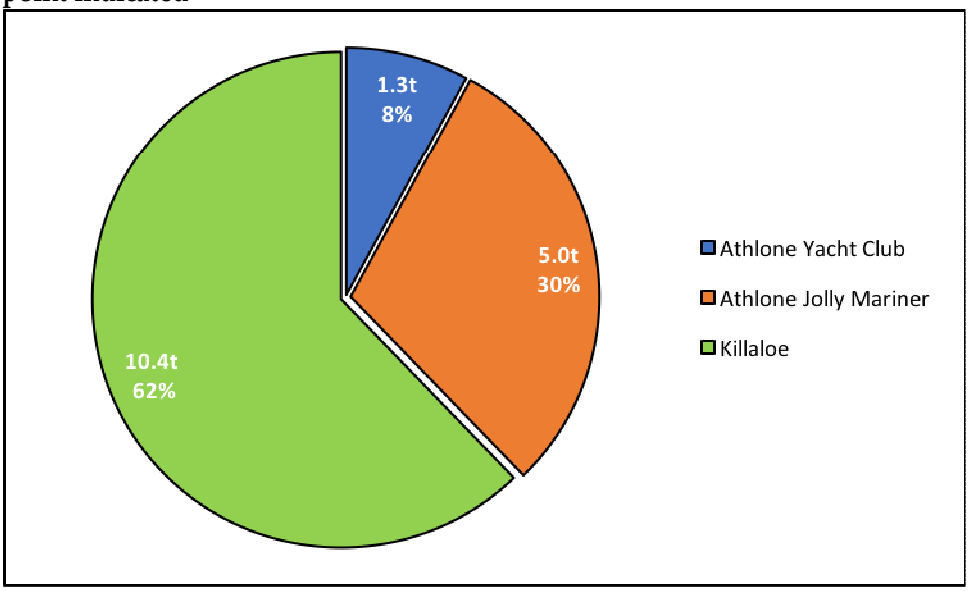

Figure 5-3 the relative quantities of silver eels contributed by fishing crews to the River Shannon T&T during the 2017/2018 season

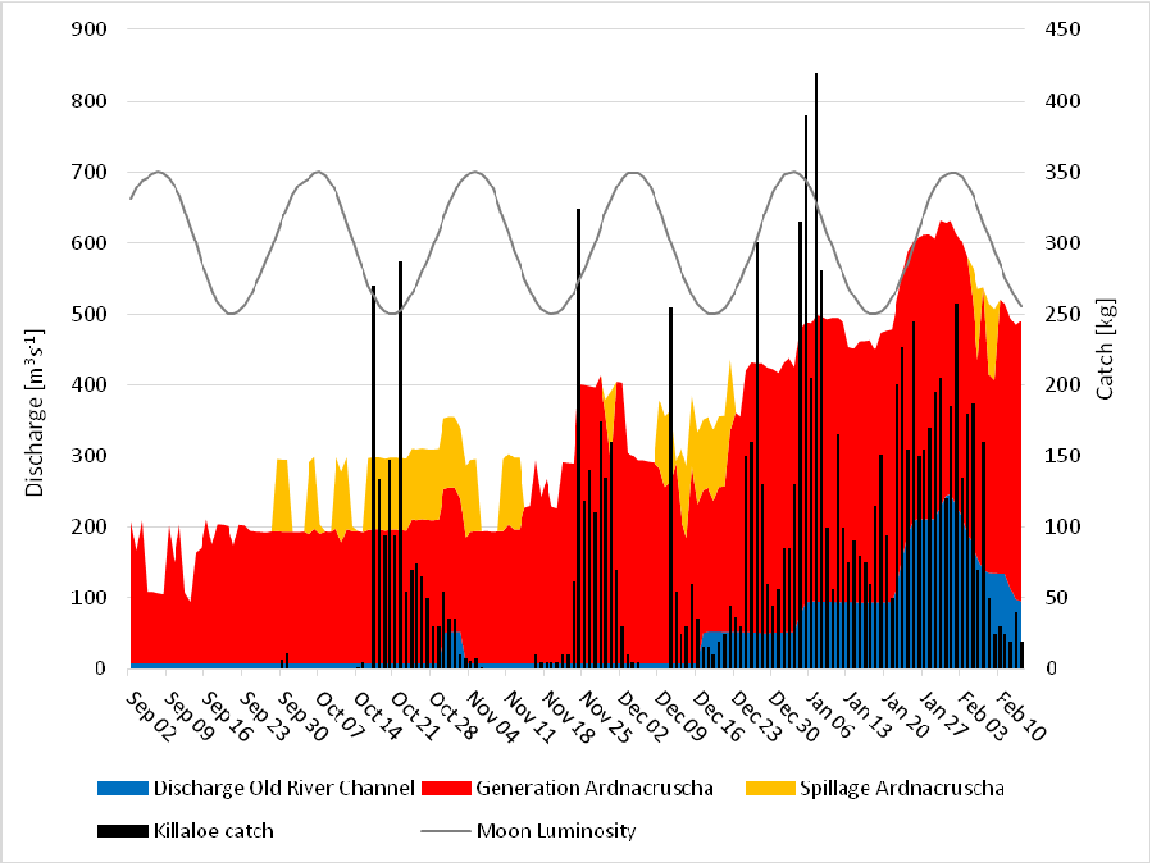

Figure 5-4 The seasonal variation in daily catches at the Killaloe eel weir during the 2017/2018 fishing season together with variation in discharge via Ardnacrusha (generation and spillage quantities) and as spillage to the Old River Shannon channel.

5.2.2 Production and Escapement

A summary of the results of an analysis of the River Shannon silver eel production and spawner escapement biomass for the 2017/2018 season is presented in Figure 5-5. As usual the estimation of production involved records of daily catches at Killaloe weir, which were used with results of floy-tagging / mark-recapture experiments. These data are used to estimate quantities of eels approaching the weir and those not caught which proceed downstream. In the 2017/2018 season a series of five tagging experiments were undertaken which involved release of 653 tagged eels and an overall recapture rate of 38.6%. This figure was used for eel weir efficiency in calculation of silver eel production, which was estimated (Figure 5-5) to have been 34.139t. This low production level, which was comparable to the previous year, suggests that a collapse of the Shannon eel stock may be occurring though further years of monitoring would be needed to confirm such a trend. The reduced production level has implications for the T&T conservation work. In the 2017/2018 season the T&T represented 49% of production and was well above the EMP target of 30%. The higher than previously recorded efficiency recorded at Killaloe confirms the importance of this monitoring and eel conservation facility.

Contrary to expectations earlier in the season when spillage at Ardnacrusha was initially occurring, route selection to the old river channel represented almost 20% of the eels going downstream from Killaloe (Figure 5-5). Dam mortalities were estimated at 2.948t. This is a precautionary overestimate as some eels would have taken advantage of the Ardnacrusha

spillway route though we cannot state definitively what quantities may have been involved. Ardnacrusha spillage occurred mostly in early season or when eel numbers were not at their peak. So its impact, whether positive due to spillway migration, or negative, due to reduction in Parteen spillage and in diversion of eels to the old river channel, may not have been as adverse as it might have been under different discharge regimes. Escapement, estimated as 31.191t, was 91.4% of production.

5.2.3 Length

A sample of silver eels (n=107) were examined by NUIG at the Athlone site on 03/11/2017. The results are presented in Figure 5-6. No major differences in size frequency appear to have taken place over last 3 years. A sample (n=201) of silver eels was examined by NUIG at Killaloe on 29/11/2017. The results are presented in Figure 5-7. These included both males (14.4%) and females (85.6%). The mean female size was 662mm. Another Killaloe sample (n=255) was examined by NUIG on 11/01/2018. This contained few males (1.96% and the predominant female (98.04%) had a mean size of 677mm. Because of limitations in sampling frequency it is difficult to interpret some of the differences between the Athlone and Killaloe silver eel size frequencies on the basis of this seasons results and a more systematic analysis of variation in population structure is therefore being initiated.

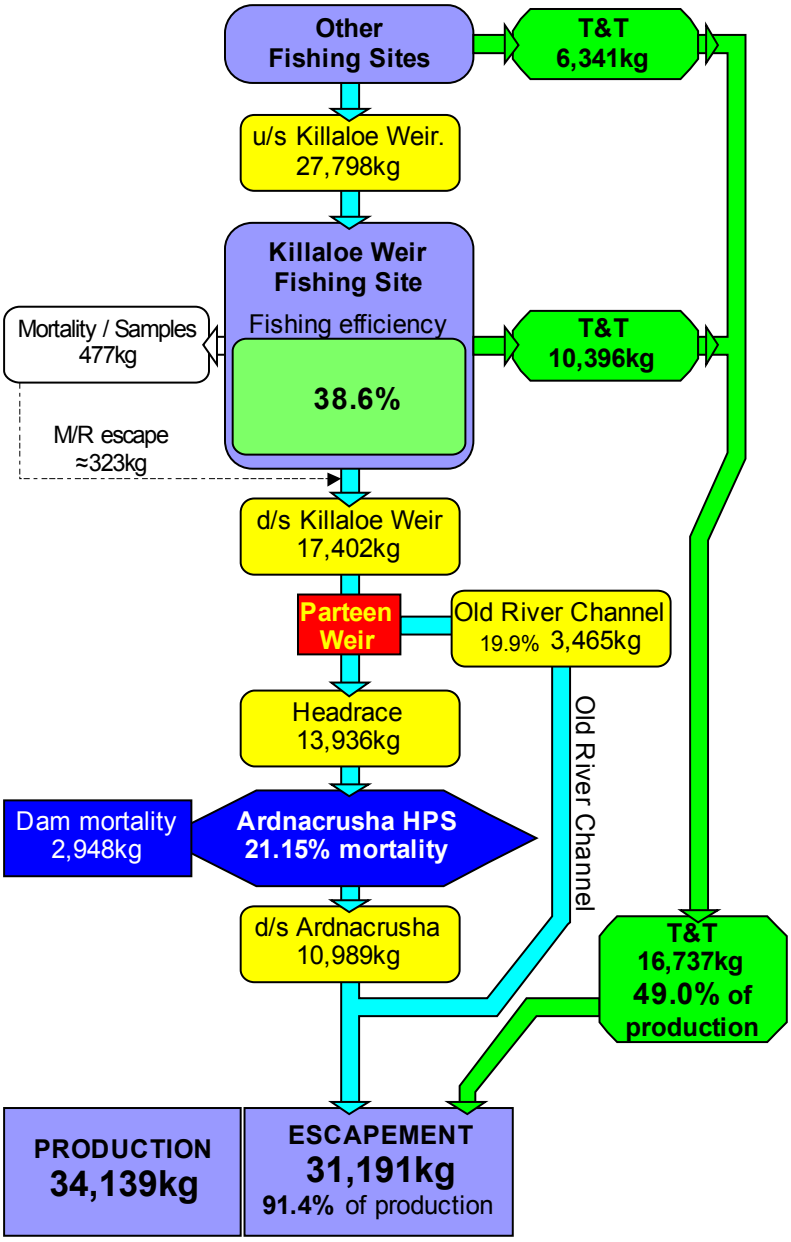

Figure 5-5 A summary of the results of the 2017/2018 analysis of silver eel production and spawner biomass escapement from the River Shannon

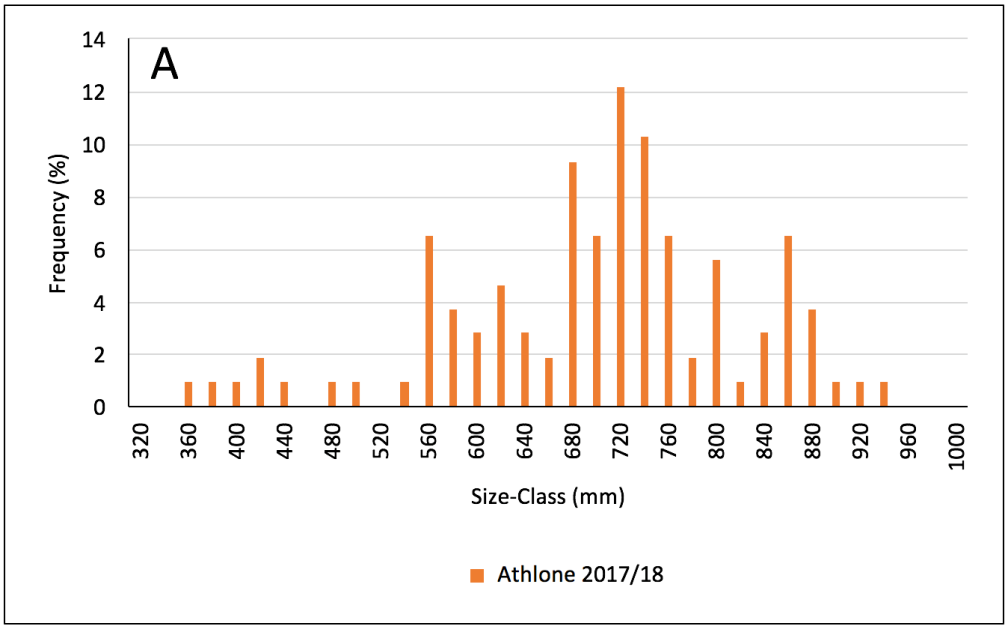

Figure 5-6 the size frequency of silver eels examined at Athlone in November 2017

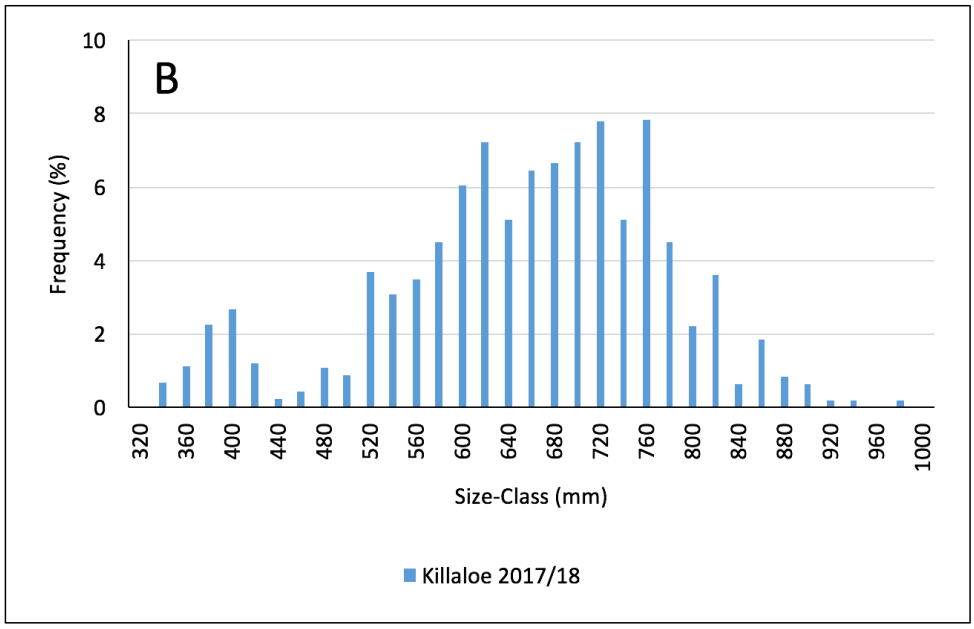

Figure 5-7 the size frequency of silver eels examine at Killaloe weir in November 2017

5.3 Burrishoole

The only total silver eel production and escapement data available in Ireland is for the Burrishoole catchment in the Western RBD, a relatively small catchment (0.3% of the national wetted area), in the west of Ireland. The Burrishoole consists of rivers and lakes with relatively acid, oligotrophic, waters (Figure 5-8). The catchment has not been commercially fished for yellow eels, has not been stocked and there are no hydropower turbines.

The eels have been intensively studied since the mid-1950s; total silver eel escapement from freshwater was counted since 1970 (Poole *et al*., 1990; Sandlund *et al*., 2017; Poole, data unpublished); and an intensive baseline survey was undertaken in 1987-88 (Poole, 1994). The detailed nature of the Burrishoole data makes it suitable for model calibration and validation (e.g. Dekker *et al.,* 2006; Walker *et al*. 2011).

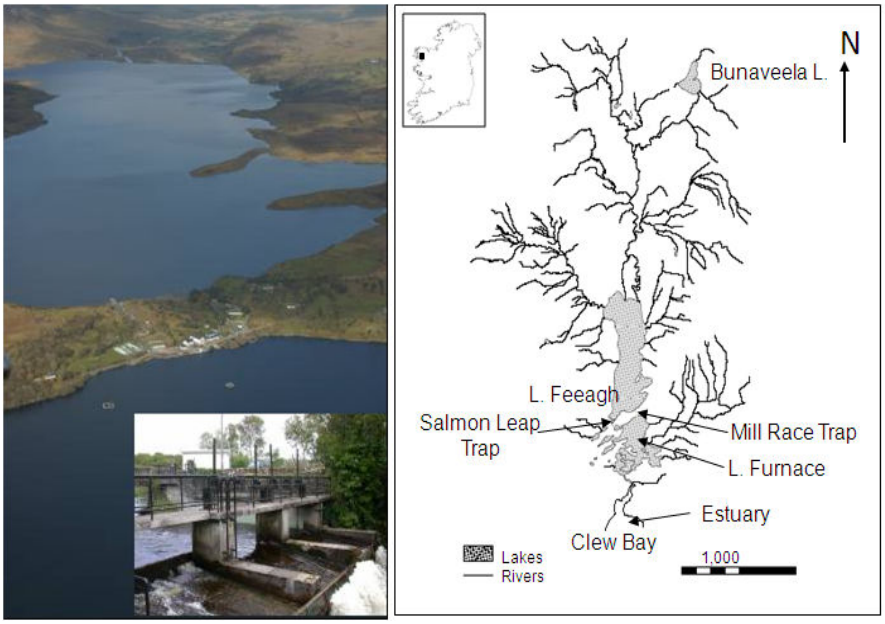

Figure 5-8: An aerial view of the Burrishoole catchment, looking north over the tidal Lough Furnace, in the foreground, and the freshwater Lough Feeagh: inset shows the silver eel downstream trap at the "Salmon Leap". A map of the Burrishoole catchment showing the locations of the silver eel traps at the lower end of the freshwater catchment.

5.3.1 Catch

The total run amounted to 2,208 eels, lower than recorded in 2016. As in other years, the highest proportion of the total catch (83%) was made in the Salmon Leap trap.

The silver eel season in 2017 was characterised by the lack of any major floods or storm events. The eels migrated on small floods and flow rates were easy to manage.

In 2017, the timing of the run was 15% migrating in August, 31% in September and 40% in October (Table 5-2). 90% of the run was completed by the end of October. Figure 5-9 shows the daily counts of silver eels.

Table 5-2: Timing and numbers of the 2017/'18 silver eel run.

	Salmon Leap	Mill Race	Total	%
May	2	0	2	0.1
June	0	0	0	0.0
July	90	1	91	4.1
August	252	75	327	14.8
September	603	81	684	31.0
October	713	171	884	40.0
November	153	40	193	8.7
December	21	2	23	1.0
Jan. 2016	2	0	2	0.1
February	1	0	1	0.0
March	1	0	1	0.0
April	0	0	0	0.0
Total	**1838**	**370**	**2208**	

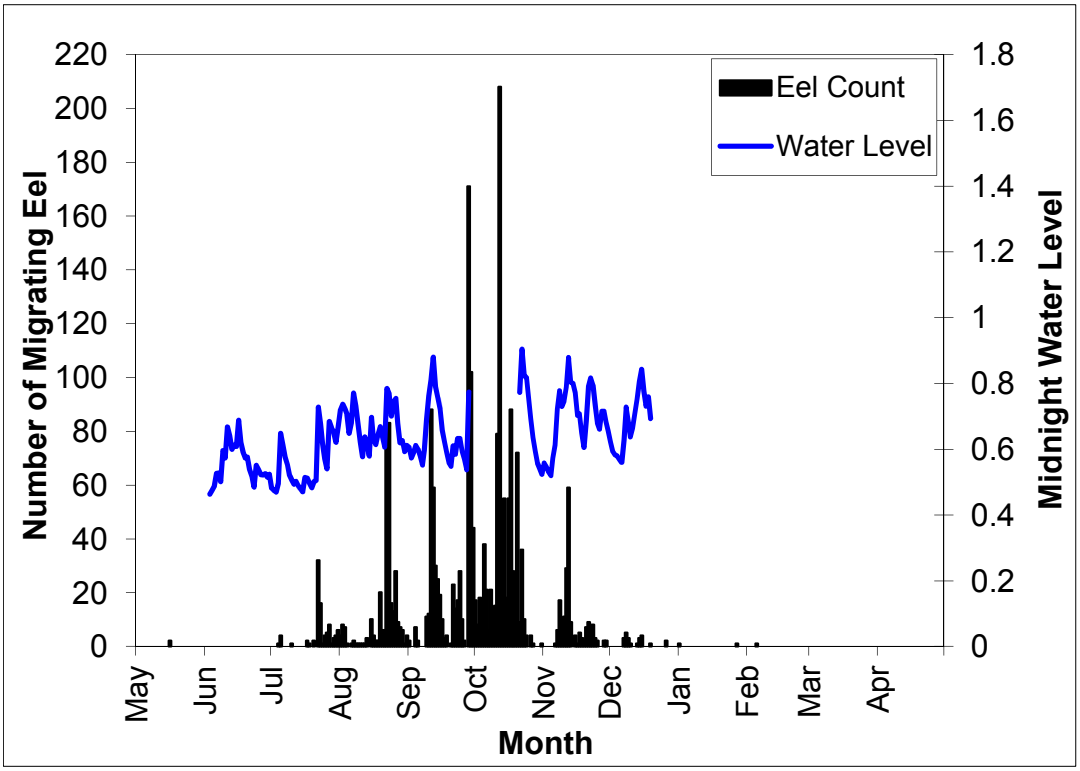

Figure 5-9: Daily counts of downstream migrating silver eel and mid-night water levels (m).

5.3.2 Length, weight & sex

Sampling of individual eels (n = 481) gave an average length of 44.4 cm (range: 30.6 – 91.2 cm) and an average weight of 177g and the proportion of male eels was 35.1%. The length frequency is presented in Figure 5-10 along with those for 2015 and 2016 for comparison. The lack of eels above 46/47 cm was notable. Figure 5-11 shows the time series of total counts and the mean weights since 1971.

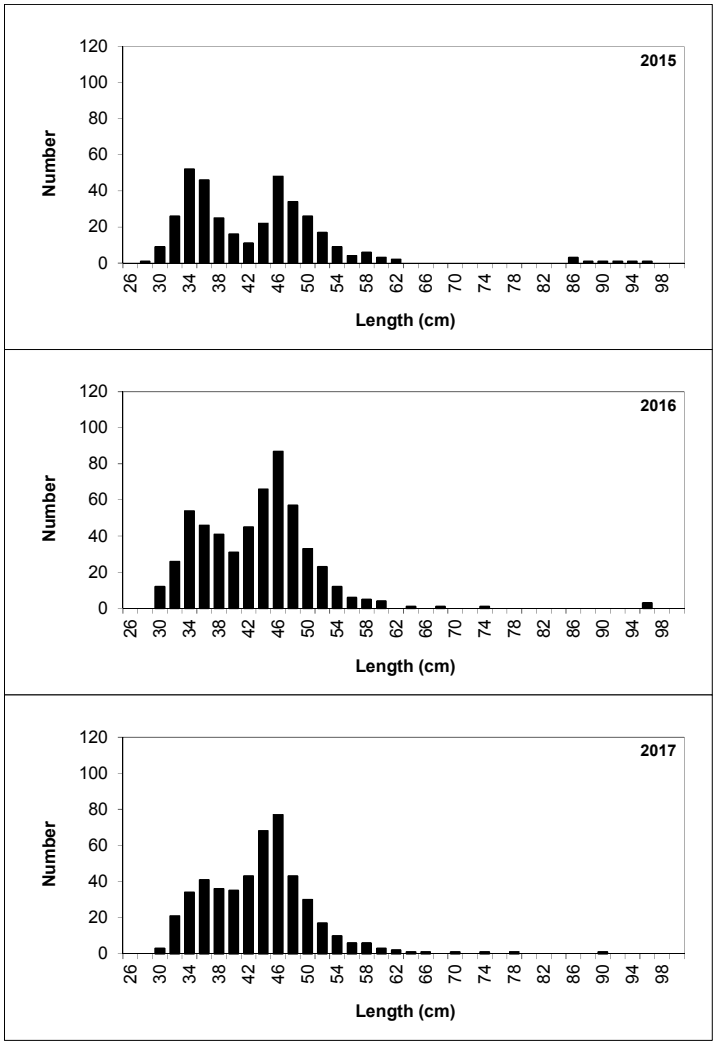

Figure 5-10: Length frequency of sub-samples of silver eels trapped in the downstream traps, 2015 (n=365), 2016 (n=554) and 2017 (n=481). Note change of y-axis scales.

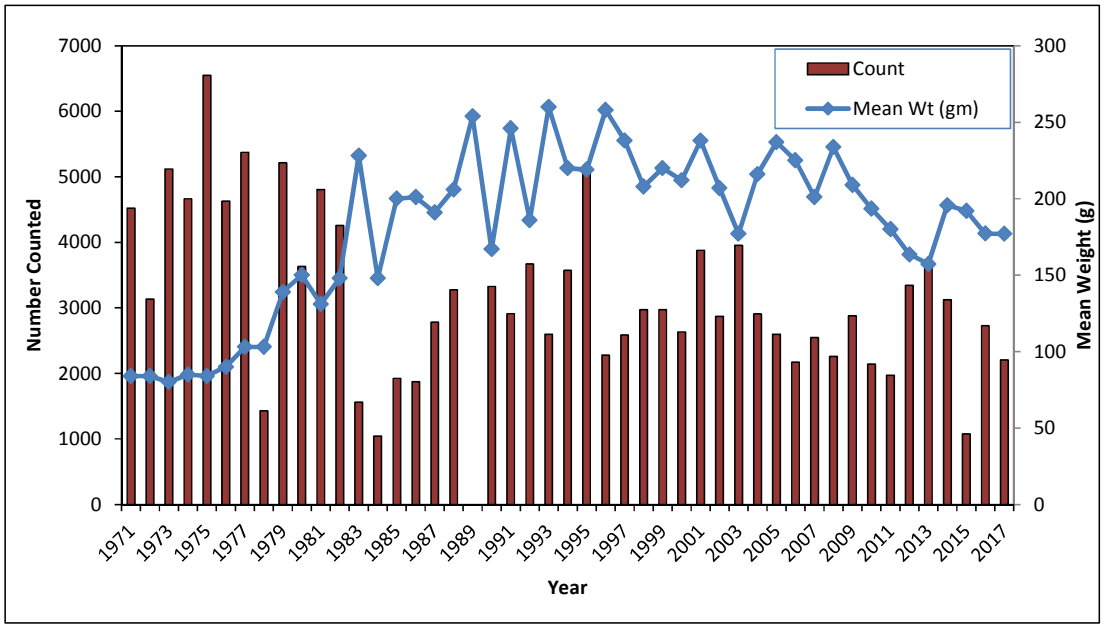

Figure 5-11: Annual number and mean weight of silver eels trapped in the Burrishoole downstream traps.

5.4 Erne Transboundary

The River Erne, a transboundary system, is the second largest river system in Ireland, with an extensive lake habitat. The River Erne conservation fishery and trap and transport (T&T) programme was monitored by researchers from the National University of Ireland (NUIG) who also undertook mark-recapture experiments at Roscor Bridge.

5.4.1 Catch

The conservation fishing on the River Erne was undertaken at six sites. The locations of these and of the release point below the Cathaleen's Fall hydropower dam are indicated in Figure 5-12. The fishing sites included ones located in the upper, middle and lower sections of the river catchment area. The fishing season began on 01/09/17 and extended to 06/12/17. However, on scientific advice ESB extended authorization for fishing at the two lowermost sites (Ferny Gap and Roscor Bridge) until 20/12/17.

The total catches from the 6 fishing sites was 43.6t and the relative proportions of this derived from each fishing site is indicated in Figure 5-13. The quantities varied from 3.6t (Roscor Bridge) to 11.6t (Ferny Gap). The daily variation in eel catches at the Ferny Gap is presented in Figure 5-14. The lunar periodicity noted at other sites was less obvious. This was also true of the effects of discharge. However, the site is a complex one with a variety of different netting systems and is influenced by a range of environmental factors that are not important in simpler river fishing sites.

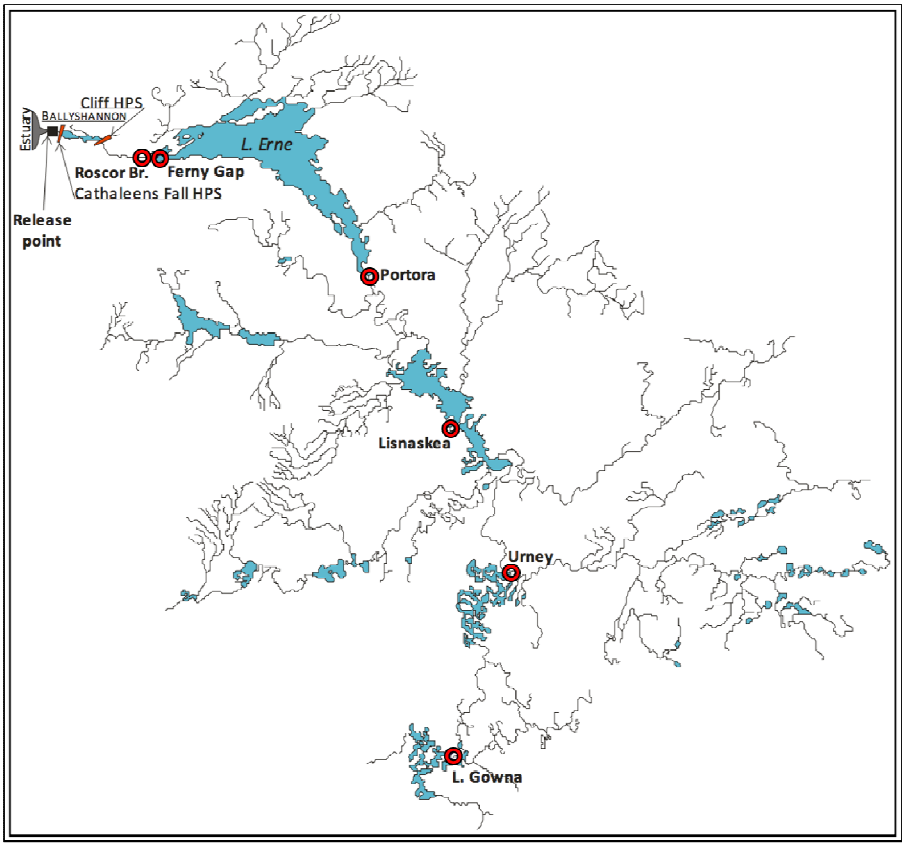

Figure 5-12 Map of River Erne catchment with conservation fishing sites, release point and hydropower dams indicated

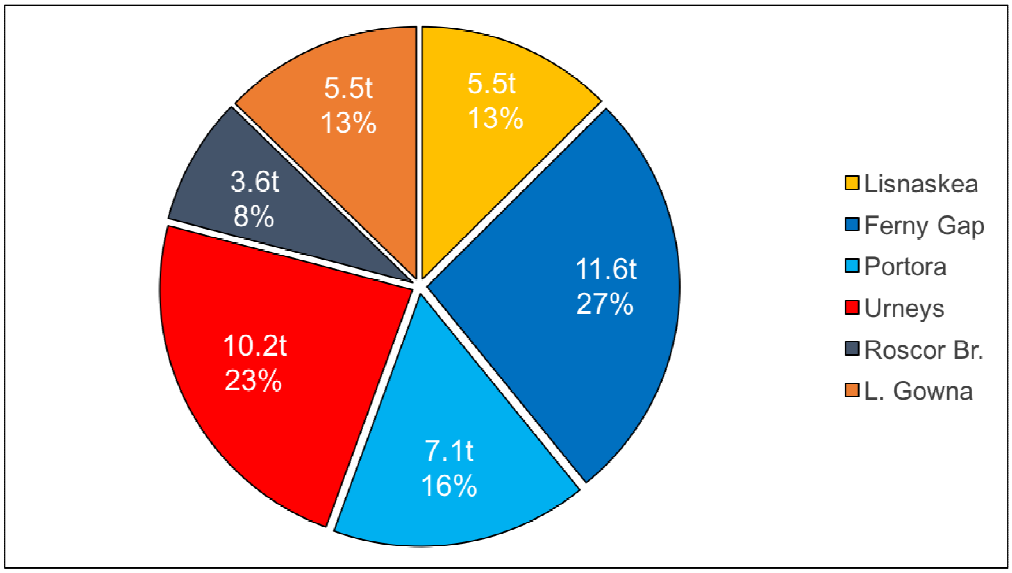

Figure 5-13 Proportions of the River Erne trap and transport catch obtained by each fishing crew in the 2017/2018 season

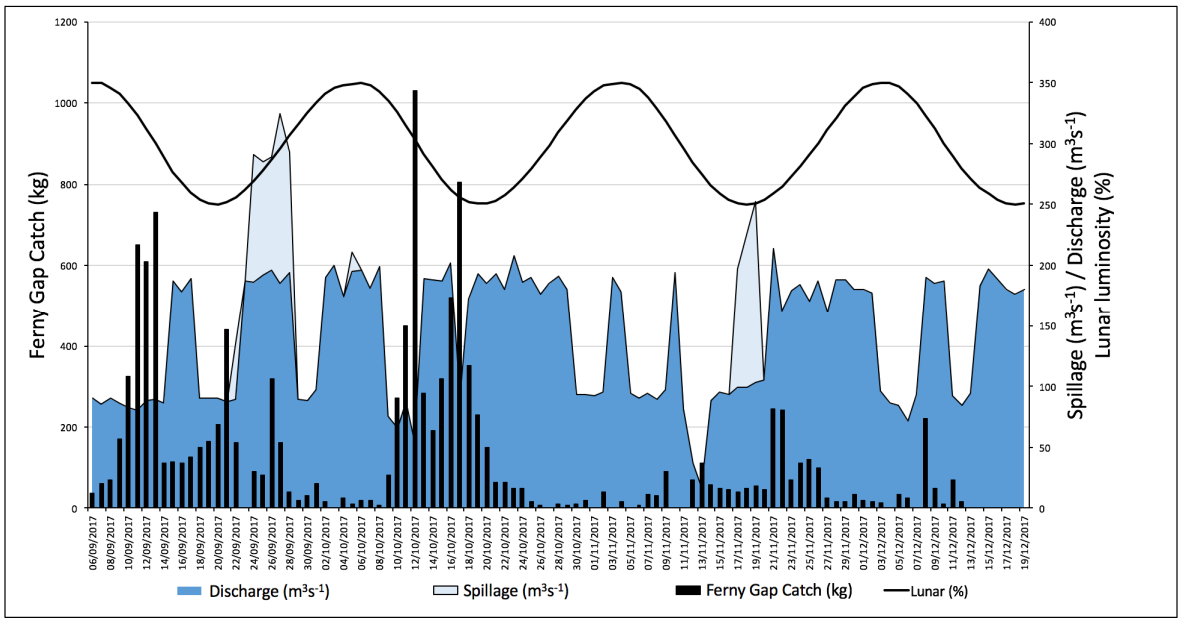

Figure 5-14 Variation in daily catches at the Ferny Gap fishing site, in relation to lunar cycle and discharge during the 2017/2018 season (the threshold discharge of 130 m3s-1 used in population analyses is indicated by a black line).

5.4.2 Production and Escapement

Quantification of eel spawner biomass escapement and production has previously relied on Lower R Erne catch data estimates of fishing site efficiency. Fishing at Roscor Bridge was delayed in the early part of the 2017 eel season and the crew declined to facilitate scientific monitoring and tagging at the site. In the absence of catch data, one option for assessment of compliance with EMP targets is a method based on modelling. The Roscor Bridge difficulties lead to development of a model, using catch data from a nearby (Figure 5-15) extensive fishing site (Ferny Gap) and environmental variables to predict daily catches at Roscor

Bridge. The type of model chosen was a Generalized Additive Model (GAM) which can incorporate non-linear relationships and offer an objective way to predict eel abundance or biomass. GAMs require no *a priori* information on the functional relationship between the response variable (Roscor Bridge catch) and the explanatory variables. Data from 2011 to 2017 was included in the model, with two-thirds of the data used to fit the model while the remaining one-third was used to evaluate the accuracy of model predictions. Final fitted model performance was evaluated by predicting Roscor Bridge catch at each of the data points in the test data set, given the catch at the Ferny Gap and the environmental factors at that point. Predicted catch and observed catch values were highly correlated (Pearson's r = 0.88, p<0.001), and 91% of observed daily catches fell within the range of predicted catch (± 95% C.I.). Based on this result it was decided to use the River Erne GAM to predict catch for the entire season 2017/2018 at Roscor Bridge. The model was used to make daily predictions of catch and when summed for the entire season this amounted to 4.248 t. The incomplete season catch recorded at Roscor Bridge in the 2017/2018 season was 3.553t, all of which was included in the T&T releases. The River Erne GAM predicted a cumulative catch of 3.687t for this incomplete fishing period.

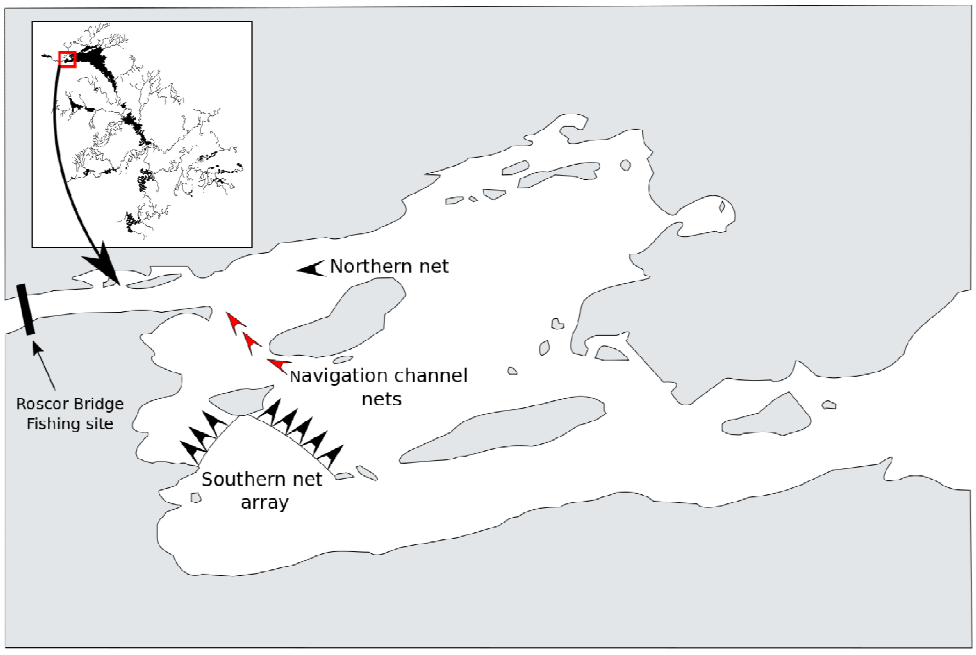

Figure 5-15 Map of the Ferny Gap with location of net arrays marked

Daily GAM predicted catches were used, together with information gained in previous years on Roscor Bridge fishing efficiency (low discharge efficiency = 9.78% and high discharge efficiency = 18.43%) to calculate the biomass of eels migrating to the fishing site and downstream to the dams. The threshold discharge of 130 m^3s^{-1} was used in distinguishing between high and low discharge levels at Roscor Bridge. Silver eel production (68.81t) was estimated by combining the estimated biomass approaching Roscor Bridge (28.894t) with the upstream T&T (39.916t). The cumulative full season biomass approaching the dams was 24.646t. Hydropower mortalities, assigned on a nightly basis, were estimated using results of telemetry undertaken in previous years (detailed in previous Country Reports). The combined mortalities estimated for the two dams was 10.073t in the 2017/2018 season. The total T&T biomass was 43.469, which was 63.17% of production. Spawner escapement biomass was estimated to have been 58.042t, which was 84.35% of production. The summary details for the River Erne are presented in Figure 5-16.

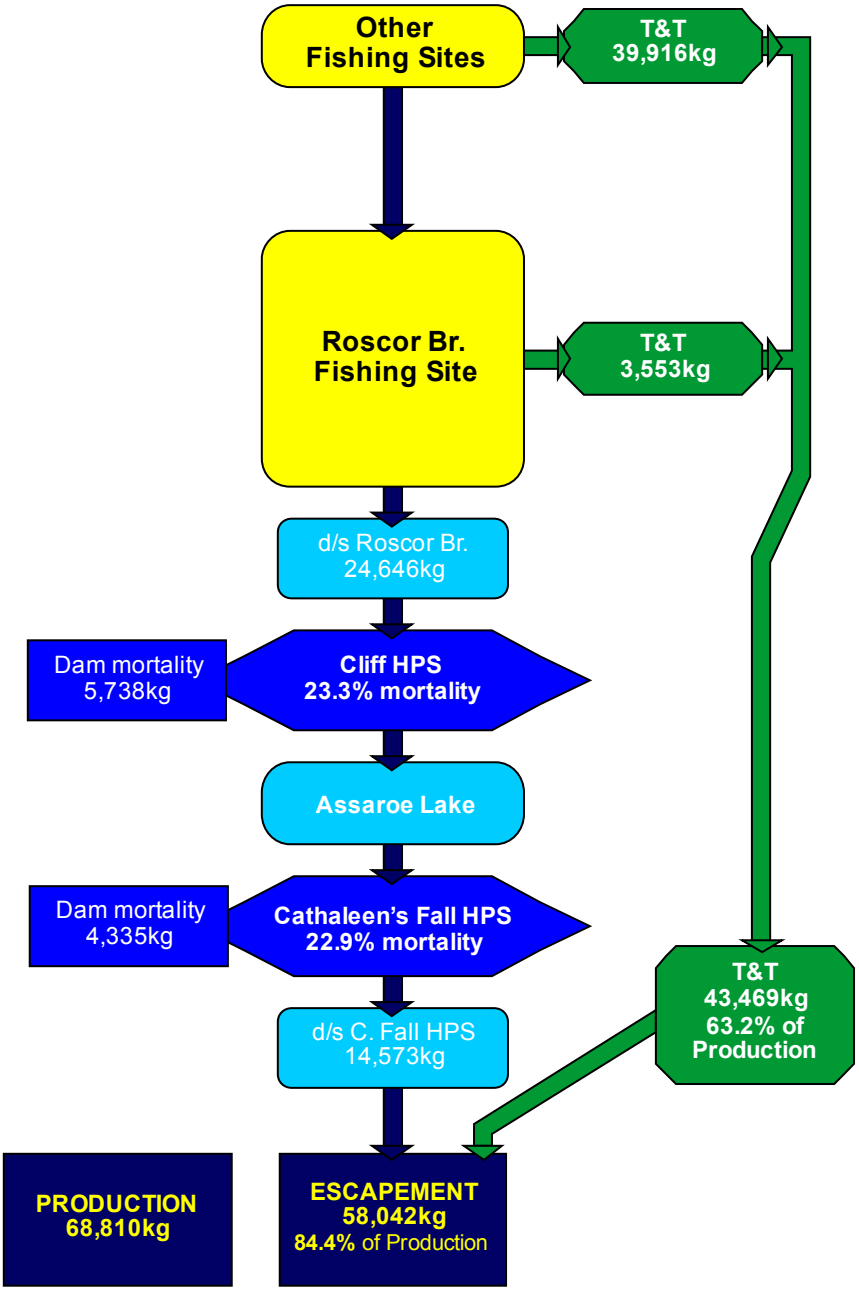

Figure 5-16 A summary of the analysis of silver eel production and escapement in the River Erne during the 2017/2018 eel migration season.

5.4.3 Length and weight

The eel population structure at Ferny Gap has been shown in previous years to vary between nets and between months. In the 2017/2018 a sample (n= 105) was examined from the navigation nets and the results are presented as a size frequency distribution in Figure 5-17. The eels were mainly females (92.38%), which varied from 454mm to 1015mm. The mean female size was 737.67mm.

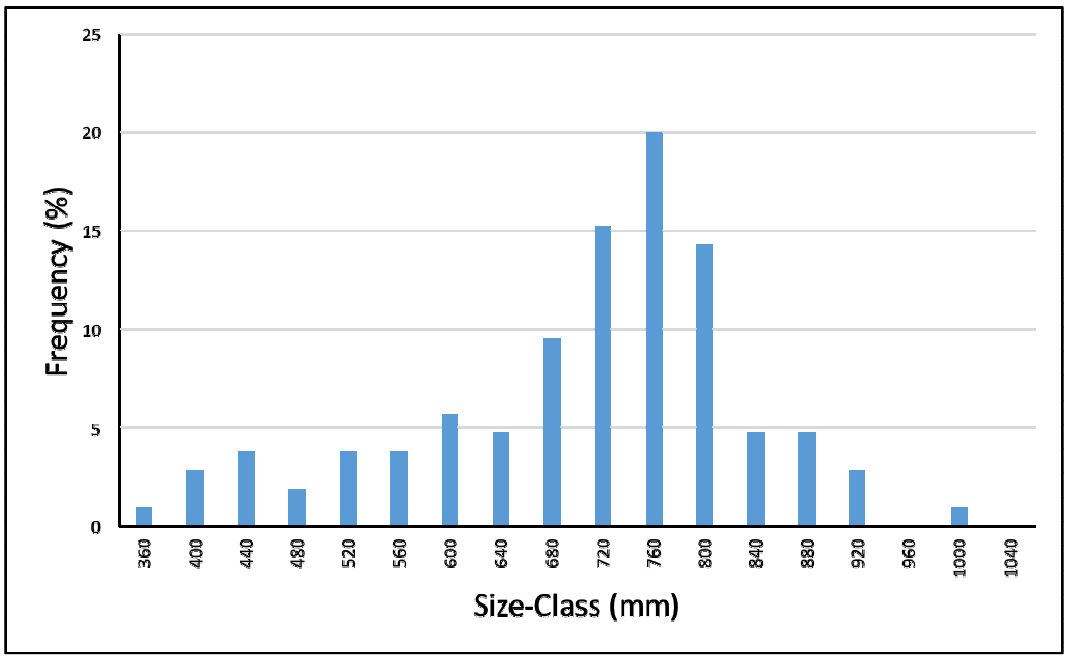

Figure 5-17 Relative size–frequency distribution of eels from Ferny Gap fishing site 14/12/17 (n=105).

5.5 Fane

The Fane is a relatively small catchment with the silver eel fishery located in the upper reaches of the system approximately 28km from the coast. The Fane has a riverine wetted area of 84 ha and a lacustrine wetted area of 553 ha. A research silver eel fishery was carried out on the Clarebane River on the outflow of Lough Muckno in the Fane catchment from 2011 to the present (Figures 5-18 & 5-19). The site was the location of a commercial fishery until 2008.

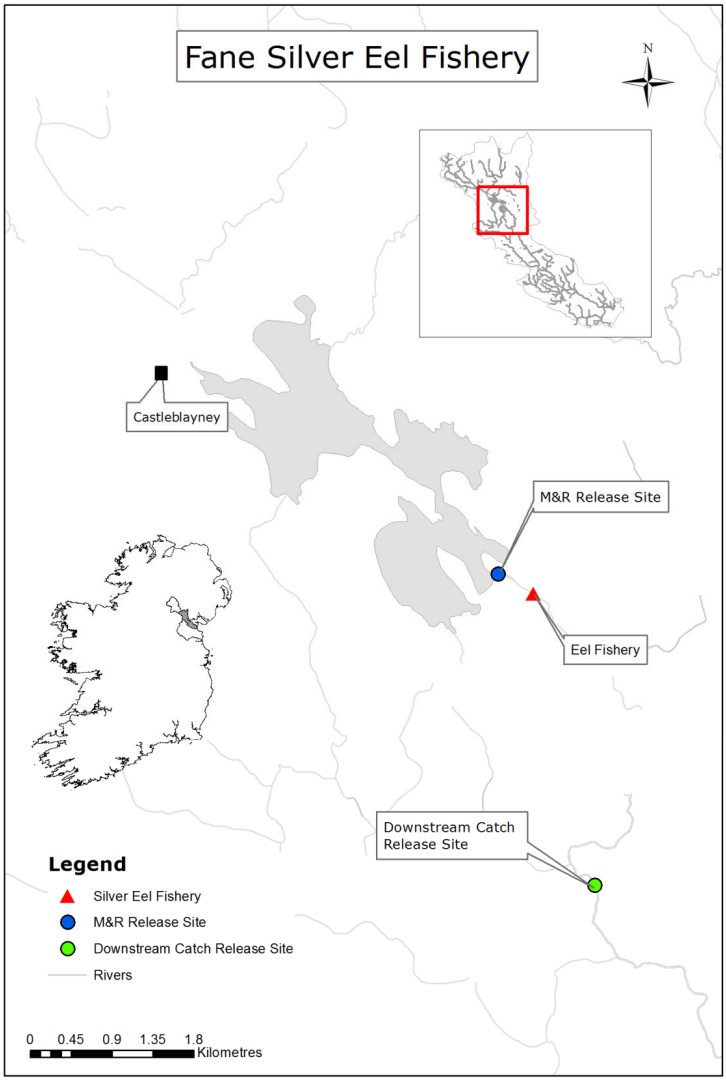

Figure 5-18: Location of Silver eel fishery on the Clarebane River (Fane).

Figure 5-19: Coghill net fishing for silver eels in the Clarebane River, 2013 (Photo: C. O'Leary)

5.5.1 Silver Eel Catch

The Fane silver eel fishery is dependent on water levels in the river in order for the nets to be set. As the fishing site is located downstream of Lough Muckno and a water abstraction site there is a delay due to the lake absorbing rainfall before a rise in river water levels is observed in the Clarebane River. Silver eel catches at the Fane Fishery were varied in 2017 with a total catch of 770 kg and 20 nights fished. The catches, numbers of nights fished and numbers of eels captured from 2011 to 2017 are presented in Table 5-3. In 2017, increasing rainfall levels on a first quarter moon (Figure 5-20), early in the silver eel season led to large catches in September. Forty percent of total catch was captured over 2 nights (28th and 29th September). The catches then tapered off for the rest of the season coinciding with water levels that never rose above 1m for the season. In total 20 nights were fished across September, October and December respectively. No fishing was carried out in November due to very low water levels and no eels were caught in the December fishing.

Table 5-3 Fane Silver eel catch record 2011 – 2017

Year	Days fished	Catch (kg)	No eels
2011	13	268	1433
2012	21	448	1965
2013	19	1151	3097
2014	25	797	2542
2015	23	730	1810
2016	9	76	206
2017	20	770	2376

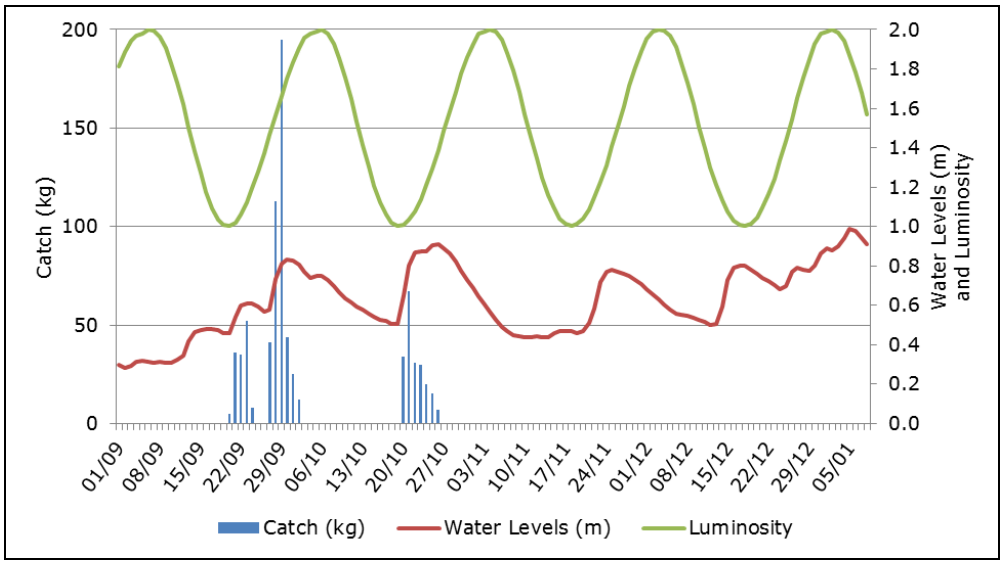

Figure 5-20 Water levels, moon phase and catch (kg) for the Fane fishery 2017 silver eel season

5.5.2 Mark Recapture

A series of Mark recapture studies are undertaken at the site to determine the efficiency of the fishery (Table 5-4). Each year a number of eels tagged at the fishery and released

upstream, when conditions are right this study can be repeated twice and three times when the silver eels are migrating. Due to the dry conditions for 2016 no MR studies were undertaken and the pattern of the silver eel run in 2017 resulted in only 1 eel being recaptured.

Table 5-4 Mark Recapture study 2012 - 2017

Year	No. tagged	Recaptured	Recaptured within Year	Overall Recapture Rate %	Within Year recapture rate %
2012	469	94	36	20	8
2013	273	92	60	34	22
2014	320	93	87	29	27
2015	252	103	101	41	40
2017	124	1	1		
Average rate				**30.91**	

5.5.3 Eel Biology

In 2017, morphometric measurements were taken on 427 eels in 2017. The processed eels had an average length was 51.9 cm (ranging from 30.9 to 94.7 cm). The average weight per eel was 0.3316 kg (ranging from 0.0140 to 1.7510 kg), (Table 5-5). The length frequency for the processed eels is shown in Figure 5-21. There were no silver eels retained during the 2017 fishing on the Fane catchment, therefore there are no results attributed to eel biological quality or parasite infections.

Table 5-5 Length and weight data for processed silver eels from the Fane catchment, 2011 - 2017

Year	No. Eels	Mean Length (cm)	Min. Length (cm)	Max. Length (cm)	Mean Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
2011	1433	43.8	30.4	91.7	0.187	0.044	1.709	268
2012	1541	47.1	31.4	96.0	0.251	0.050	2.090	387
2013	1165	49.2	30.8	96.6	0.289	0.030	1.952	337
2014	1334	50.4	30.4	95.0	0.292	0.045	1.721	389
2015	1622	54.0	31.2	96.6	0.370	0.030	2.045	599
2017	427	51.9	30.9	94.7	0.332	0.014	1.751	142

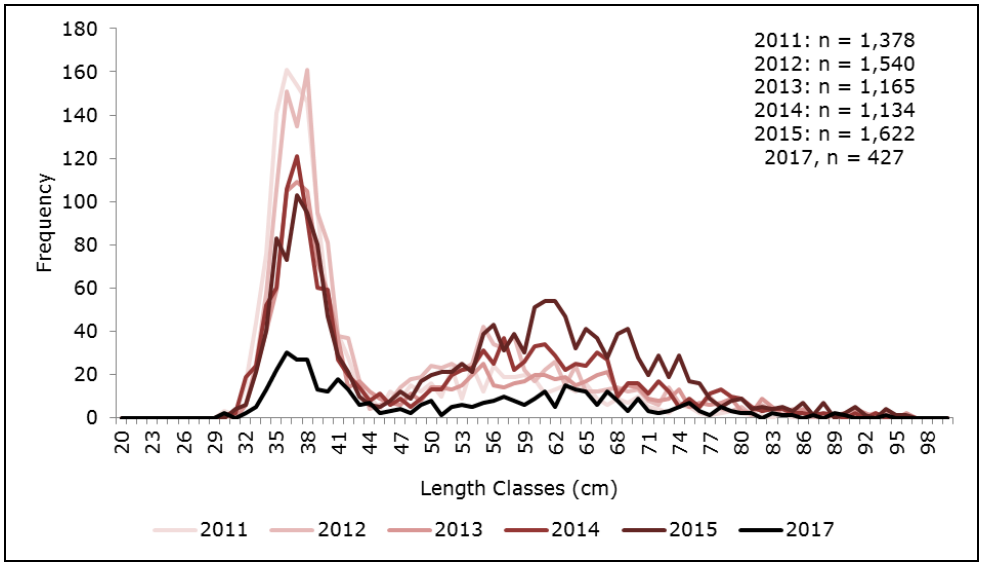

Figure 5-21 Length frequency for silver eels caught on Clarebane River (Fane Catchment), 2011 – 2017

5.6 River Barrow

The Barrow catchment is a large riverine catchment located on the east coast of Ireland in the South Eastern River Basin District (SERBD). The SERBD is 60% calcareous bedrock which makes it a very productive habitat for eels. There has historically been a commercial fishery on the River Barrow and the presence of historical catch will aid in the assessment of the current silver eel escapement levels from the river. There is also historical research data on the River Barrow from the Fisheries Research Centre which is available to Inland Fisheries Ireland. The assessment of the silver eel stocks from a river dominated catchment will help highlight any difference in production and escapement of eels compared with catchments with large lake/lacustrine wetted areas. The Barrow is the first riverine dominated silver eel index catchment assessed to date.

Four nets were fished from openings on the Ballyteiglea Lock gates of the canal section of the River Barrow during the silver eel season (Figures 5-22 and 5.23). The location fished is upstream of the town of Graiguenamanagh; approximately 5km upstream from the tidal limit (estuary) in the River Barrow. The location of the Ballyteiglea Lock fishing site means that over 99% of the River Barrow freshwater wetted area is above the fishing site. Due to the size of the River Barrow, it is currently not possible to fish the entire freshwater channel, however through a mark recapture study it is hoped to assess the efficiency rate of the fishing site and estimate what proportion of the run is bypassing the nets.

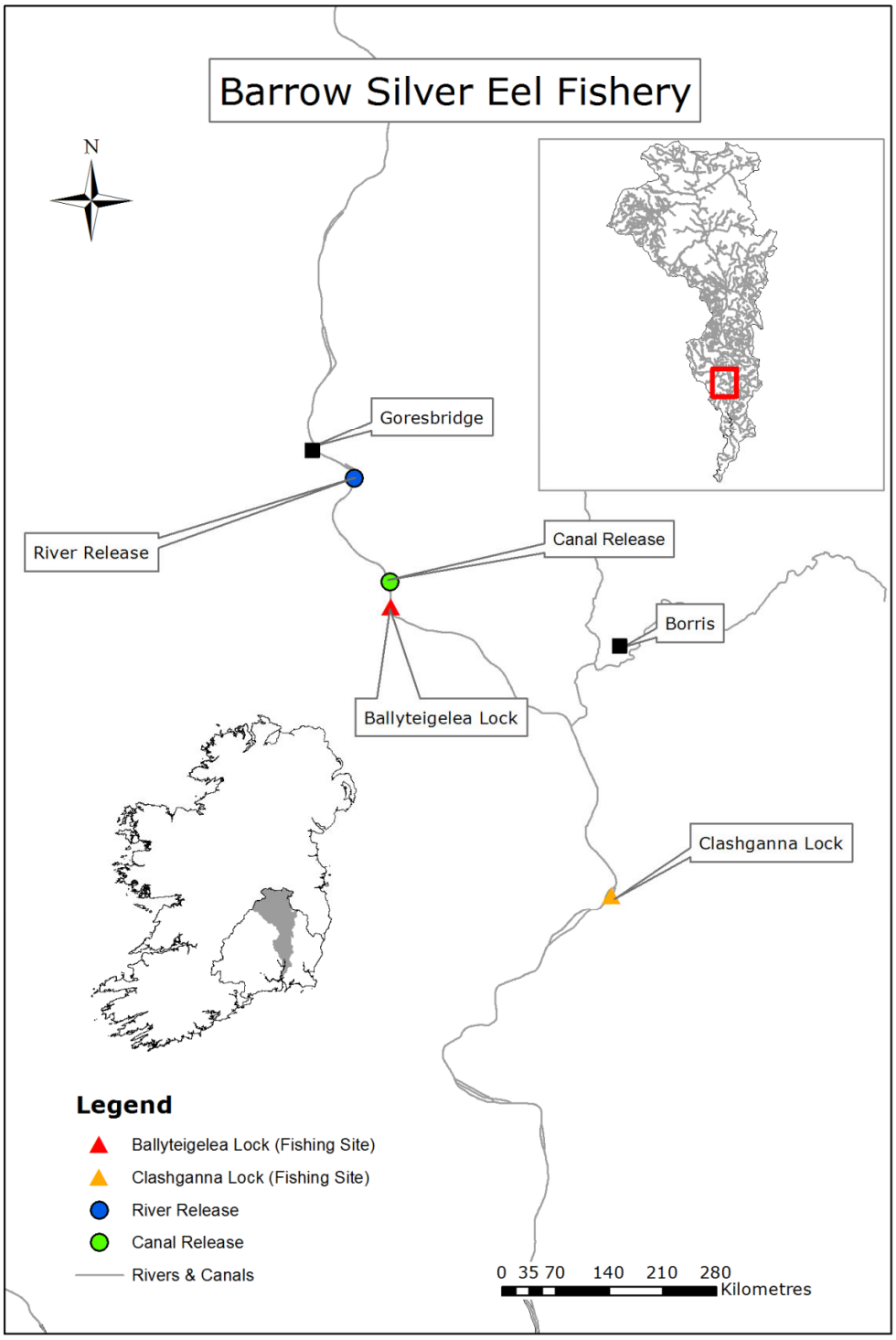

Figure 5-22: Map of silver eel fishing and release locations within the Barrow Catchment, 2016 (Insets: Map of Ireland with Barrow catchment (shaded) and South Eastern River Basin District (outlined) and detail of Barrow Catchment rivers))

Figure 5-23: Ballyteiglea Lock - location of research silver eel fishery on Barrow canal (Photo: C. O'Leary)

5.6.1 Eel catch

The Barrow silver eel fishery performed much as the Fane fishery in 2017 (Table 5-6). Increasing rainfall levels on the first quarter (Figure 5-24), early in the silver eel season led to large catches over 2 nights September (155 kg & 57% of the overall catch). In total 24 nights were fished with a total weight of 273 kg and morphometric measurements were taken on 351 eels. Catches then tapered off for the rest of the season coinciding with decreasing water levels (Figure 5-24).

Table 5-6 Silver eel catch record for Barrow 2014 – 2017

Year	No. Days Fished	Catch (kg)	No of Eels
2014	22	174	1,223
2015	20	128	687
2016	25	193	880
2017	24	273	1,388

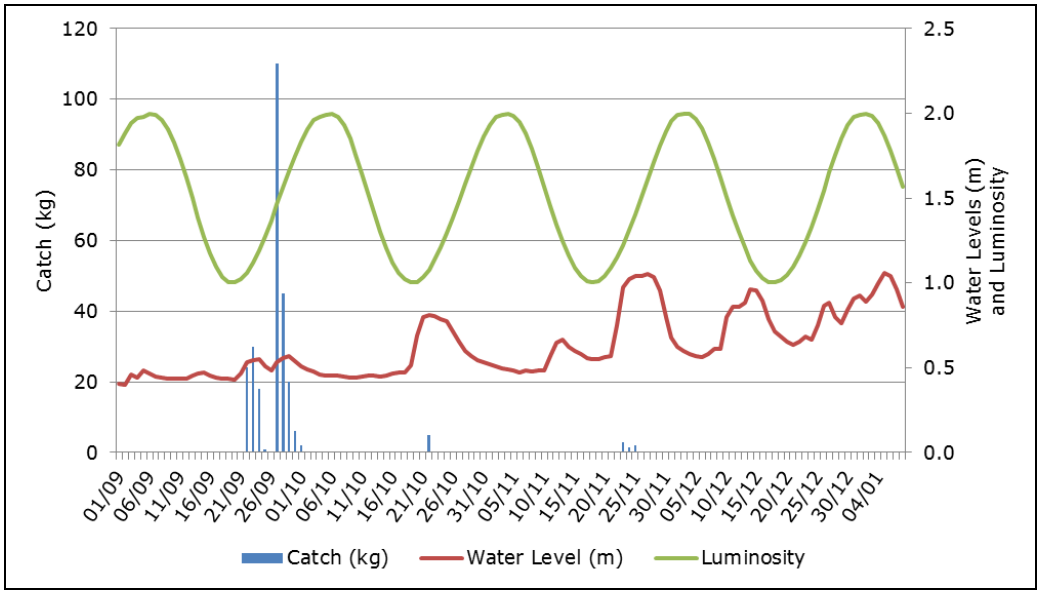

Figure 5-24 Water levels (m), Luminosity and Catch (kg) for the Barrow fishery 2017 silver eel season

5.6.2 Mark Recapture

A series of mark recapture studies are undertaken at the Barrow fishery to determine the efficiency of the site (Table 5-7). There are 2 locations for the study, one is Ballyellin lock, located upstream of the fishing site. The eels released at this site have 2 options for migrating downstream via the main channel or the canal, the second location is within the canal just upstream of the fishing site. Due to the unusual silver eel migration pattern for 2016 and 2017 only 1 MR session was undertaken in these years.

Table 5-7 Mark Recapture Preliminary Results for Barrow Fishery, 2015 – 2017

Location	Year	Month	No. Tagged	No. Recaptured	% Recapture	Average rate
Ballyellin Lock	2014	October	202	7	3	11
Ballyellin Lock	2015	October	60	16	27	
Ballyellin Lock	2015	November	167	4	2	
Ballyteiglea Lock	2015	November	50	21	42	34
Ballyteiglea Lock	2016	November	48	21	44	
Ballyteiglea Lock	2017	September	51	8	16	

5.6.3 Eel Biology

Morphometric measurements were taken on 351 eels in 2017. The processed eels had an average length was 45.5 cm (ranging from 26.2 to 81.8 cm). The average weight per eel was 0.2032 kg (ranging from 0.0250 to 1.078 kg), (Table 5-8). The length frequency for the processed eels is shown in Figure 5-25. During the silver eel season at the Barrow fishery, a total of 83 were retained in order to assess biological quality and were dissected in the laboratory. Of these, 67% were female and 33% were male (Figure 5-26 and Table 5-9).

The prevalence of the swimbladder parasite *Anguillicola crassus* was 69.8%, with a mean infection intensity of 5.67 worms per eel (Figure 5-27). In total, 329 parasites were recorded among the 83 retained eel samples. Swimbladder tissue health was assessed using the Swimbladder Degenerative Index (SDI) and the Length-Ratio Index (LRI). Both reported only slight / moderate damage to the swimbladder tissue of the eels within the sample (Figures 5-28 and 5-29).

Table 5-8 Length and weight data for silver eels from the Barrow catchment, 2014 - 2017

Year	No. Eels	Mean Length (cm)	Min. Length (cm)	Max. Length (cm)	Mean Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
2014	811	41.4	27.6	76.2	0.140	0.033	0.742	114
2015	730	41.8	31.5	77.4	0.149	0.050	0.873	109
2016	681	45.2	32.0	77.8	0.195	0.052	0.860	133
2017	351	45.5	26.2	81.8	0.203	0.025	1.078	71

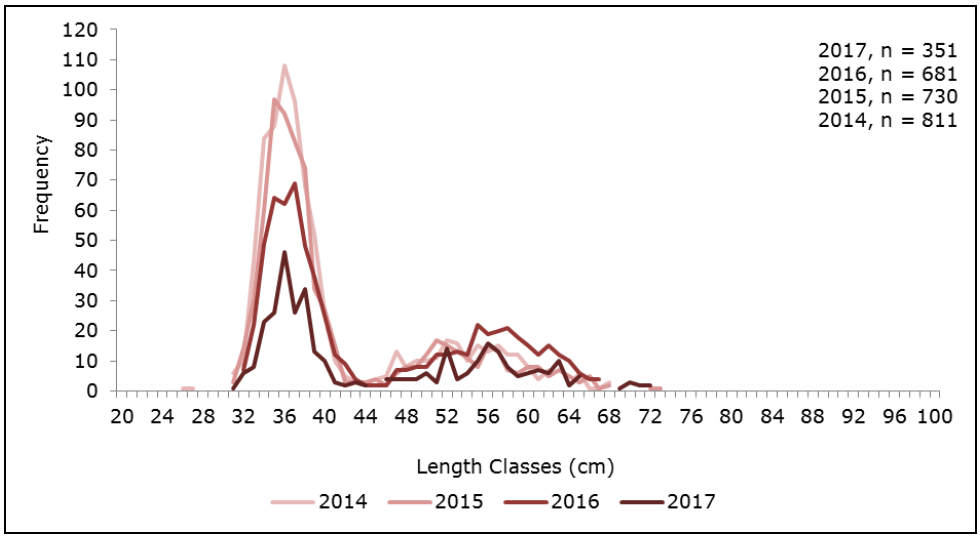

Figure 5-25 Length frequency for silver eels caught on Barrow fishery, 2014 – 2017

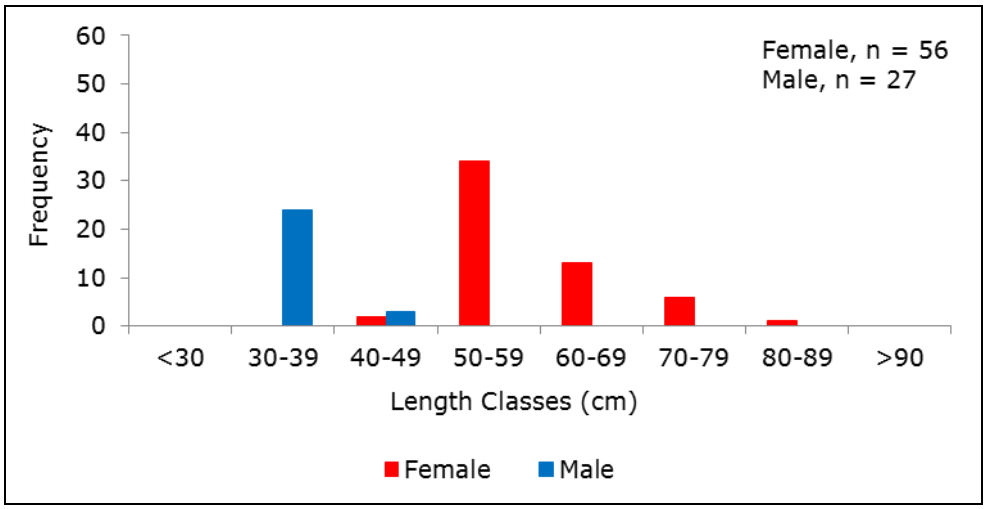

Figure 5-26 Sex distribution of sacrificed eels at Barrow silver eel fishery, 2017

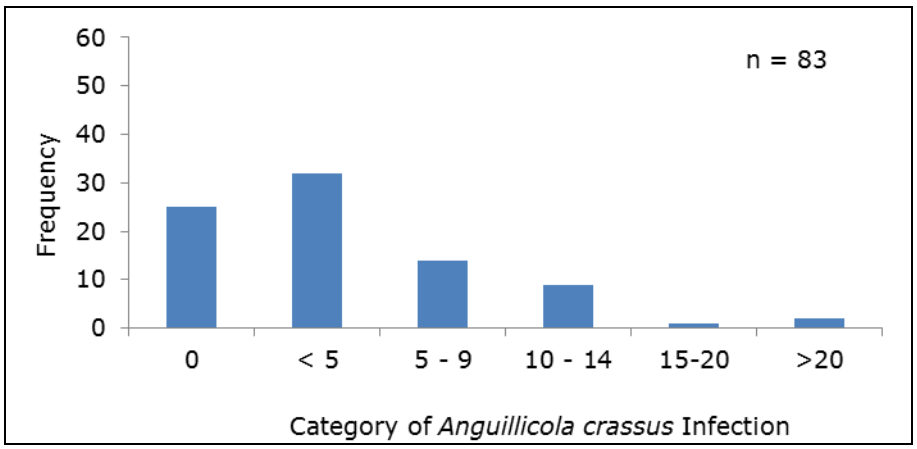

Figure 5-27 *Anguillicola crassus* infection intensity for sacrificed silver eels collected from Barrow fishery, 2017

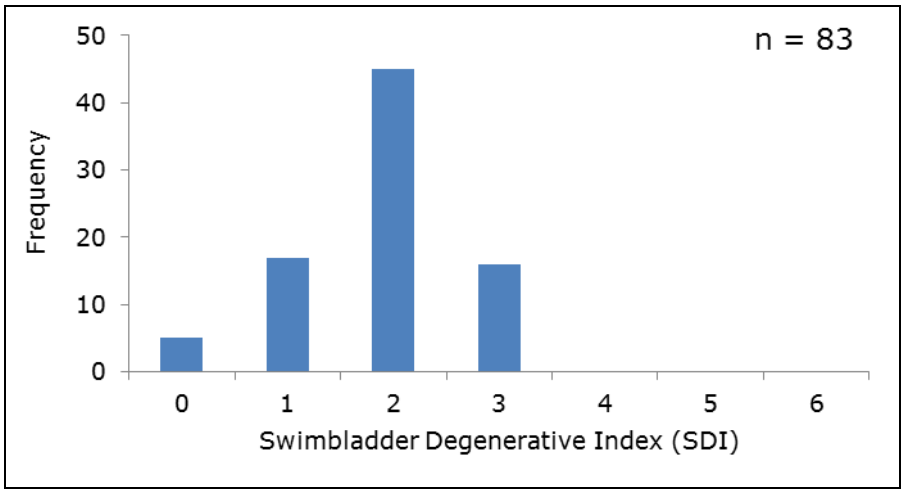

Figure 5-28 Swimbladder Degenerative Index (SDI) results for swimbladder health among sacrificed eels collected from Barrow fishery, 2017

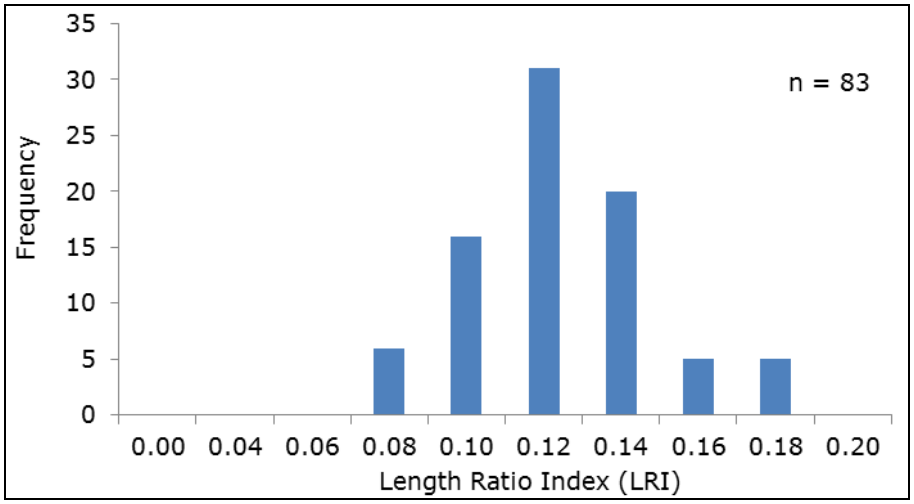

Figure 5-29 Length-Ratio Index (LRI) results for swimbladder health among sacrificed eels collected from Barrow fishery, 2017

Table 5-9 Biological data for silver eels from Barrow catchment, 2014 - 2017

Year	No. Eels	No. Females	No. Males	% Female	% Male	% Prevalence *A. crassus*	Mean Intensity *A. crassus*	Count *A. crassus*
2014	51	20	31	39	61	73	6.11	226
2015	55	19	36	35	65	56	5.16	160
2016	109	41	62	40	60	67	4.20	290
2017	83	56	27	68	33	69	5.67	329

5.7 Boyne

The Boyne catchment is a large catchment located on the east coast of Ireland in the Eastern River Basin District (SERBD). There has historically been a commercial fishery on the River Boyne and the presence of historical catch will aid in the assessment of the current silver eel escapement levels from the river. The fishing site selected on the Boyne was located at Floods Bridge on the main channel of the Kells Blackwater River (Figure 5-30). The location fished is 5 km downstream of Lough Ramor and upstream of the town of Kells; approximately 50 km upstream from the tidal limit (estuary) in the River Boyne. A large river fyke net was fished during the 2017 silver eel season.

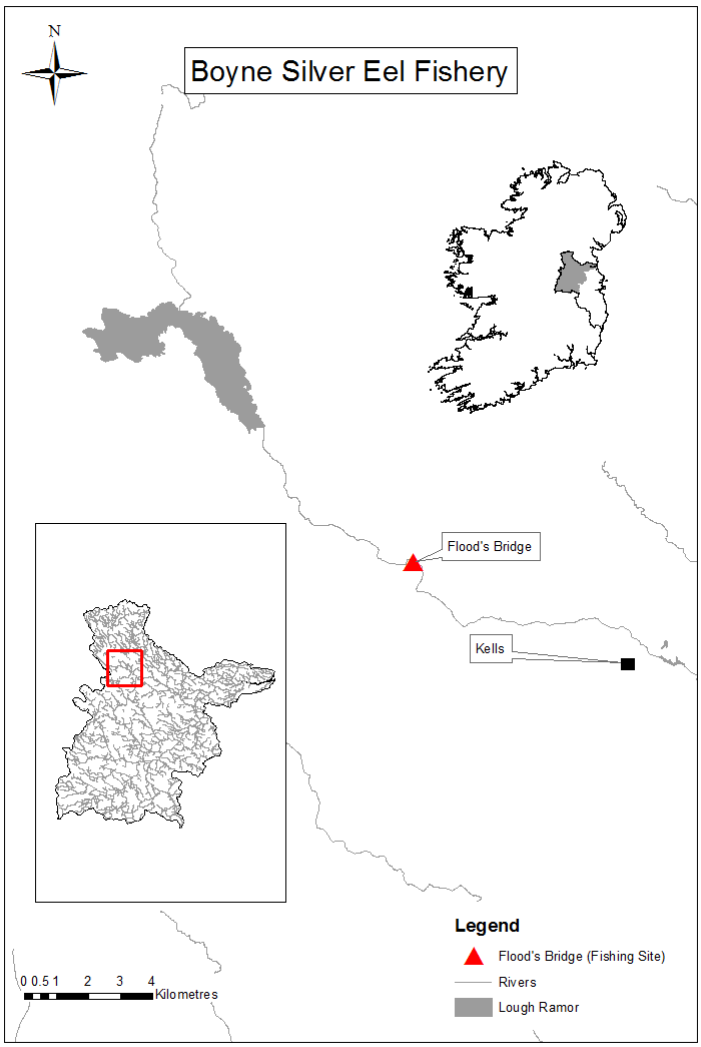

Figure 5-30: Map of silver eel fishing location within the Boyne Catchment, 2017 (Insets: Map of Ireland with Boyne catchment (shaded) and Eastern River Basin District (outlined) and detail of Boyne Catchment rivers)

5.7.1 Silver Eel Catch

The Boyne silver eel were low in 2017 with a total catch of 91 kg. Catches in the winged fyke net were limited despite fishing carried out during increased flow conditions and around the new moon. High rainfall levels on the first quarter (Figure 5-31), early in the silver eel season led to the largest catches in September (115 eels captured). A further 20 eels were caught in October and just 8 in November. No eels were captured in December but a further 14 were caught in January 2018. In total, 157 eels were captured and measured during the silver eel season. As on the Fane catchment, the catches then tapered off for the rest of the season coinciding with decreasing water levels. In total 22 nights were fished.

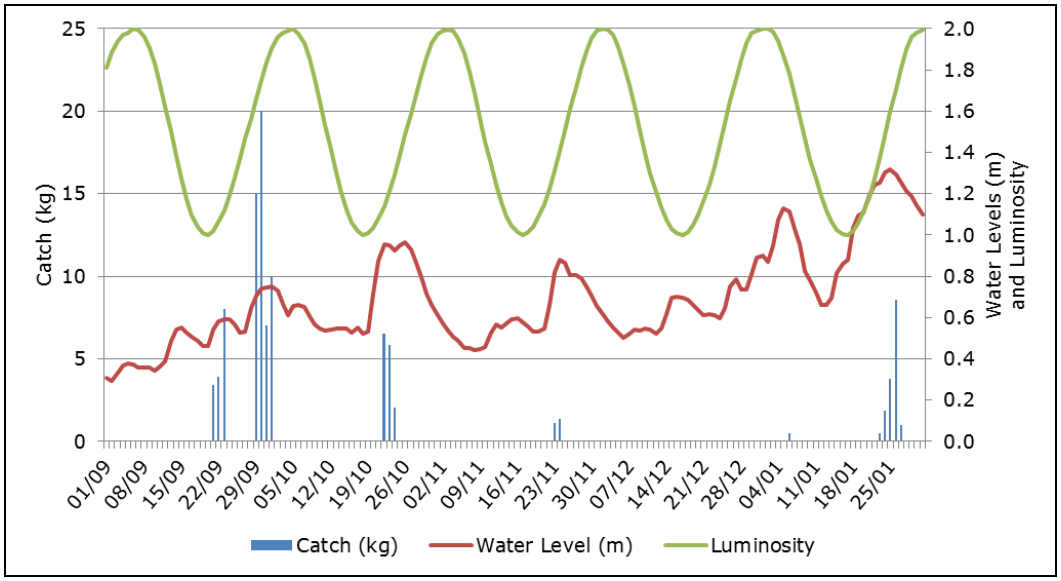

Figure 5-31 Water levels (m), Luminosity and Catch (kg) for the Boyne fishery 2017 silver eel season

5.7.2 Eel Biology

Morphometric measurements were taken on 157 eels in 2017 / 2018 season. The processed eels had an average length was 64.5 cm (ranging from 31.4 to 93.0 cm). The average weight per eel was 0.5260 kg (ranging from 0.0620 to 1.4245 kg), (Table 5-10). The length frequency for the processed eels is shown in Figure 5-32. During the silver eel season on at the, a total of 61 were retained in order to assess biological quality and were dissected in the laboratory. Of these, 54 (89%) were female (Figure 5-33).

The prevalence of the swimbladder parasite *Anguillicola crassus* was 84%, with a mean infection intensity of 9.82 worms per eel (Figure 5-34). In total, 501 parasites were recorded among the 61 retained eel samples. Many of the infected eel had large intensity infections, with 8 eels having infections in excess of 20 parasites maximum infection was 77 parasites in one eel (Table 5-11). Swimbladder tissue health was assessed using the Swimbladder Degenerative Index (SDI) and the Length-Ratio Index (LRI). Despite the high intensity infections in many eels, both indices reported only slight / moderate damage to the swimbladder tissue of the eels within the sample (Figures 5-35 and 5-36).

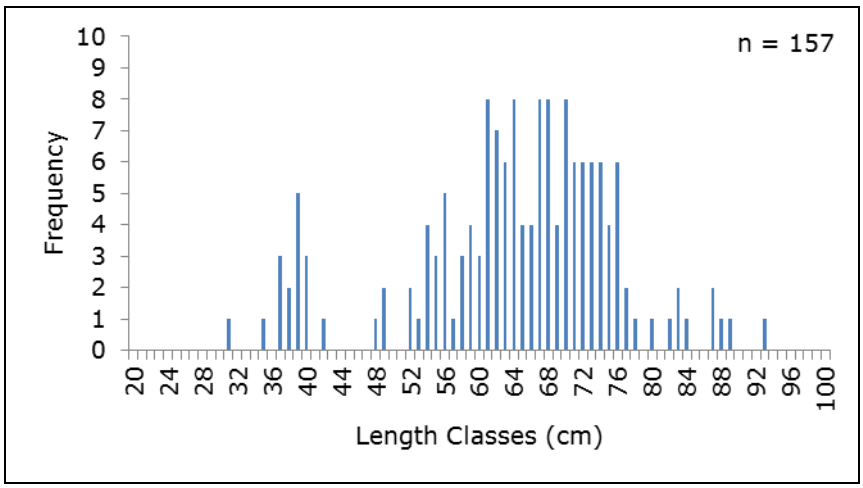

Figure 5-32 Length frequency of silver eels captured at the Boyne fishery, 2017

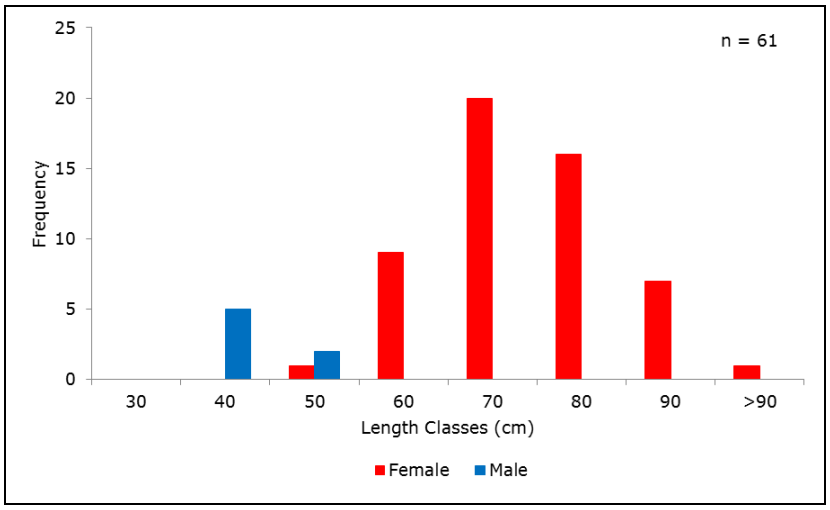

Figure 5-33 Sex distribution of sacrificed eels at Boyne silver eel fishery, 2017

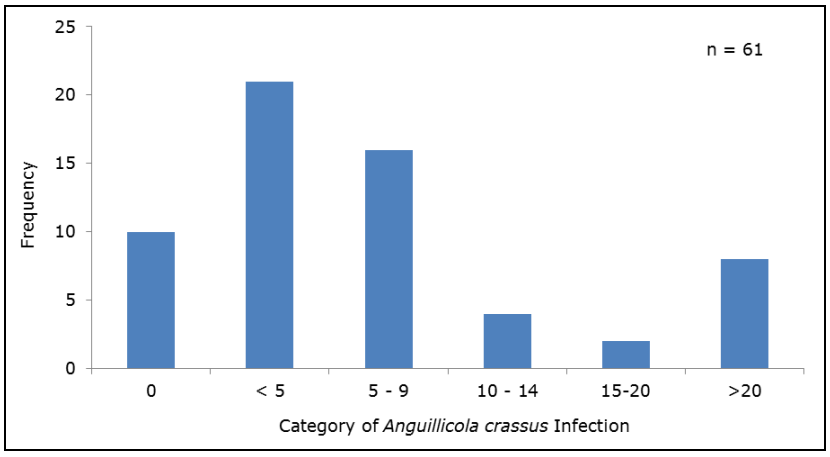

Figure 5-34 *Anguillicola crassus* infection intensity for sacrificed silver eels collected from Boyne fishery, 2017

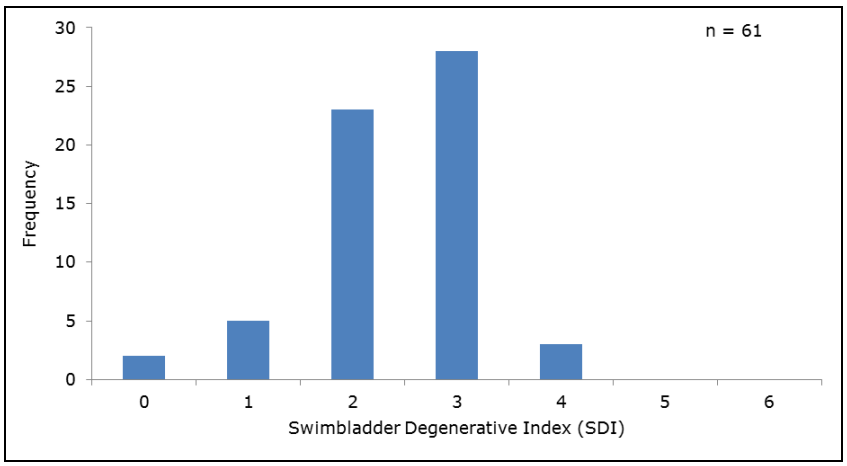

Figure 5-35 Swimbladder Degenerative Index (SDI) results for swimbladder health among sacrificed eels collected from Boyne fishery, 2017

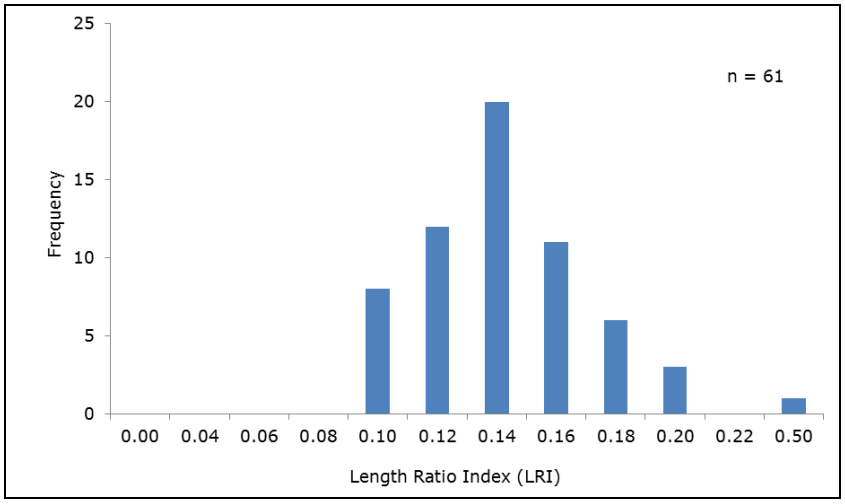

Figure 5-36 Length-Ratio Index (LRI) results for swimbladder health among sacrificed eels collected from Boyne fishery, 2017

Table 5-10 Length and weight data for silver eels from the Boyne catchment, 2017

Year	No. Eels	Mean Length (cm)	Min. Length (cm)	Max. Length (cm)	Mean Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
2017	157	64.5	31.4	93.0	0.521	0.062	1.425	82

Table 5-11 Biological data for silver eels from Boyne catchment, 2017

Year	No. Eels	No. Females	No. Males	% Female	% Male	% Prevalence *A. crassus*	Mean Intensity *A. crassus*	Count *A. crassus*
2017	61	54	7	89	11	84	9.82	501

6 Yellow Eel Stock Assessment

(refers to Ch. 7.2.2 of the National EMP Report, 2008)

Yellow-eel stock monitoring is integral to gaining an understanding of the current status of local stocks and for informing models of escapement, particularly within transitional waters where silver eel escapement is extremely difficult to measure directly. Such monitoring also provides a means of evaluating post-management changes and forecasting the effects of these changes on silver eel escapement. The monitoring strategy aims to determine, at a local scale, an estimate of relative stock density, the stock's length, age and sex profiles, and the proportion of each length class that migrate as silvers each year. Furthermore, individuals from this sample will be used to determine levels of contaminants and parasites to assess spawner quality. Two classes of survey methodologies will be employed; eel specific surveys and multi-species surveys, mainly involving standardised fyke netting and electro-fishing. Table 6-1 gives the locations for eel specific lake and transitional waters to be surveyed in the 2015 period.

Fyke net surveys carried out between 1960 and 2008 by State Fisheries Scientists will provide a useful bench mark against which to assess the changes in stock. The yellow eel monitoring strategy will rely largely on the use of standard fyke nets. Relative density will be established based on catch per unit (scientific-survey) effort.

Water Framework Directive general fish surveys were undertaken on lakes (fyke nets, gill-nets and hydro acoustics), rivers (electro-fishing and fyke nets) and transitional waters (fyke nets, seine nets & beam trawls) in 2017 which adds significantly to the national eel specific programme. The WFD is being undertaken on a three year rolling cycle by Inland Fisheries Ireland. The National programme of yellow eel monitoring in 2017, as laid out in the EMPs, was undertaken by Inland Fisheries Ireland with additional support from the Marine Institute (Table 6-1).

Under the Irish Eel Management Plan a number of key monitoring objectives were outlined. A monitoring programme for the years 2015 – 2017 will aim to meet these objectives:

2.1 Estimate silver eel escapement using indirect assessment from yellow eel stocks.

3. Monitor the impact of fishery closure on yellow eel stock structure.

4. Inter-calibration with water framework sampling.

5. Compare current and historic yellow eel stocks.

6. Establish baseline data to track changes in eel stock over time.

8. Determine parasite prevalence and eel quality.

Table 6-1: Monitoring Programme 2015-2017.

RBD	Location	Water body	Life stage	1	2	2.1	3	4	5	6	7	8	2015	2016	2017	Notes
SHIRBD	ESB Shannon	Catchment	Silver	√	√		√		√	√			√	√	√	Scan for tagged eels
NWIRBD	ESB Erne	Catchment	Silver	√	√		√		√	√			√	√	√	Scan for tagged eels
WRBD	Burrishoole	Catchment	Silver	√	√				√	√			√	√	√	Scan for tagged eels
SERBD	Barrow	River	Silver	√	√		√			√			√	√	√	20 nights fishing; MR
ERBD/NBRBD	Fane	River	Silver	√	√		√			√			√	√	√	20 nights fishing; MR
ERBD	Boyne	River	Silver	√	√		√			√				√*	√*	20 nights fishing, MR
SHIRBD	Maigue	River	Elver	√						√			√	√	√	
SHIRBD	Feale	River	Elver	√						√			√	√	√	
SHIRBD	Inagh	River	Elver	√						√			√	√	√	
ERBD	Liffey	River	Elver	√						√			√	√	√	
WRBD	Ballysadare	River	Elver	√						√			√	√	√	
WRBD	Corrib	River	Elver	√						√			√	√	√	
SHIRBD	Shannon	Catchment	Yellow	√			√	√	√	√			√	√		WFD
NWIRBD	Erne	Catchment	Yellow	√		√	√		√	√	√	√	√	√		PIT tag
SHIRBD	Inchiquin	Lake	Yellow	√					√	√	√	√	√			parasite study
WRBD	Ballynahinch	Lake	Yellow	√		√			√	√	√	√	√			parasite study
SWRBD	Blackwater	Catchment	Yellow	√			√		√	√	√	√	√	√	√*	
ERBD/NBRBD	Broadmeadow	T. water	Yellow	√					√	√	√			√†		
ERBD	Ramor	Lake	Yellow	√		√	√	√	√	√	√	√		√*	√*	Additional location
WRBD	Corrib	Catchment	Yellow	√		√	√	√	√	√	√	√		√	√	
WRBD	Moy	Lake	Yellow	√		√	√	√	√	√	√	√		√*	√*	Additional location

RBD	Location	Water body	Life stage	1	2	2.1	3	4	5	6	7	8	2015	2016	2017	Notes
SERBD	Barrow	Catchment	Yellow	√			√		√	√	√			√*	√	
ERBD/NBRBD	Fane	Catchment	Yellow	√			√	√		√	√			√*	√	
Ireland	WFD Parasite Free Lakes	Lakes	Yellow	√				√		√	√	√	√	√	√	
Ireland	WFD Alkaline lakes	Lakes	Yellow	√				√		√	√	√	√	√	√	
Ireland	WFD Rivers	Rivers	Yellow	√				√		√	√		√	√	√	
Ireland	WFD Transitional	T. water	Yellow	√				√		√	√	√	√	√	√	Growth & parasite
WRBD	Lough Feeagh	Lake	Yellow	√			√		√	√		√	√	√	√	
WRBD	Lough Furnace	T. water	Yellow	√			√		√	√		√	√	√	√	

† planned but not completed

*not planned but carried out

6.1 Lake Survey 2017

Yellow eel surveys took place in 7 lakes, 3 transitional waters and 1 sub-catchment of the Barrow (Figure 6-1). The lakes surveyed were Lough Corrib (Upper and Lower), Lough Conn, Lough Cullin, Lough Muckno and Lough Ramor by IFI, and two lakes in Burrishoole (by MI). The transitional waters were Waterford Estuary, the Munster Blackwater Estuary (by IFI) and Lough Furnace in Burrishoole (by MI). A semi-quantitative electric-fishing survey was also undertaken in 3 sub catchments of the River Barrow (Tully, Pollmounty and Aughnavaud sub catchments) in order to determine the extent of eel distribution in the rivers around the main channel.

The yellow eel surveys need to meet a number of objectives, to monitor the impact of fishery closure on yellow eel stock structure, compare with historic eels surveys, establish baseline data set, evaluate impedance of upstream migration and determine parasite prevalence within Ireland. Samples of eels are measured for length, weight, and INDICANG style morphological features associated with silvering (eye measurements, pectoral fin measurements, and pigmentation). At selected locations eels are retained for further analysis in the laboratory. These analysis include age, growth, sex determination, parasite prevalence and diet.

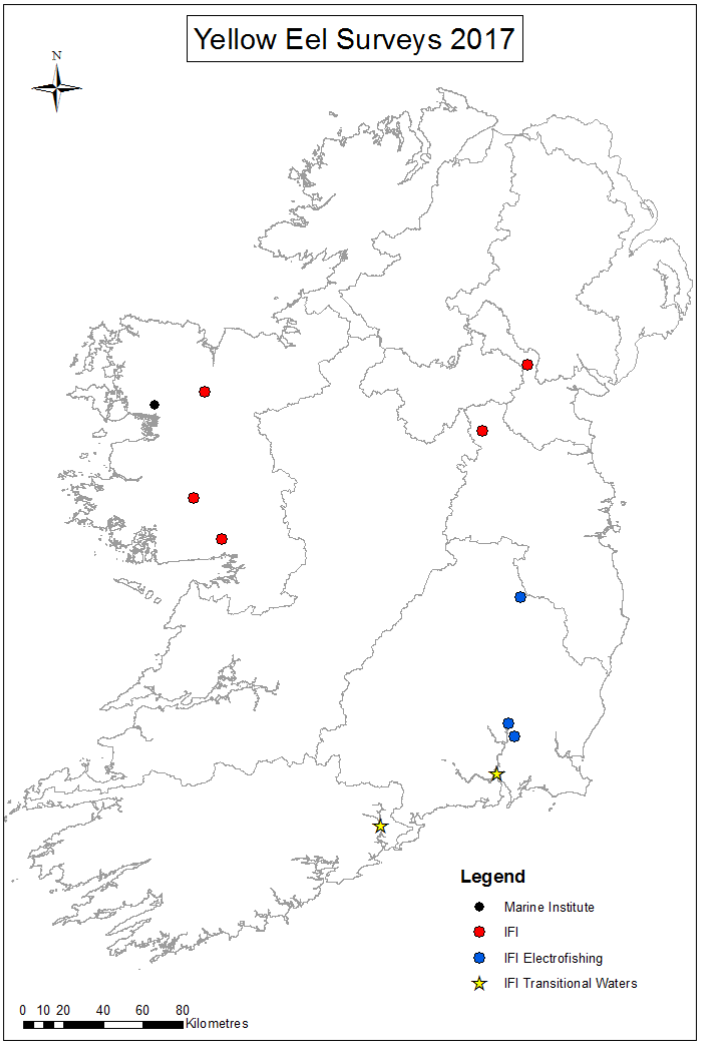

Figure 6-1: Locations of yellow eel surveys carried out in 2017.

6.1.1 Upper Lough Corrib

Lough Corrib is situated in Co. Galway in the Corrib catchment. The lake has a total surface area of 16,438.72 ha and a maximum depth of approximately 39m. It is divided in two for surveying purposes. Both upper and lower Lough Corrib was sampled in 2017.

6.1.1.1 2017 survey

A repeat fyke net survey of the lake was performed in 2017 over 8 nights (4 nights in July and 4 nights in August (Figure 6-2)). An additional one night survey (8 chains of 5 fyke nets) was conducted in the Salthouse Bay in September in the week between the full and new moon.

A total of 2,159 eels were captured within the lake as a whole giving a CPUE of 5.59. While this catch was very high, the majority of these eels (1,659) were captured in Salthouse bay. This bay was of interest following large catches in 2016 (n = 1,970) and a targeted survey was carried out to further investigate the local eel fisherman's knowledge that the greatest numbers of eels were to be captured here during the August dark moon phase. The bay was fished for 8 nights with between 2 and 4 chains of fyke nets (10 -20 nets) in July and August, with all 8 chains set in the bay over the one night in September (40 nets). All eels captured and processed ranged in length from 30.7 cm to 83.2 cm and in weight from 0.050 kg to 1.104 kg, with a total catch weight of 392.7 kg (Table 6-4 and Figure 6-3). The Upper Corrib survey was hampered on the first sampling occasion by high winds, with 8 chains of nets being left in for 2 nights due to poor weather conditions. On the last nights survey the lake rose quite substantially from heavy rainfall, which may have hindered catch figures.

The abundance of eels in Salthouse Bay was investigated over the 3 sampling occasions in 2017 (Table 6-2). In 2016 the large number of eels in the bay occurred during the August new moon (n = 1,970), in 2017 the equivalent large numbers occurred in the July new moon (n = 1,291) with lower catches during the August new moon (n = 302) and the first quarter moon phase in September (n = 66). This indicates that there is a temporary accumulation of eels within the bay based on local environmental conditions.

One theory to explain the large numbers of eels in the bay during the new moon phase in August 2016 and July 2017 was that these were silver eels congregating in the bay before migrating downstream. A look at the maturation stage for the eels taken during both 2016 and 2017 does not show a large number of migrant eels classified using the Durif classification (Table 6-3, Figure 6-4). In August 2016 96% of the samples taken in the bay were of resident eels and 4% were pre-migrant. In July 2017 75% were resident eels and 20% were pre-migrant eels.

During the single nights survey in Salthouse Bay in September a total of 66 eels were captured ranging from 0 to 19 eels within a chain. The resultant CPUE was 1.65. This leads us to believe that eels do indeed congregate in the bay during certain periods of the summer and not at any other time of the year. If and why they are moving into the bay from the local bog lands through the Cross River and the many sink holes within the bay or in from the main lake, will have to be investigated further.

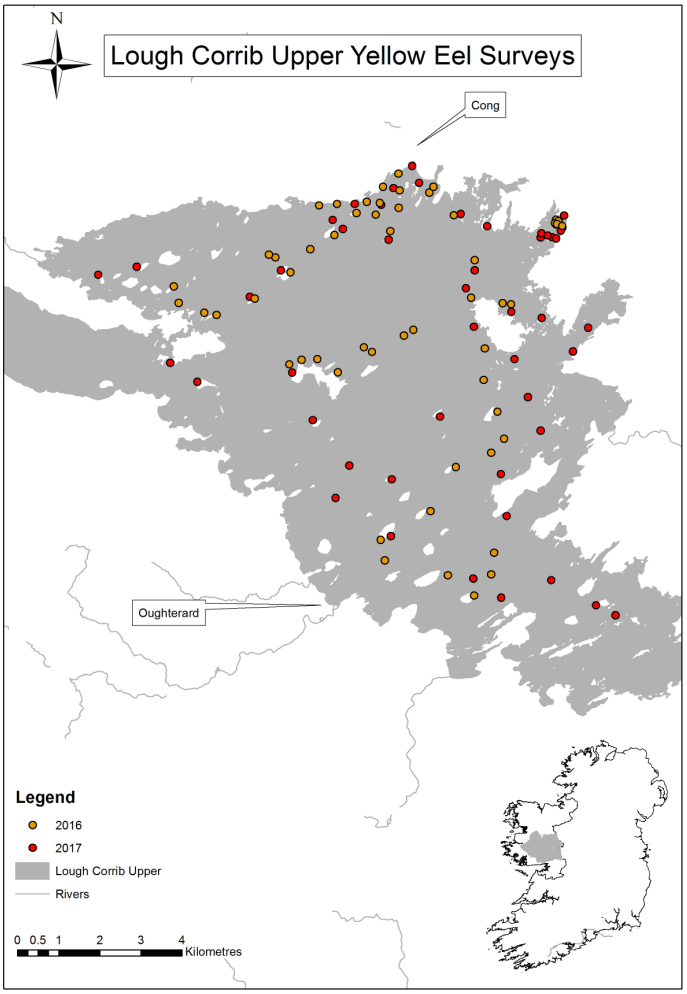

Figure 6-2 Locations of fyke nets sampled on L. Corrib Upper, 2016 - 2017. (Inset: Map of Ireland with Corrib catchment (shaded) and Western River Basin District (outlined))

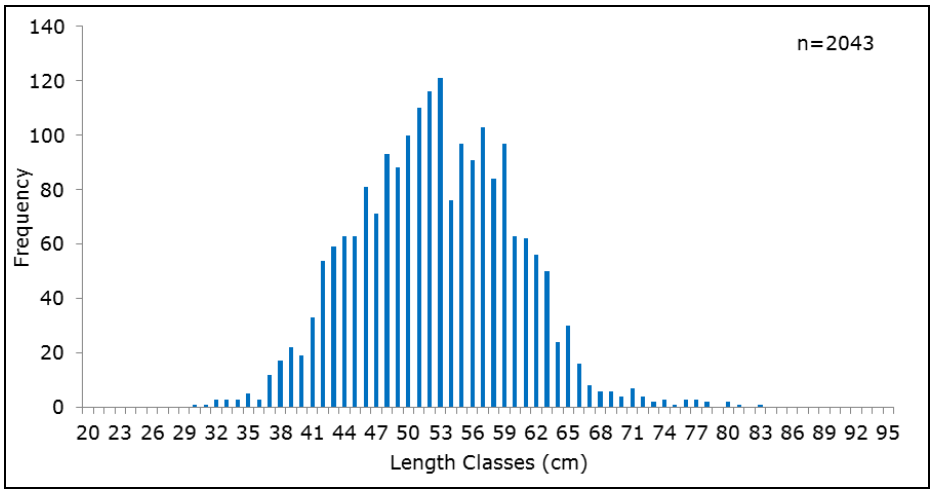

Figure 6-3 Length frequency of yellow eels captured at L. Corrib Upper, 2016 & 2017

Table 6-2 Showing the number of eels captured in 2016 & 2017 inside and outside of Salthouse Bay.

Sampling Period	Count Inside Bay	Count Outside Bay
July 2016	0	101
August 2016	1,484	53
July 2017	1,311	291
August 2017	302	209
September 2017	66	0

Table 6-3 Showing the number and percentage of eels classified as per the Durif classification, for inside vs. outside of Salthouse Bay, 2016 & 2017

Location	Month	Year	% Resident	% Pre- migrant	% Migrant
Inside	August	2016	96	4	0
Outside	July	2016	75	24	8
Inside	July	2017	75	20	5
Inside	August	2017	79	17	5
Outside	August	2017	63	16	21
Inside	September	2017	60	40	0

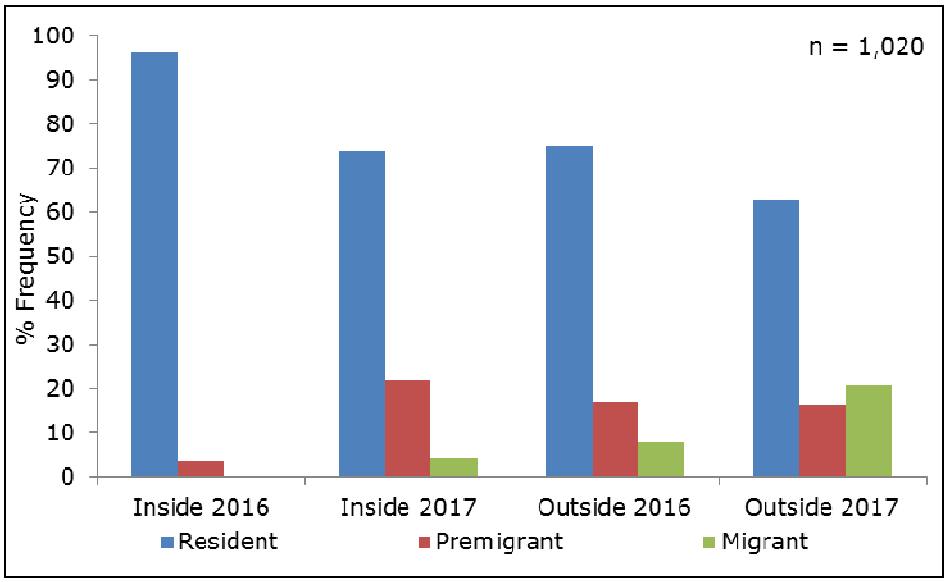

Figure 6-4 Graph showing the Durif classification applied to eels measured inside and outside of the Salthouse Bay in 2016 & 2017.

6.1.2 Lower Lough Corrib

Lough Corrib is situated in Co. Galway in the Corrib catchment. The lake has a total surface area of 16,438.72 ha and a maximum depth of approximately 39 m. It is divided in two for surveying purposes. Both upper and lower Lough Corrib was sampled in 2017.

A repeat survey was carried out in 2017 over 8 nights (4 nights in June and 4 nights in August), (Figure 6-5). A total of 507 eels were captured giving a CPUE of 1.59. The eels ranged in length from 32.4 cm to 70.3 cm and in weight from 0.054 kg to 0.584 kg, with a total catch weight of 81.880 kg (Table 6-4 and Figure 6-6). No eels were retained for further analysis in 2017.

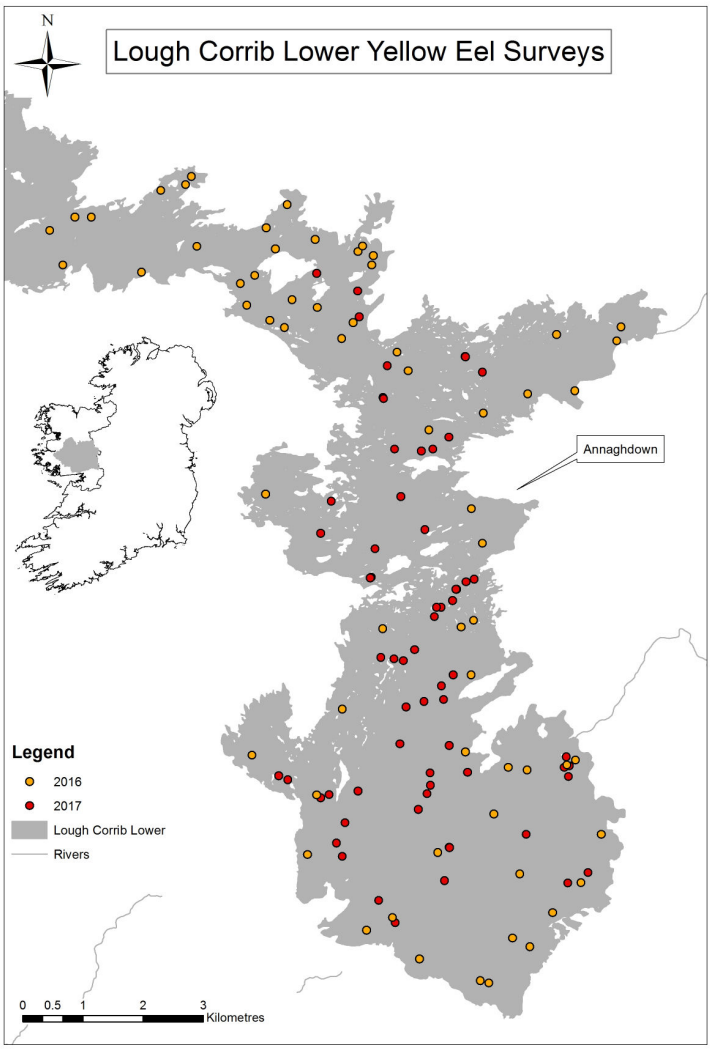

Figure 6-5 Locations of fyke nets sampled on L. Corrib Lower, 2016 - 2017. (Inset: Map of Ireland with Corrib catchment (shaded) and Western River Basin District (outlined))

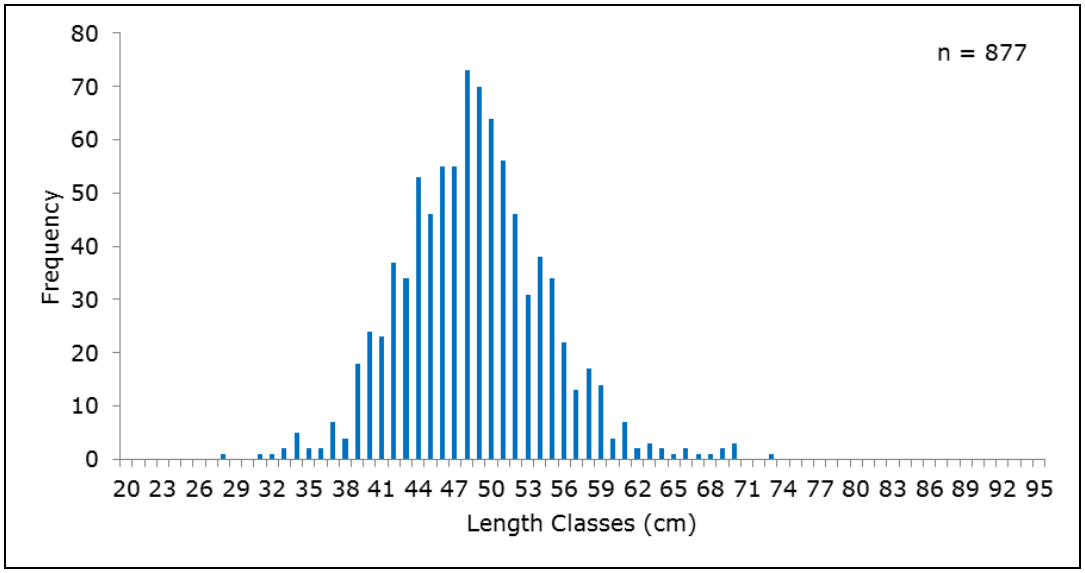

Figure 6-6 Length frequency of yellow eels from L. Corrib Lower (n = 877, measured eel), combined 2016 & 2017

6.1.3 Lough Conn

Lough Conn is located in Co. Mayo on the Moy catchment, with a surface area of 4,704 ha. A repeat survey was carried out in 2017 over 8 nights (4 nights in July and 4 nights in August), (Figure 6-7). A total of 886 eels were captured (including batch weighed eels) giving CPUE of 1.35. The eels ranged in length from 30.6 cm to 93.7 cm and in weight from 0.052 kg to 1.139 kg, with a total catch weight of 119.083 kg (Table 6-4 and Figure 6-8).

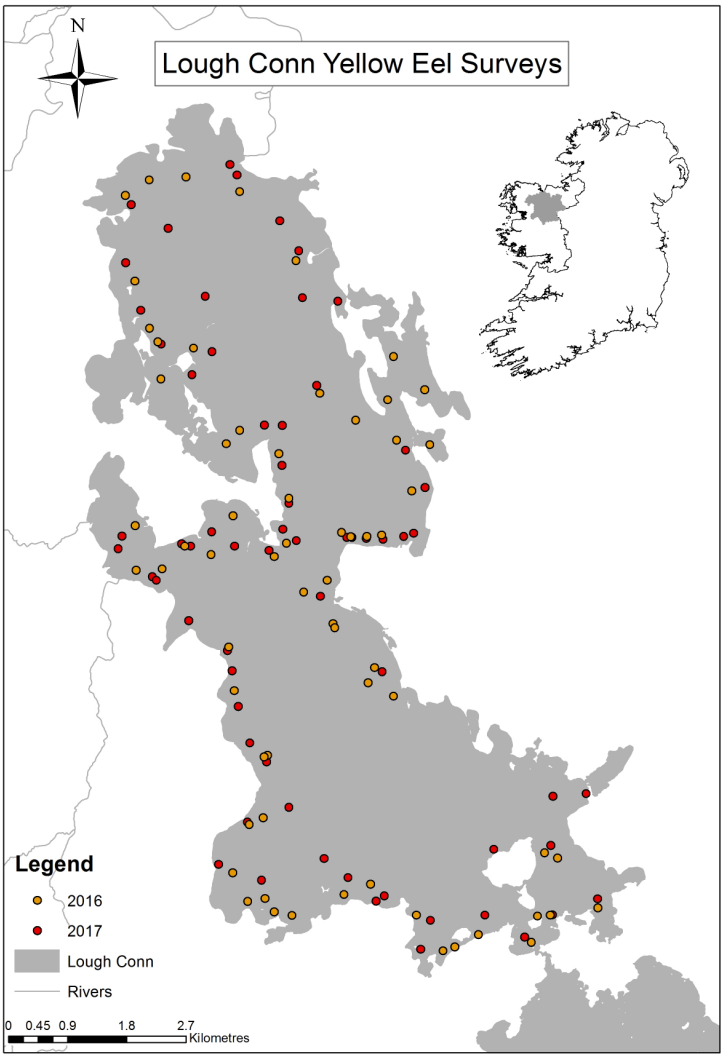

Figure 6-7 Locations of fyke nets sampled on L. Conn, 2016 -2017. (Inset: Map of Ireland with Moy catchment (shaded) and Western River Basin District (outlined))

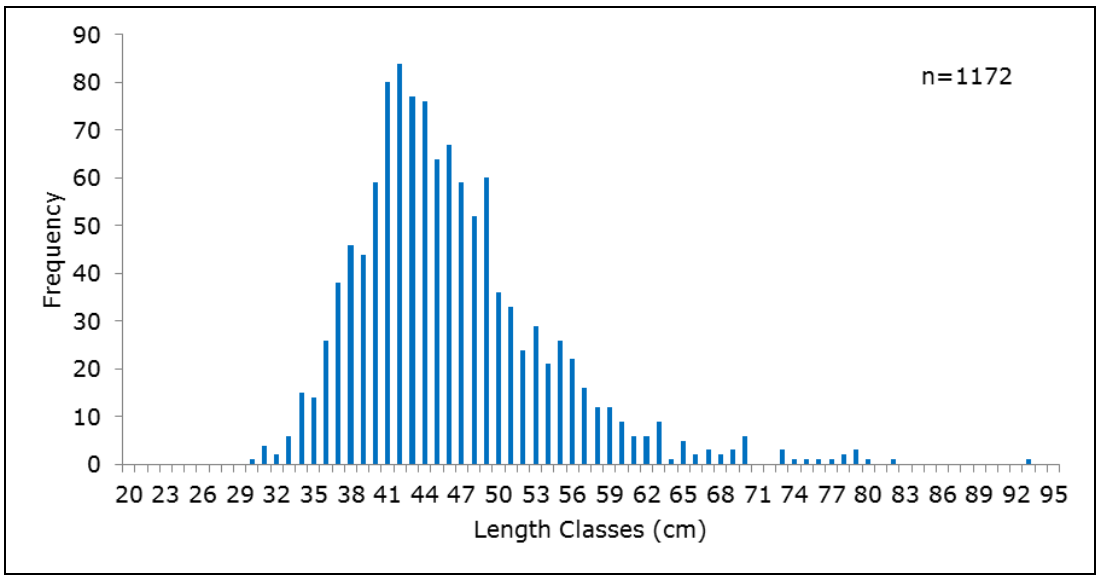

Figure 6-8 Length frequency of yellow eels captured at L. Conn, (n = 1172 eels measured) 2016-2017

6.1.4 Lough Cullin

Lough Cullin is a large, shallow lake situated to the west of Foxford, which is connected to Lough Conn by a narrow inlet at Pontoon, Co. Mayo. The outflow from the lake discharges directly into the River Moy south-west of Foxford (NPWS, 2004). Lough Cullin has a surface area of 1,019.3ha with a maximum depth of approximately 3m (O'Reilly 2007).Though adjacent to and connected to Lough Conn, Lough Cullin has a completely different type of bedrock geology. It lies completely on granite while Lough Conn lies mostly on limestone apart from the very south west corner which sits on granite. The lake was sampled for the first and only time in 2017 during the three year cycle.

6.1.4.1 Surveys

An intensive fyke net survey was carried out over 2 nights in July (Figure 6-9). A total of 146 eels were captured giving a CPUE of 1.83. The captured eels ranged in length from 31 cm to 66 cm and in weight from 0.048 kg to 0.577 kg, with a total catch weight of 26.446 kg (Table 6-4 and Figure 6-10). Lough Cullin was last surveyed for eels in 2009 with a total catch of 431 eels and a CPUE of 1.959. The eel length ranged from 29 cm to 82 cm.

6.1.4.2 Biology

A total of 49 eels were sacrificed from this lake, 86% of which were female and 14% were male (Table 6-5 and Figure 6-11). This is the highest occurrence of males in a lake during this three year cycle. There was a parasite prevalence of 73% recorded and a mean Infection Intensity 6.25 (Table 6-5 and Figure 6-12). The high prevalence of male eels maybe due to the shallow nature of the lake, which has a maximum depth of 3m and an average depth of 1.4m were the fyke nets were set throughout the lake. Unlike its sister lake, L. Conn which has a maximum depth of 34m and an average depth of 5m were fyke nets were set throughout the lake and had only a 2% males in the sample taken. The Swimbladder Degenerative Index (SDI) and Length Ratio Index (LRI) were applied to the 49 sacrificed eels from L. Cullin in order to assess swimbladder condition. Both indices suggested only slight/moderate damage to the swimbladder, with an SDI average result of 2 and an LRI average of 0.15 (Figures 6-13 and 6-14). The examinations of stomach contents of the sacrificed eels suggested that *Asellus* sp. and small fish made up the largest element of the diet of the L. Cullin population.

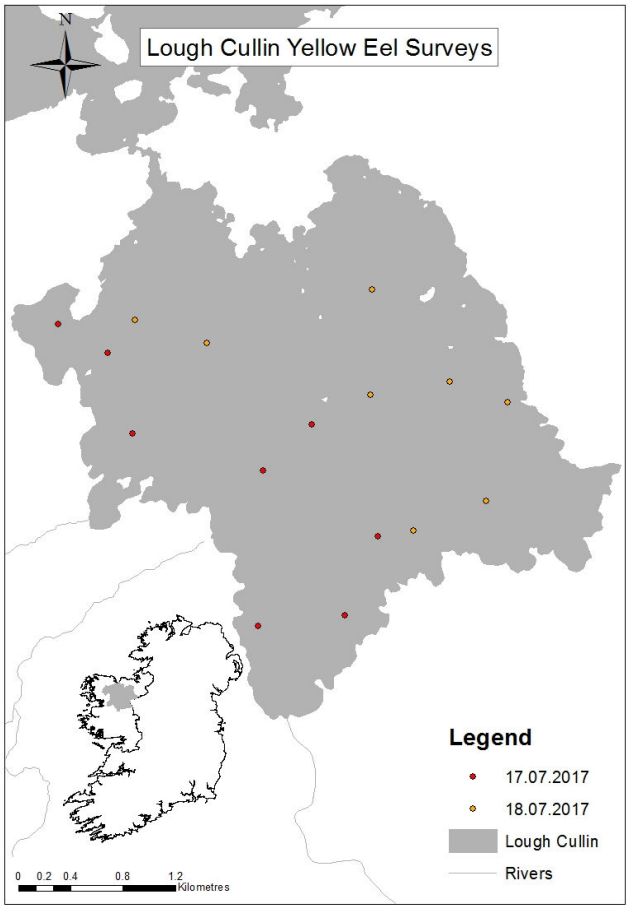

Figure 6-9 Locations of fyke nets sampled on Lough Conn, 2017. (Inset: Map of Ireland with Moy catchment (shaded) and Western River Basin District (outlined))

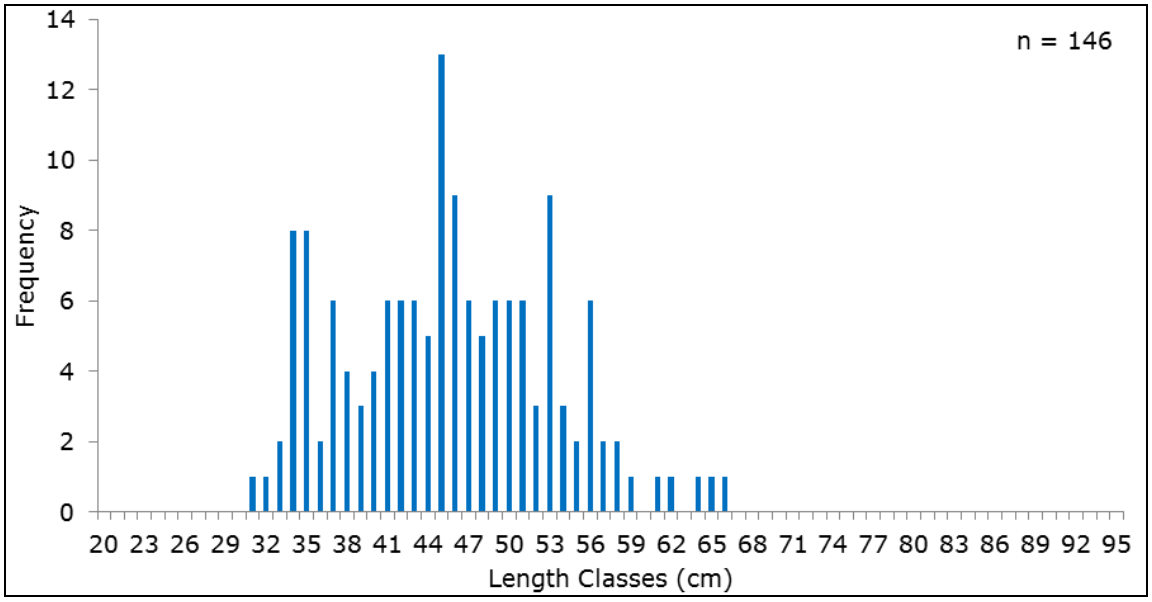

Figure 6-10 Length frequency of yellow eels captured at L. Cullin, (n = 146, measured eel) 2017

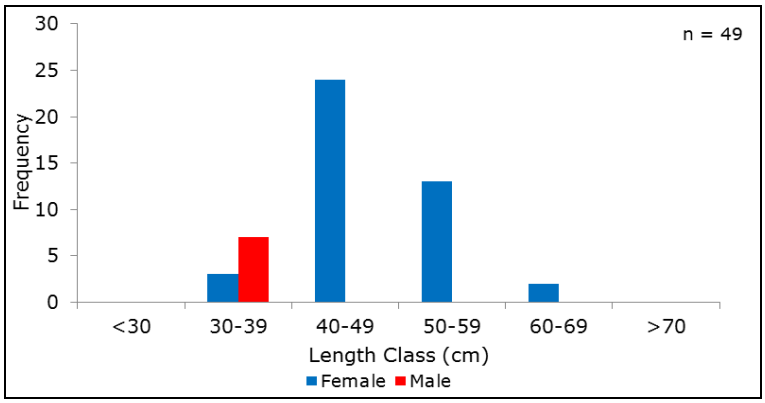

Figure 6-11 Sex distribution of sacrificed yellow eels in L. Cullin, 2017

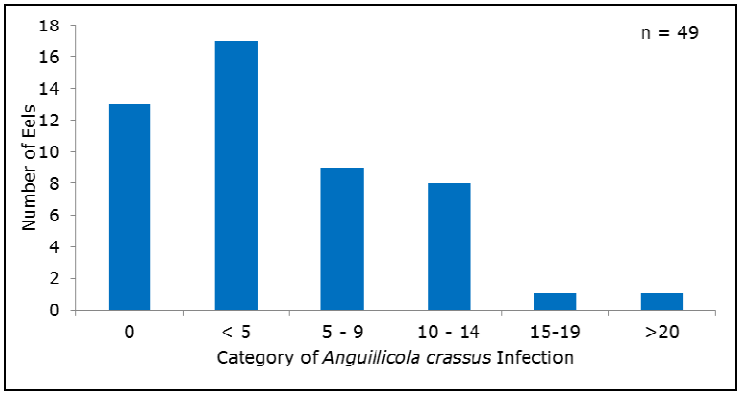

Figure 6-12 *Anguillicola crassus* infection intensity for sacrificed yellow eels collected from L. Cullin, 2017

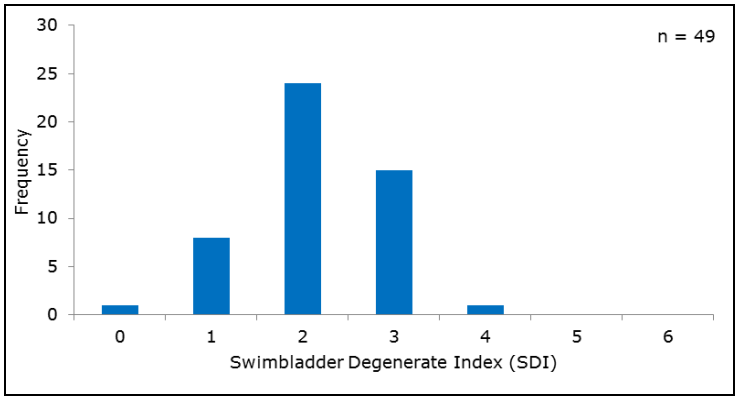

Figure 6-13 Swimbladder Degenerative Index (SDI) results for swimbladder health among sacrificed eels collected from L. Cullin, 2017

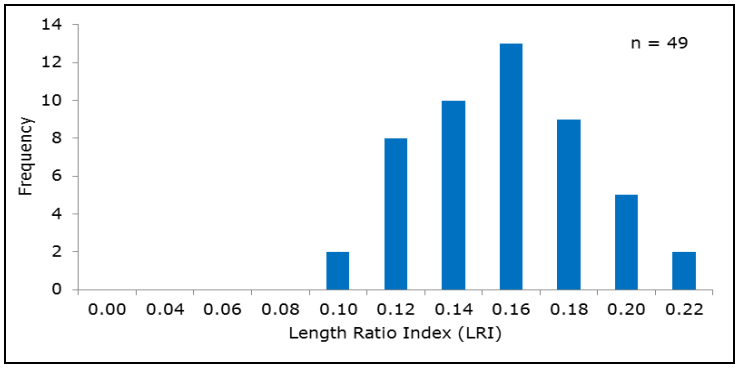

Figure 6-14 Length Ratio Index (LRI) results for swimbladder health among sacrificed eels collected from L. Cullin, 2017

6.1.5 Lough Ramor

Lough Ramor is a shallow glacial lake located near Virginia (Co. Cavan) in the Boyne catchment. It has a surface area of 712 ha. The outflow of Lough Ramor is the Kells Blackwater River which discharges into the River Boyne.

The fyke net survey of Lough Ramor was repeated during the summer of 2017 (Figure 6-15). On this occasion the net positions were fixed as opposed to a random distribution around the lake and revisited on each survey occasion as part of an on-going parasitology study. The lake was surveyed for one night each in May, June, July and early and late August so investigate the levels of parasitology and swimbladder damage with time. In total, 940 eels were captured with a CPUE of 4.7 (Table 6-4). The eels ranged in length from 27.5 to 83.8 cm and in weight from 0.051 to 1.188 kg, with a total catch weight of 242.534 kg (Table 6-4 and Figure 6-16).

6.1.5.1 Biology

In 2017, a total of 80 eels were sacrificed from this lake, 100% of which were female (Table 6-5 and Figure 6-17). There was a parasite prevalence of 72.5 %, with a mean Infection Intensity was 5.48 (Table 6-5 and Figure 6-18). The Swimbladder Degenerative Index (SDI) and Length Ratio Index (LRI) were applied to the sacrificed eels as a whole from L. Ramor in order to assess swimbladder condition. Both indices suggested only slight/moderate damage to the swimbladder, with an SDI average of 2 and an LRI average of 0.16 (Figures 6-19 and 6-20). The diet preference on all sampling occasions was for *Asellus* sp. with some larger females supplementing their diet with small fish.

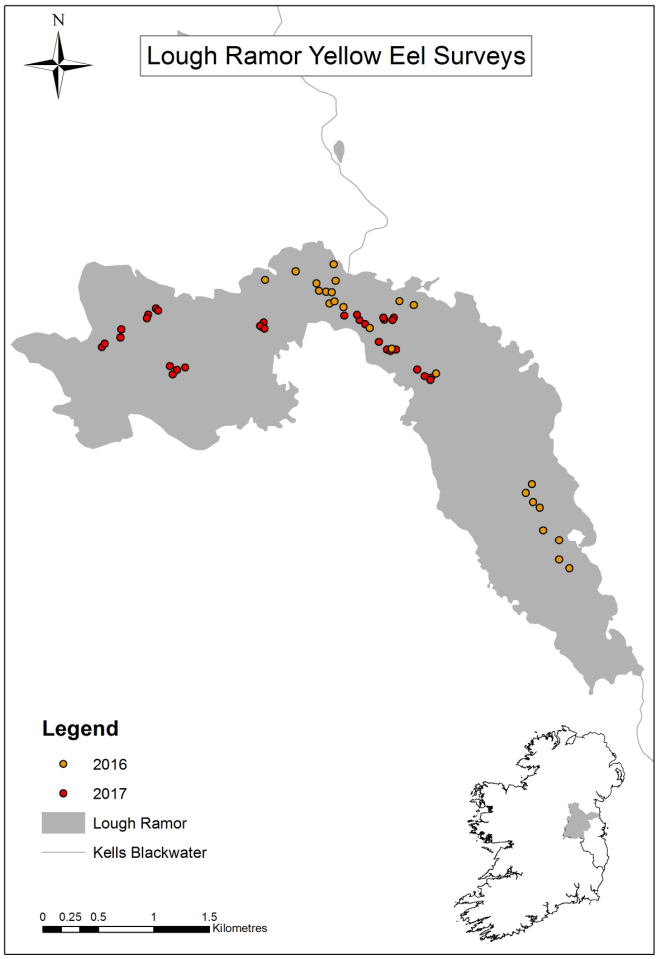

Figure 6-15: Locations of fyke nets sampled on L. Ramor, 2016 - 2017. (Inset: Map of Ireland with Boyne catchment (shaded) and Eastern River Basin District (outlined))

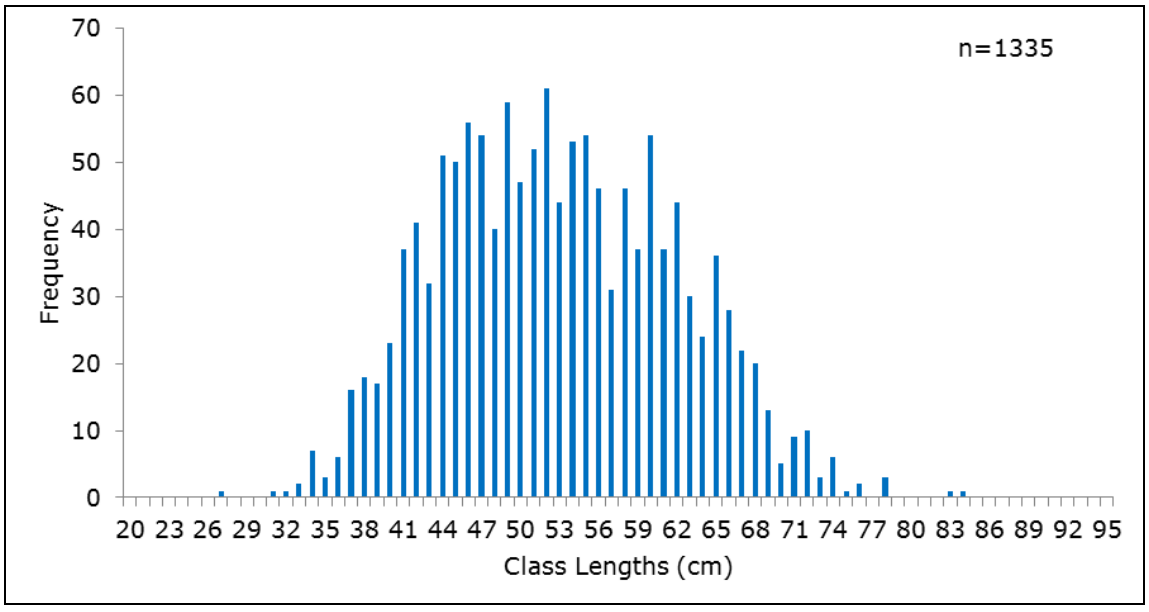

Figure 6-16 Length frequency of yellow eels captured at L. Ramor between 2016- 2017

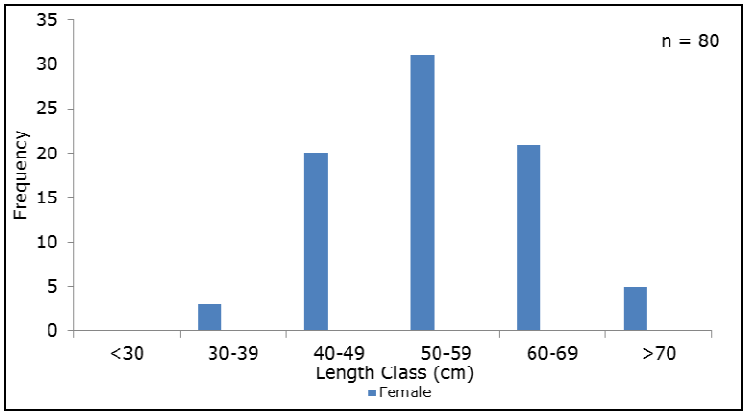

Figure 6-17 Sex distribution of sacrificed yellow eels in L. Ramor, 2017

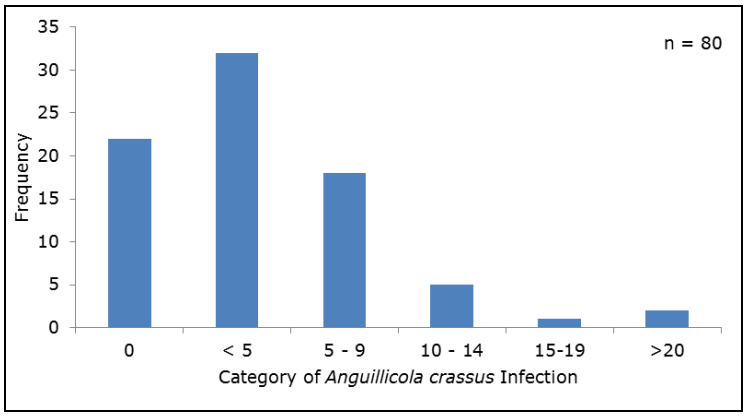

Figure 6-18 *Anguillicola crassus* infection intensity for sacrificed yellow eels collected from L. Ramor, 2017

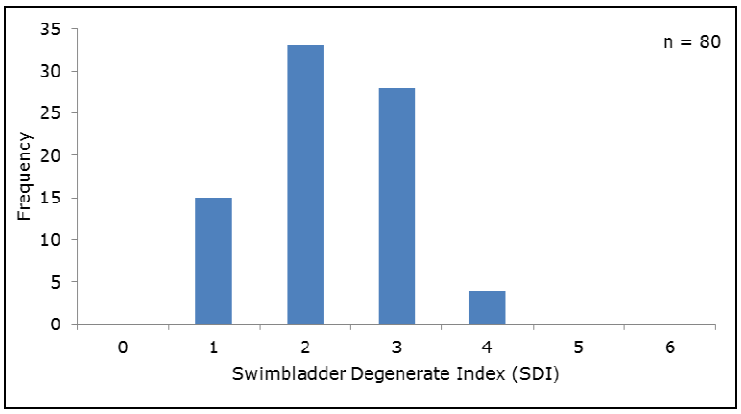

Figure 6-19 Swimbladder Degenerative Index (SDI) results for swimbladder health among sacrificed eels collected from L. Ramor, 2017

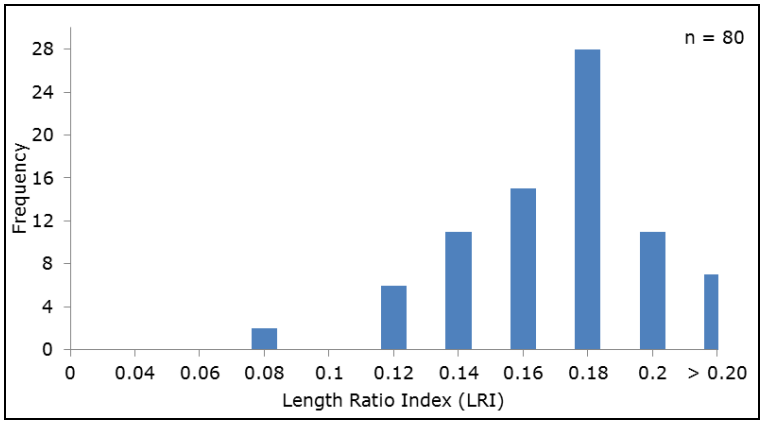

Figure 6-20 Length Ratio Index (LRI) results for swimbladder health among sacrificed eels collected from L. Ramor, 2017

6.1.6 Lough Muckno

Lough Muckno is located on the east coast within the Fane catchment. It has a surface area of 325 ha and depths reaching up to 20m. The lake had been sampled by the EMP in 2012, 2013 and 2014 before the most recent survey in 2016, which included a full mark-recapture study.

In 2017 the mark–recapture survey was repeated in conjunction with a parasitology study looking at the impact of temperature and parasite prevalence within the North Bay (Figure 6-21). The bay was surveyed for one night in May, June, July, August and September. In total 703 eels were captured resulting in a CPUE of 3.52 (Table 6-4). The eels ranged in length from 26.5 to 88.1 cm and in weight from 0.026 to1.673 kg, with a total catch weight of 148.842 kg (Table 6-4 and Figure 6-22).

6.1.6.1 Biology

In 2017 a total of 80 eels were sacrificed from within North Bay, 96% were female and 4% were immature (Table 6-5 and Figure 6-23). There was a parasite prevalence of 79 % with a mean Infection Intensity of 5.43 (Table 6-5 and Figure 6-24).

A higher proportion of <30 cm (0.57% of overall catch) eels (Figure 6-22) were captured during the 2016 and 2017 surveys than is normally seen from the whole lake surveys carried out in previous years. This may be due to the surveys only targeting the North Bay area. The habitat and environment within a shallower sheltered bay may be favoured by smaller eels than the larger deeper lake as a whole which is generally the habitat preference of larger female eels.

The Swimbladder Degenerative Index (SDI) and Length Ratio Index (LRI) were applied to all L. Muckno eels in order to assess swimbladder condition. Both indices suggested only slight/moderate damage to the swimbladder for both years, with an SDI average of 3 and 2 and an LRI average of 0.17 for both years due to *A. crassus* infections (Figures 6-25 and 6-26). The diet preference was for *Chironomid* sp. and Insect remains.

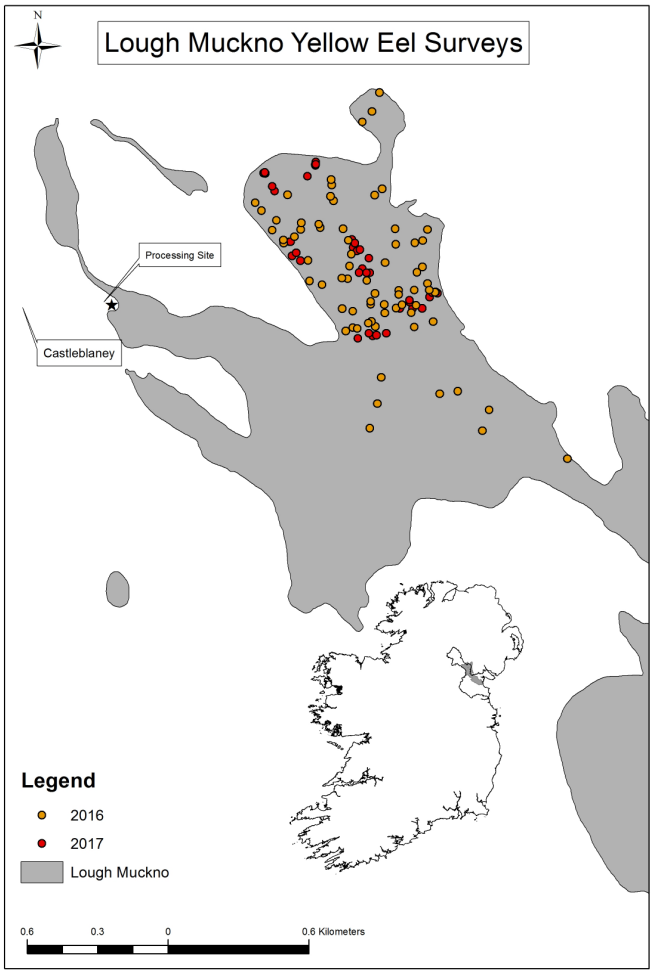

Figure 6-21 Locations of fyke nets sampled on L. Muckno, 2016-2017. (Inset: Map of Ireland with Fane catchment (shaded) and Neagh-Bann District (outlined))

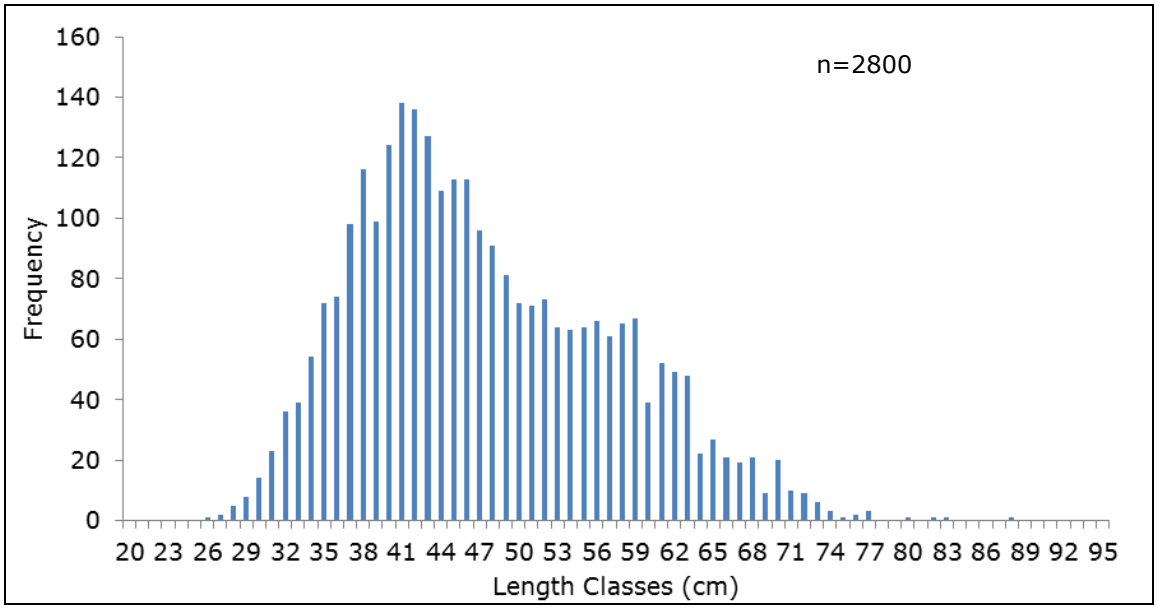

Figure 6-22 Length frequency of yellow eels captured at L. Muckno 2016- 2017

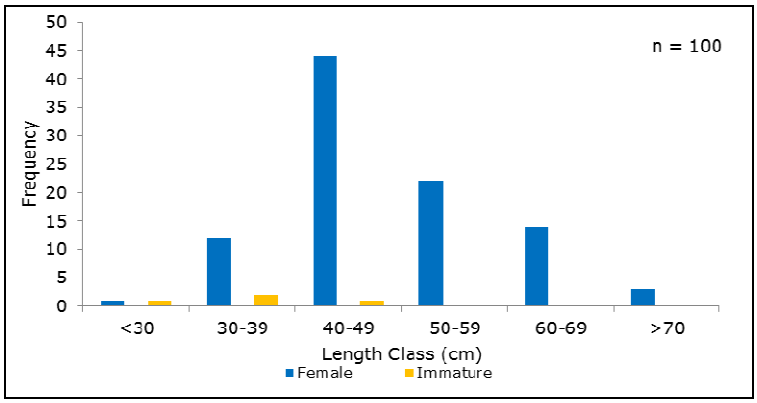

Figure 6-23 Sex distribution graphs of sacrificed yellow eels in L. Muckno 2017

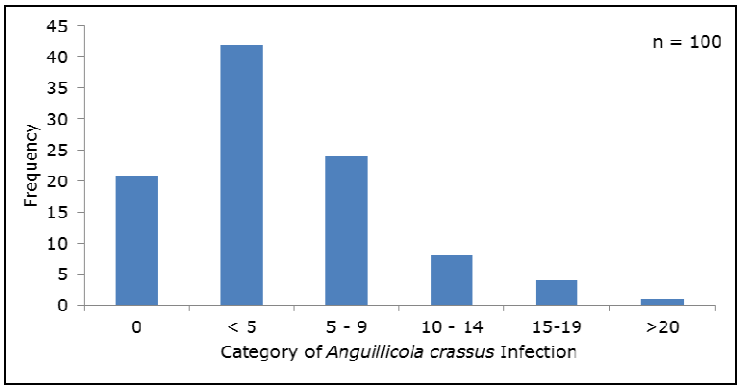

Figure 6-24 *Anguillicola crassus* infection intensity for sacrificed yellow eels collected from L. Muckno 2017

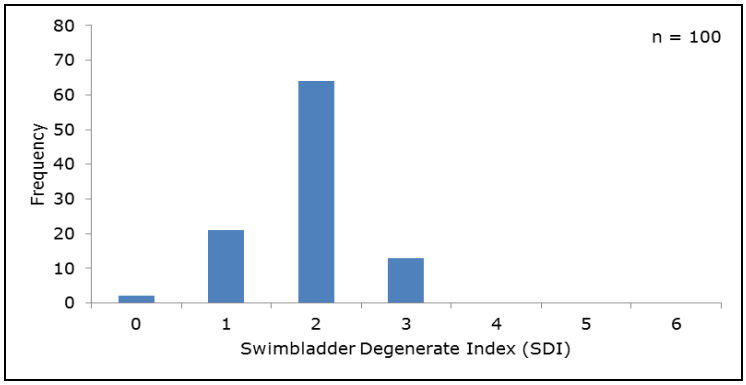

Figure 6-25 Swimbladder Degenerative Index (SDI) results for swimbladder health among sacrificed eels collected from L. Muckno 2017

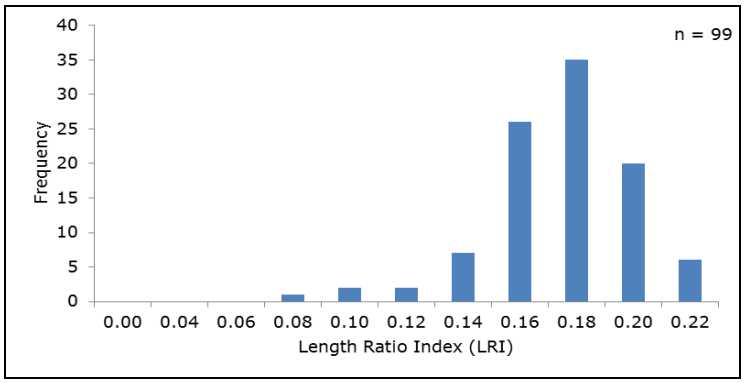

Figure 6-26 Length Ratio Index (LRI) results for swimbladder health among sacrificed eels collected from L. Muckno 2017

6.1.7 Burrishoole

Bunaveela Lough is located in the upper reaches of the catchment (Figure 6-27). It has a surface area of 42ha and a maximum depth of 23m. Bunaveela L. was fished in the traditional style (sets of 10 nets perpendicular to the shore) in 2017 (18 July 2017), with chains of 10 nets fished at three sites. In total eight eels were caught with a catch per unit of effort of 0.27 eels/net/night (Table 6-4). The average length was 48.1cm and ranged in length from 40.4cm to 59.5cm. Eight eels were PIT tagged and no recaptures were made of previously tagged fish.

Lough Feeagh has a surface area of 395ha and an average depth of 14.5m (with several areas >35m in depth). L. Feeagh was fished in the traditional style (sets of 10 nets perpendicular to the shore) in 2017 (11-12 July 2017), with chains of 10 nets fished at six sites for one night each. In total, 40 eels were caught with a catch per unit effort (CPUE) of 0.67 eels/net/night (Table 6-4). The average length of eels was 43.4cm and ranged in length from 31.3cm to 59.9cm (Figure 6-28), with a total weight of 6.130 kg caught in the two nights. Most of the catch (34) was PIT tagged and one previously tagged eel was recorded.

Six eels were sacrificed in this survey. Four of the six (66.7%) of the eels contained *A. crassus* with an infection intensity of 6.8. This is the first recording of *A. crassus* in yellow eels in freshwater in Burrishoole.

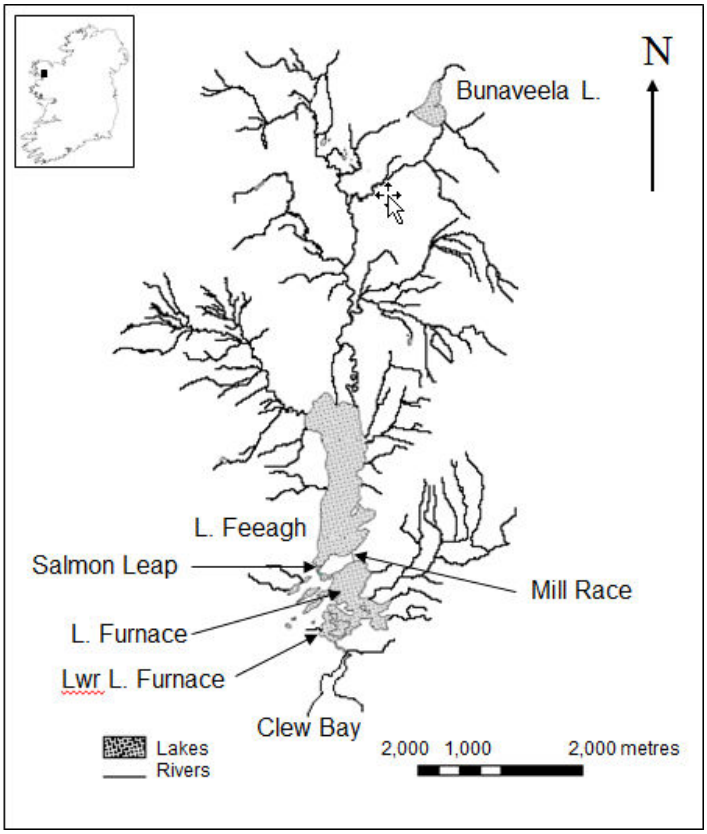

Figure 6-27 Map of Burrishoole showing the lakes surveyed.

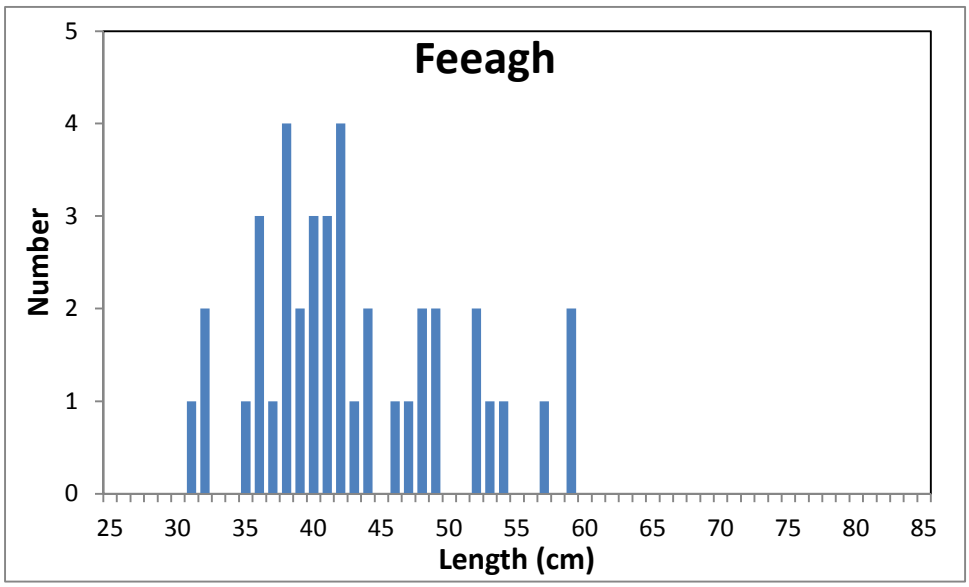

Figure 6-28 Length frequency of yellow eels captured at L. Feeagh, 2017.

6.2 River Survey 2017

6.2.1 Munster Blackwater River

The AMBER project, which stands for Adaptive Management of Barriers in European Rivers, seeks to raise awareness of the problems posed by stream fragmentation, the pressures on freshwater ecosystems and the need for innovative solutions to restore river connectivity. Colleagues within the Amber project were carrying out riverine surveys on the stretch of water above the Clondulane weir on the Munster Blackwater to assess the current fish population above the weir before its proposed removal. As this river is an eel Index catchment the two programmes collaborated to carry out a mark recapture study on eels in the impounded section. Clondulane Weir is located 25 km upstream of the tidal limit of the Munster Blackwater (MBW). The height of the weir coupled with the rivers gradient has resulted in an impounded zone extending for 4km upstream of the weir almost to Fermoy town, making an ideal habitat for eels.

6.2.1.1 Survey

The 4km impounded section of the Munster Blackwater above the weir was split into three sections for fishing (Figure 6-29). A single chain of 5 fyke nets was fished in each zone per night over the 6 nights. A total of 698 eels were captured over the duration of the survey giving a CPUE of 7.76 (Table 6-4). The eels ranged in length from 25.6cm to 86.6cm, and weight 0.029kg to 1.442kg with a total catch weight of 128.84kg (Figure 6-30). Over the 5 nights 498 eels were tagged, with 34 eels recaptured resulting giving a recapture rate of 6.8%. The largest catch was in zone 3 just above the weir with 392 eels caught compared with 168 in zone 2 and 138 in zone 1; catches of eels dropping with distance upstream from weir. The large catch over 6 nights in the impounded section of the River is in stark contrast to the 540 eels caught after 15 nights fishing in the estuary.

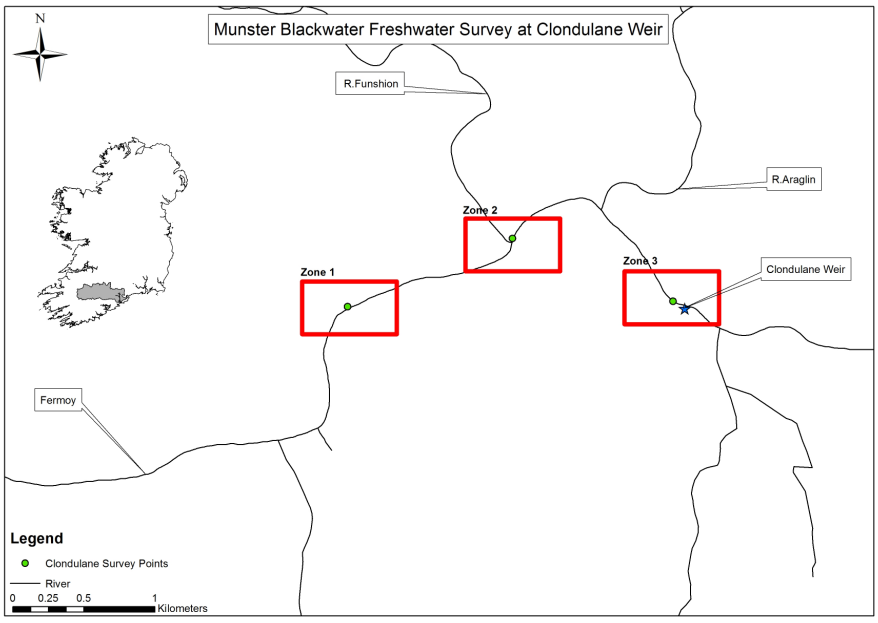

Figure 6-29 Locations of survey zones and points sampled on Munster Blackwater above Clondulane Weir, 2017. (Inset: Map of Ireland with Munster Blackwater catchment (shaded)

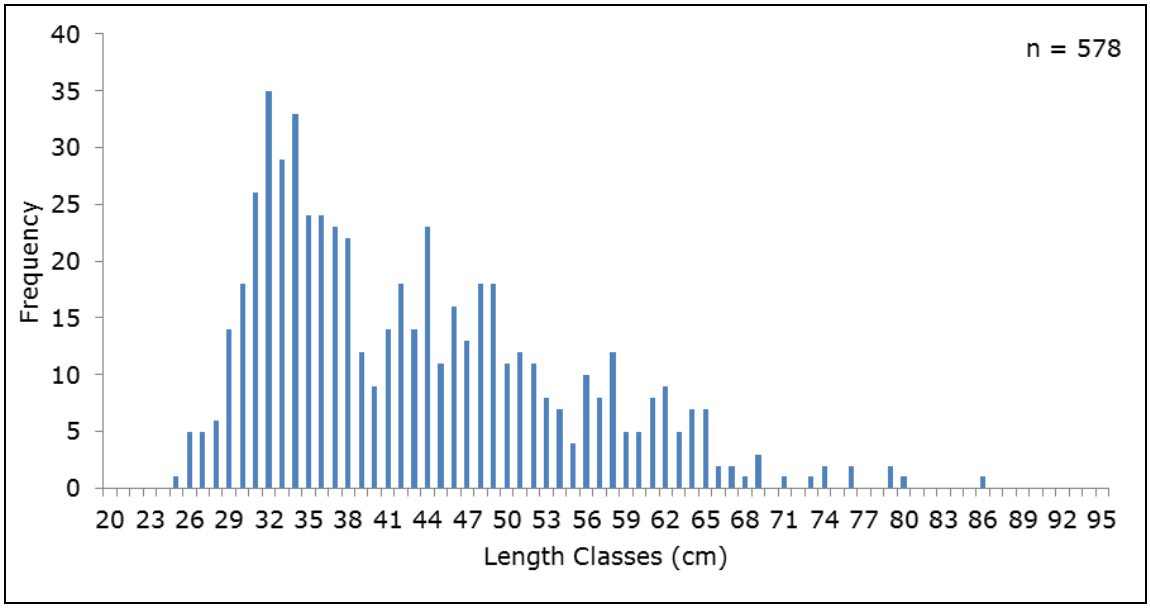

Figure 6-30 Length frequency of yellow eels captured at Clondulane Weir.

6.2.2 Barrow Canal (at Levitstown)

A total of two sites were fished using fyke nets (2 chains of 10 nets) on the Barrow Canal at Levitstown in September 2017 (Figures 6-31 and 6-32). The survey replicated the methodology of a previous 2012 survey carried out by the EMP and corresponded to historical data available from the Fisheries Research Centre (FRC) from 1975 and 1979.

In 2012, a total of 94 eels were captured during the study, however the 2017 survey located only 27 eels (21 of which were retained for dissection and are to be included in a future ICP-Analysis). The captured eels ranged in length from 33.9 to 63.5 cm and in weight from 0.054 to 0.497 kg. The length frequency for this catch is shown in Figure 6-33.

Figure 6-31 Barrow Canal, Levitstown near Athy

Figure 6-32 Fyke netting locations on Barrow Canal (Levitstown) in 2012 and 2017 (Inset: Map of Ireland with Barrow catchment (shaded) and South Eastern River Basin District (outlined). Red square denotes location of netting

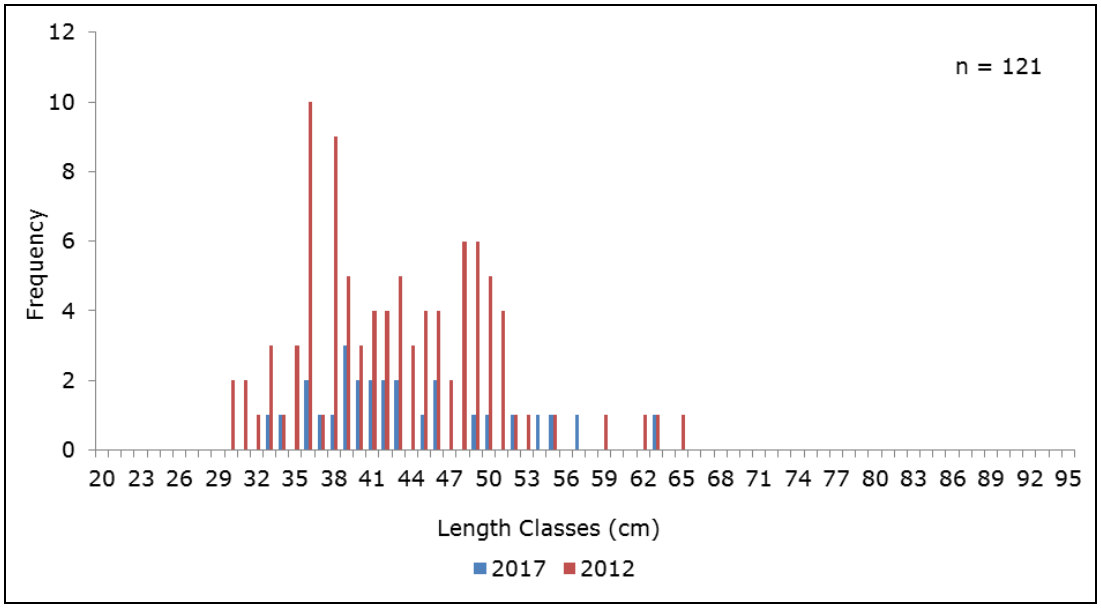

Figure 6-33 Length frequency of yellow eels captured on the Barrow Canal (Levitstown), 2012 & 2017

6.3 Transboundary Yellow Eel

No Surveys were carried out in 2017.

6.4 Transitional Waters

6.4.1 Burrishoole Transitional Waters

Lough Furnace, the tidal lough, has a surface area of 125ha north of Nixon's Island and 16ha between Nixon's Island and the mouth of the estuarine river (Lower Lough Furnace) (Figure 6-27 map). The main lough has a maximum depth of 21.5m. Furnace is heavily stratified with significant areas of deoxygenated water in the main basin. L. Furnace was fished in the traditional style (sets of 10 nets perpendicular to the shore) in 2017 (20-21 July 2017), with chains of 10 nets fished at six sites in one night each and one night (7 July 2017) with two chains of nets at the Back of the House, which is a shallow tidal area between the lough and the estuarine river.

In L. Furnace, only 9 eels were caught with a catch per unit effort (CPUE) of 0.15 eels/net/night (Table 6-4). The average length was 46.4cm and ranged in length from 33.9cm to 71.1cm (Figure 6-34). A total weight of 1.83kg was caught.

In the Lower Lough Furnace, only 9 eels were caught with a catch per unit effort (CPUE) of 0.45 eels/net/night (Table 6-4). The eels average length was 40.7cm and ranged in length from 33.1cm to 52.9cm, with a total weight of 1.01 kg caught.

The catches in the 2017 survey were particularly poor and the absence of large eels was notable. In 2017, large inundations of jelly fish caused problems with the survey. The impact on the eel stock of huge densities of jellyfish on the bottom is unknown.

Six eels were sacrificed in this survey from Lough Furnace. Four of the six (66.7%) of the eels contained *A. crassus* with an infection intensity of 20.8. *A. crassus* has been established in the lough since about 2011.

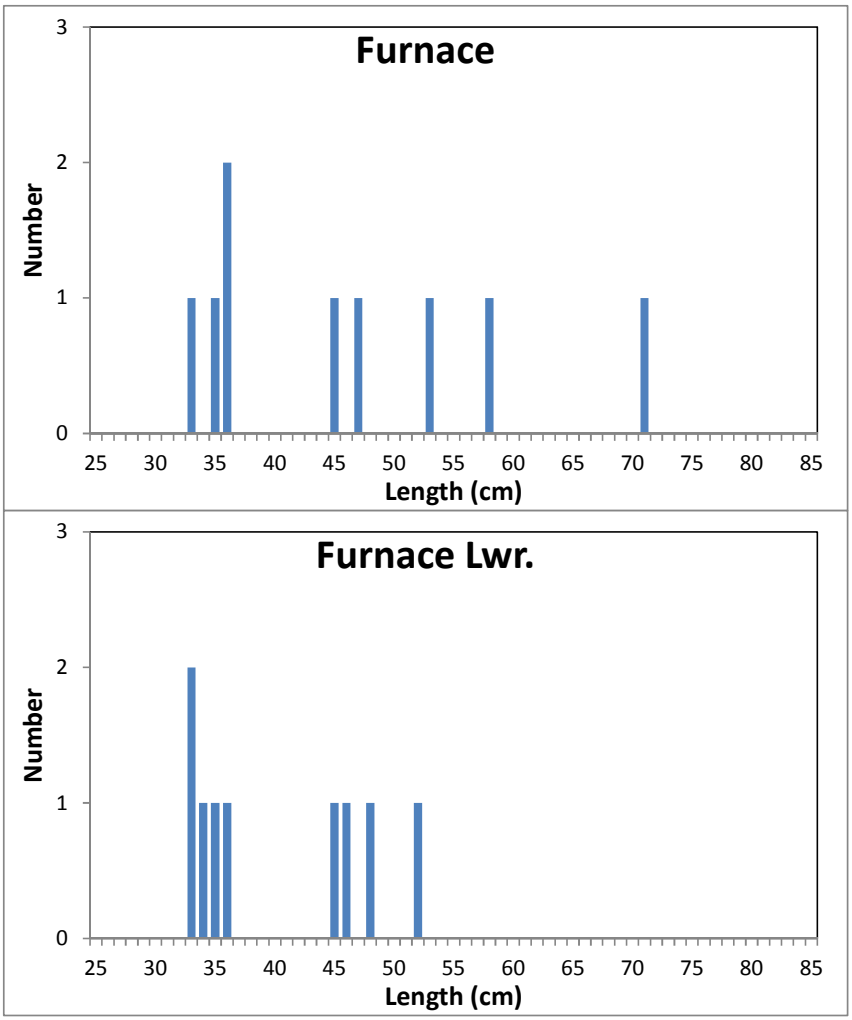

Figure 6-34 Length frequency of yellow eels captured at L. Furnace and L. Furnace Lower, 2017

6.4.2 Waterford Estuary

The Waterford Estuary comprises the estuarine habitat of the Barrow, Suir and the Nore rivers. An area of approximately 70 km² was fished over the three week long survey (15 days) comprising five Zones of intensive fishing (Figure 6-35). A combination of baited pot and fyke nets were used, the baited pots were used during the full and new moon phases where the tides are stronger with the fyke nets used in the slacker tides.

6.4.2.1 2017 Survey

The baited pots (Weeks 1 & 3) caught a total of 6,285 eels (276.64 kg) giving a CPUE of 34.92. Of these, 2,362 eels were measured. The length of eels caught in baited pots ranged in length from 15.5 to 76.0 cm and in weight from 0.007 to 0.857 kg (Figure 6-36, Table 6-4). The fyke net fishing in Week 2 yielded lower numbers. In total 378 eels were caught (49.84 kg) giving a CPUE of 5.04. Of these 377 eels were measured. The length of the fyke net caught eels ranged from 23.0 to 66.5 cm and their weights ranged from 0.017 to 0.578 kg (Figure 6-36, Table 6-4). The baited pot method captured smaller eels than the fyke net method. The smallest eel

captured in pots was 15.5 cm while the smallest noted in fyke net catches was 23.0 cm. Baited pots captured greater numbers of eels overall as they attracted eels in to the area towards the nets.

In 2017, 120 eels were sacrificed from the study area. The sample was collected across all Zones, approximately 20 from each Zone (with 40 retained from Zone 1). These eels are being kept to examine the otolith microchemistry of the eels in the estuary.

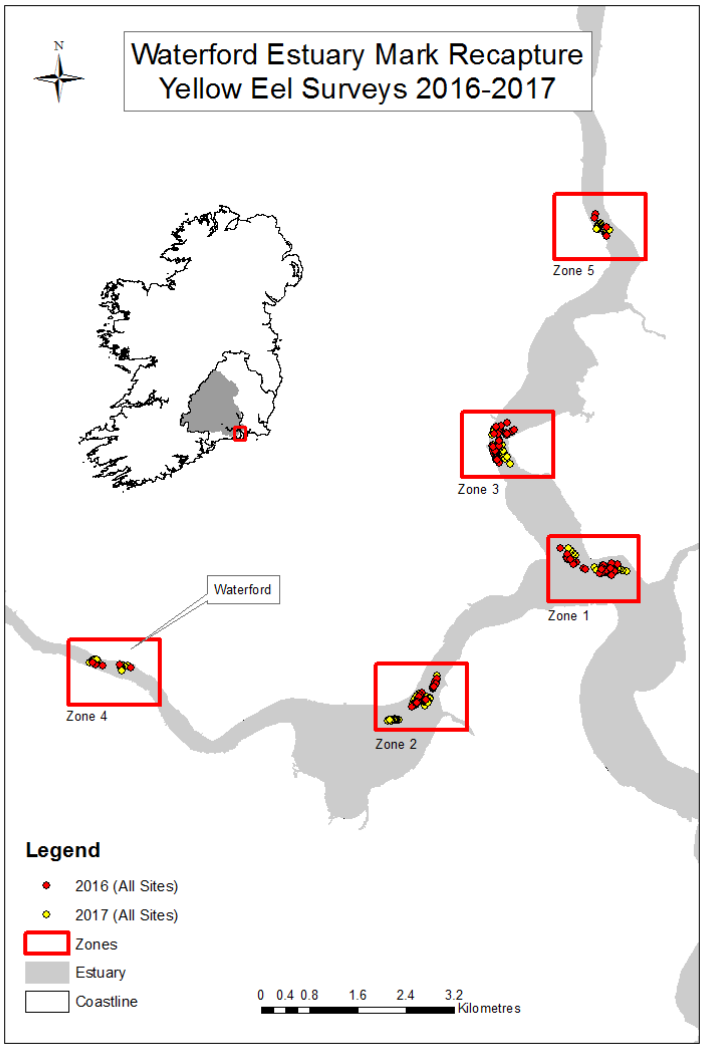

Figure 6-35 Locations of fyke nets and pots sampled on Waterford Estuary, 2016 and 2017. (Inset: Map of Ireland with Barrow and Suir catchments (shaded) and South Eastern River Basin District (outlined)), red squares denotes study zones

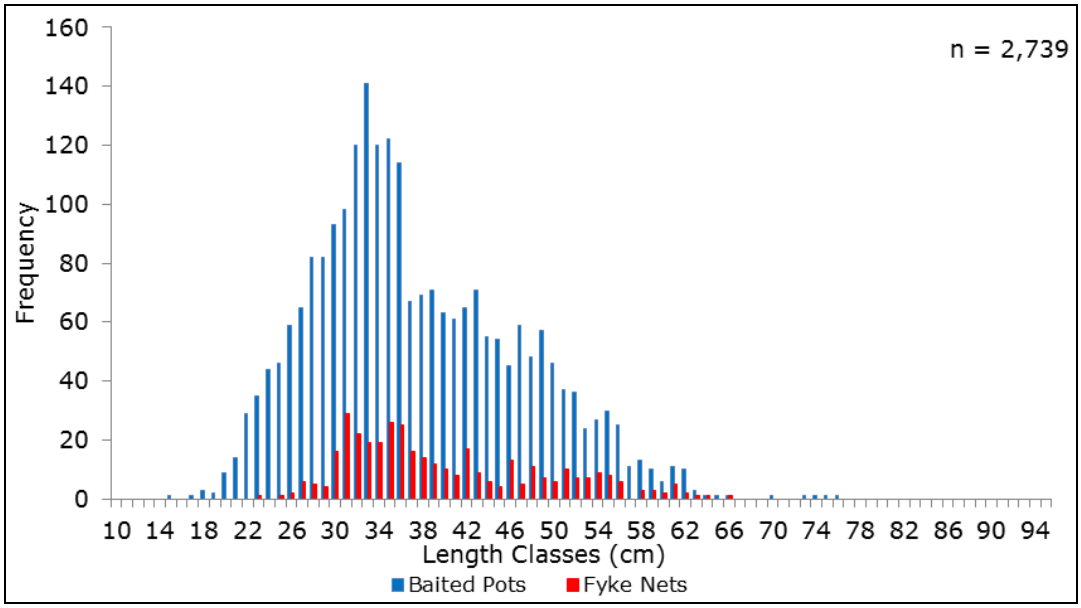

Figure 6-36 Length frequency of yellow eels captured on the Waterford Estuary, 2017 (separating total catch using baited pots and fyke nets)

6.4.3 Munster Blackwater Estuary

The Munster Blackwater joins the sea in Youghal on the southern coast of Ireland. The estuarine habitat has an approximate area of 1,298 ha. Five chains of pots were set on each night of the survey (Figure 6-37). Each chain had five pots, giving a total of 25 pots set per night. On 11 out of 14 of the nights fished, 2 chains of fyke nets (in chains of 3) were also fished in combination with the pots. Catches along the estuary were generally quite low across all three weeks of the survey period. A total of 330 eels were caught using pots giving a CPUE of 1.04. A total of 197 was recorded using fyke nets giving a CPUE of 2.98. This gives a total of 540 eels over the sampling period yielding a total weight of 47.5 kg (of which all 540 were measured). The same survey in 2016 caught 521 eels with a CPUE of 1.39 and a weight of 99.9 kg.

The difference in catch between the two fishing methods can most likely be attributed to the difference in the effort, the site characteristics in which the nets were set and net location in week 3 was targeted in the lower zones to capture eels for the acoustic study. The length frequencies for the catch are presented in Figure 6-38. It can be noted that the two fishing methods were quite similar in the size range of eels which they captured. In 2017, the eels ranged in length from 15.3 to 79.7 cm and in weight from 0.008 to 0.668 kg. Larger eels captured during the study were initially retained to be surgically implanted with acoustic tags as part of an on-going investigation into eel movement in the estuary.

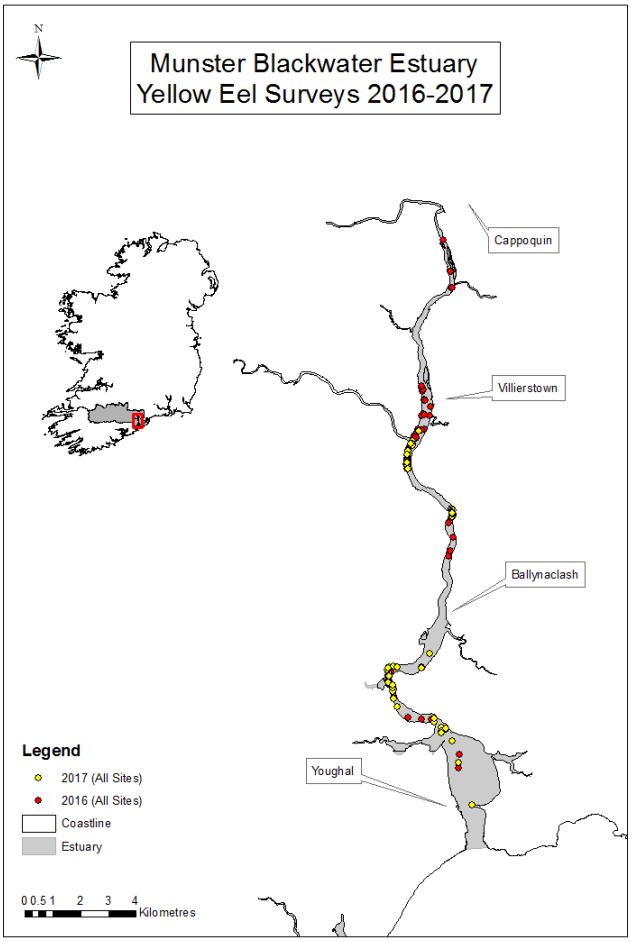

Figure 6-37 Sampling locations on Munster Blackwater Estuary, 2016 and 2017. (Inset: Map of Ireland with Munster Blackwater catchment (shaded) and South Western River Basin District (outlined)), red square denotes study area

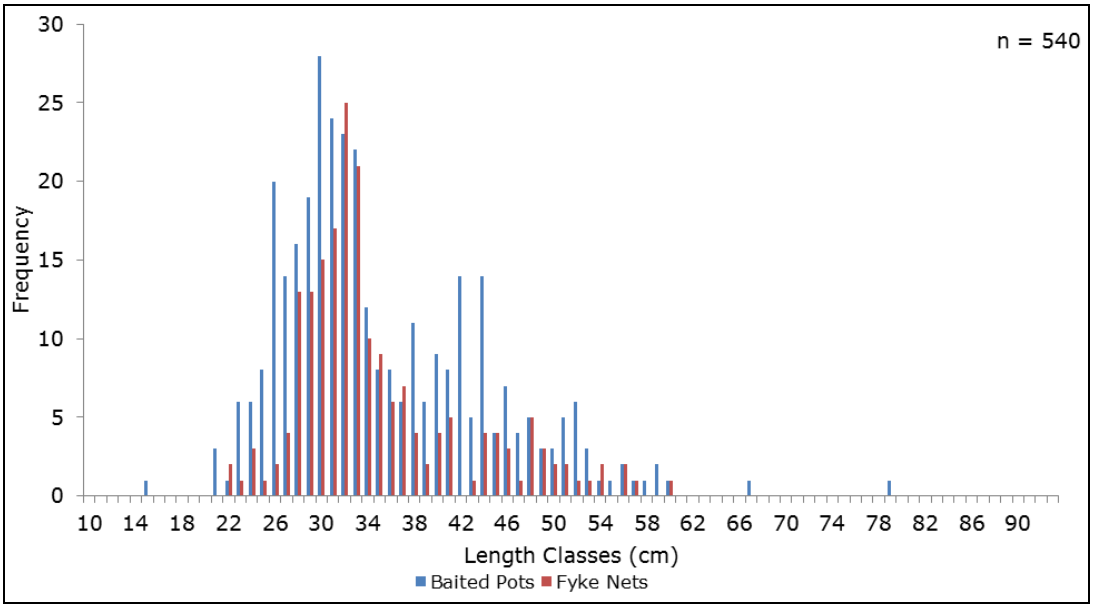

Figure 6-38 Length frequency of yellow eels captured on the Munster Blackwater Estuary, 2017 (separating total catch using pots and fyke nets)

Table 6-4: Catch detail from yellow eel lake and transitional water surveys, 2017.

Site	Dates	No. Eels	Nets*Nights	CPUE	Mean Length (cm)	Min. Length (cm)	Max. Length (cm)	Mean Weight (kg)	Min. Weight (kg)	Max. Weight (kg)
Upper L. Corrib	July	1882	200	7.91	53.3	30.7	83.2	0.284	0.050	1.104
	August	511	160	3.19	53.1	31.9	81.4	0.281	0.052	1.079
	September	66	40	1.65	56.4	35.3	65.9	0.339	0.052	0.634
Lower L. Corrib	June	144	160	0.90	47.9	33.5	61.8	0.2001	0.054	0.519
	August	364	160	2.28	49.7	32.4	70.3	0.2227	0.059	0.584
L. Conn	June	442	160	2.76	48.5	34.0	93.7	0.215	0.067	1.139
	August	424	160	2.65	45.4	30.6	79.9	0.170	0.052	1.127
L. Ramor	May	157	40	3.93	52.1	34.4	73.5	0.239	0.061	0.681
	June	235	40	5.88	52.9	27.5	73.7	0.252	0.051	0.698
	July	216	40	5.40	50.9	33.2	74.8	0.229	0.062	0.747
	August	332	80	4.15	55.1	36.9	83.8	0.29	0.078	1.188
L. Muckno	May	83	40	2.08	48.7	31.9	72.9	0.213	0.054	0.834
	June	219	40	5.48	48.7	29.2	80.1	0.234	0.045	1.102
	July	191	40	4.78	47.1	28.8	88.1	0.205	0.039	1.673
	August	124	40	3.10	48.3	29.4	77.4	0.215	0.037	0.845
	September	86	40	2.15	45.0	26.5	73.4	15.410	0.026	0.729
Lough Cullin	August	146	80	1.83	46.0	31.0	66.0	0.181	0.048	0.577

Site	Dates	No. Eels	Nets*Nights	CPUE	Mean Length (cm)	Min. Length (cm)	Max. Length (cm)	Mean Weight (kg)	Min. Weight (kg)	Max. Weight (kg)
M. Blackwater Clondulane Weir	June	698	90	7.76	43.3	25.6	86.6	0.183	0.029	1.442
Waterford Estuary	Wk 1 (Baited Pots)	1108	80	13.85	37.7	15.5	66.5	0.112	0.007	0.671
	Week 2 (Fyke Nets & Unbaited Pots)	471	95	4.96	40.8	21	67	0.133	0.015	0.578
	Week 3 (Baited Pots)	5177	100	51.77	38.2	18.9	76	0.099	0.009	0.857
Munster Blackwater Estuary	Pots Only	343	330	1.04	35.7	15.3	79.7	0.090	0.008	0.668
	Fykes Only	197	66	2.98	35.3	22.4	60.4	0.084	0.017	0.451
L. Feeagh	July	40	60	0.67	43.4	31.3	59.9	0.153	0.055	0.200
L. Furnace Upper	July	9	60	0.45	40.7	33.1	52.9	0.112	0.055	0.200
L. Furnace Lower	July	9	20	0.15	46.4	33.9	71.1	0.203	0.050	0.615

Table 6-5: Biological data from yellow eel lake surveys, 2017

Location	Year	Total Eels	No. Females	No. Males	No. Immature	% Female	% Male	% Immature	% Prevalence *A. crassus*	Mean Intensity *A. crassus*	Preferential Diet from Stomach Contents
L. Ramor	2017	80	80	0	0	100	0	0	73	5.48	*Asellus* sp.
L. Muckno	2017	100	96	0	4	96	0	4	79	5.43	*Chironomid sp.*
L. Cullin	2017	49	42	7	0	86	0	14	73	6.25	*Asellus* sp. ,Gammarus sp. *&*
Clondulane	2017	15	13	1	1	86	7	7	56	7.56	*Asellus* sp.

6.5 Electric-Fishing Surveys

6.5.1 Background

Under the National Eel Management Plan 2009, IFI has been tasked with a number of monitoring objectives. These include establishing baseline data sets to track changes in the eel population over time; monitoring the impact of fishery closure on yellow eel stocks; determining the prevalence of parasites and the current quality of the eel stocks

The Eel Monitoring Programme (EMP) has engaged in catchment electric-fishing for eels since 2013, using a semi quantitative bankside method and a quantitative 3-pass depletion fishing methods (Figure 6-40). In 2013 and 2014, the Fane and Kells Blackwater catchments were electric-fished. Both lacustrine dominated catchments, demonstrated that the majority of the eels captured were on the inflows and outflows of the catchment lake (i.e. Lough Muckno and Lough Ramor respectively). From 2015, the focus moved to riverine catchments (i.e. those without a lake in the system) in order to assess the distribution of eel in comparison to lacustrine catchments. From 2015 to 2017, five riverine catchments have been surveyed for eels (Table 6-6).

Table 6-6 Catchments electric-fished by EMP, 2015 – 2017

Year	Catchment	Sub catchment
2015	Munster Blackwater	Bride
2016	Barrow	Greese
2017	Barrow	Tully
2017	Barrow	Aughnavaud
2017	Barrow	Pollmonty

Figure 6-39: Bankside electric-fishing survey (Photo: K. Kelly)

6.5.2 2017

In 2017, the Tully catchment was fished along with two smaller sub-catchments the Aughnavaud and the Pollmonty Rivers, located lower in the Barrow system (below the high water mark; Figure 6-40). A fyke nets study of the Barrow canal near the Tully catchment was also surveyed in 2017.

6.5.2.1 Tully River

The Tully catchment is approximately 20,850 ha (208.5 km^2) in area and flows southwest from Kildare town to just north of Athy, were it joins the main channel of the Barrow and flows southwards to towards Waterford. The sub-catchment is made up of the Tully, Ballysaw, Kildoon/Finnery and Mullaghmoyne Rivers. The main channel flows southwest and drains into the Barrow main channel near Levitstown. A total of 14 sites were bankside fished on the Tully, with a subset of 3 of these sites being fished using the 3-pass depletion method. There are no lakes in the system and no eels were retained from the electric-fishing. Figure 6-40 shows the locations of the sites fished on the Tully catchment (red points) as part of the overall investigation into eel distribution carried out on the River Barrow Catchment in 2017.

After the intensive electric-fishing on the Tully catchment, no eels were captured in either electric-fishing method (Figure 6-40). No major barriers were found and information gained from local fishermen, farmers and landowners in the area, suggested that numbers of adult eels and elvers had been plentiful in the past but had declined drastically in recent years.

6.5.2.2 Aughnavaud & Pollmonty Rivers

The Aughnavaud and Pollmonty Rivers join the main channel of the Barrow near St Mullins, around the high water mark (HWM) of the catchment. The Aughnavaud is approximately 6,440 ha (64.4 km^2) in area and the Pollmonty is a further 4,825 ha (48.25 km^2). Two sites were bankside fished in the Aughnavaud and three were bankside fished on the Pollmonty River. One site on each sub-catchment was also fished using a 3-pass depletion method. There are no lakes in these systems and no eels were retained from the electric-fishing. Figure 6-40 shows the locations of the sites fished on the Aughnavaud (green points) and Pollmonty (blue points) as part of the overall investigation into eel distribution carried out on the River Barrow Catchment in 2017.

Low numbers of eels were captured on the Aughnavaud and Pollmonty Rivers. Using the bankside method, one eel was caught on the Pollmonty and 5 were located on the Aughnavaud (Figure 6-40 a). The depletion method (carried out just one week later) gained a similar result, one on the Pollmonty and 5 on the Aughnavaud (Figure 6-40 b). The eels captured using the two fishing methods ranged in length from 14.6 to 34.3 cm. The length frequency for this catch is shown in Figure 6-41.

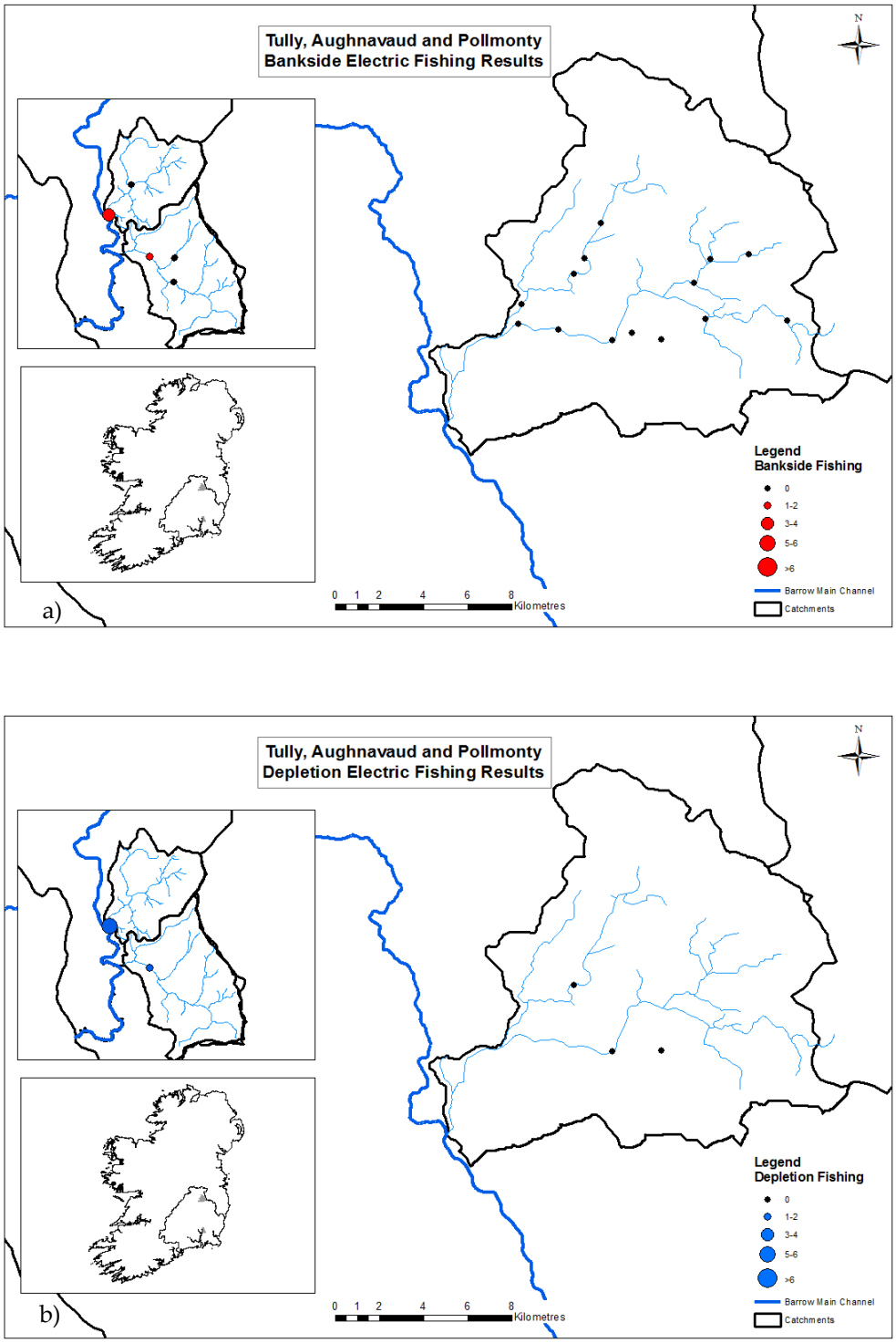

Figure 6-40 Results of a) semi-quantitative (Bankside) electric-fishing and b) quantitative (Depletion) electric-fishing sites sampled on Tully, Aughnavaud and Pollmonty catchments, 2017. (Inset(s): Map of Ireland with Tully, Aughnavaud and Pollmonty catchments (shaded) and South Eastern River Basin District (outlined)

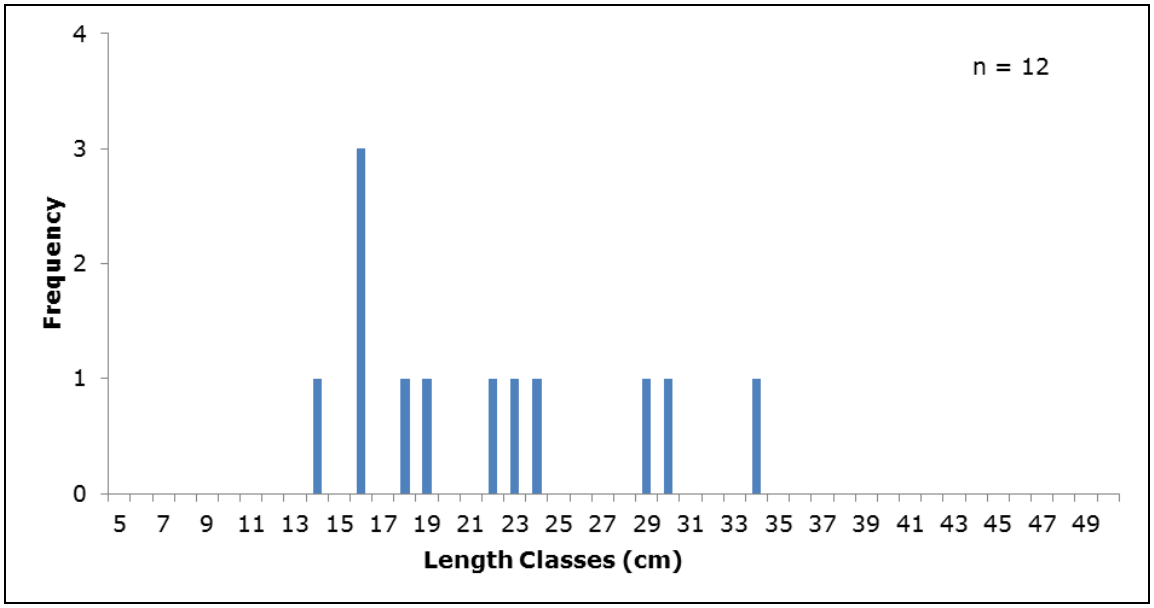

Figure 6-41 Length frequency of yellow eels captured on the Aughnavaud and Pollmonty Rivers, 2017 (graph depicts pooled results from bankside and depletion methods)

6.6 Summary: Yellow Eel, 2017

Of the lakes sampled in 2017 the lowest cpue was in Lower Lough Corrib where 580 eels were caught in 320 net nights giving a cpue of 0.90. The highest cpue was in Upper lough Corrib where 1,882 eels were caught in 200 net nights giving a cpue of 7.91. The majority of these eels were caught in one bay in the lake coinciding with a new moon, however the majority of the eels were classified as yellow eels and not pre-silver or silver eels. A repeat survey of Munster Blackwater estuary resulted in similar results for the 2 years with 521 eels recorded in 2016 and 540 eels in 2017. A repeat survey in Waterford estuary resulted in 6,988 eels in 2016 and 6,756 eels in 2017.

Fyke surveys in freshwater resulted in different results with a good number of eels present above Clondulane Weir on the Munster Blackwater River in contrast to the limited numbers in the estuary. In the Barrow low numbers of eels were found in Barrow canal at Levitstown in contrast to the large numbers found in Waterford Harbour downstream.

The electric-fishing carried out this year focused on the Tully catchment in the middle section of the catchment and the Pollmounty and Aughavaud sub catchments which are found at the high water mark. Following an intensive survey of the Tully sub catchment no eels were recorded in the sub catchment, with only 1 individuals being recorded in the Pollmounty and 5 eels in the Aughavaud. This result builds on the evidence of recent years of reduced eel distribution in the sub catchments of the River Barrow.

6.7 Water Framework Directive

6.7.1 Introduction

In December 2000, the European Union introduced the Water Framework Directive (WFD) (2000/60/EC) as part of a standard approach for all countries to manage their water resources and to protect aquatic ecosystems. The fundamental objectives of the WFD are to protect and maintain the status of waters that are already of good or high quality, to prevent any further deterioration and to restore all waters that are impaired so that they achieve at least good status by 2015.

A key step in the WFD process is for EU Member States to assess the health of their surface waters through national monitoring programmes. Monitoring of all biological elements including fish is the main tool used to classify the status (high, good, moderate, poor and bad) of each water body. The responsibility for monitoring fish has been assigned to Inland Fisheries Ireland. A national fish stock surveillance monitoring programme has been initiated at specified locations in a 3 year rolling cycle.

6.7.2 WFD Sampling Programme Methods

6.7.2.1 Lakes

Lakes are surveyed between June and September. Standard multi-mesh monofilament survey gill nets were used to sample the fish population. Surface floating nets, "Dutch" fyke nets and benthic braided single panel (62.5 mm mesh knot to knot) gill nets were used to supplement the gillnetting effort. Survey locations were randomly selected using a grid placed over the map of the lake and portable GPS instruments were used to mark the precise location of each net. All nets were set between 3 and 6 pm, fished overnight and lifted between 10.00 am and 12.00 midday in order to ensure that the activity peaks of each fish species were included.

6.7.2.2 Rivers

Electric fishing is the method of choice for WFD surveillance monitoring of fish in rivers to obtain a representative sample of the fish assemblage at each sampling site. The standard methodology includes fish sampling, hydrochemistry sampling, and a physical habitat survey.

Various electrofishing methods appropriate to the habitat type were used (Depletion wading and non-wading, Single pass wading and non-wading, Separate sides, non-wading); a new ten-minute electrofishing sampling method was introduced in 2015 on surveys in the River Barrow catchment (Delanty *et al.*, 2017) and developed further by Matson *et al.*, 2017. In 2016 ten sites were surveyed using a ten-minute boat electrofishing method as part of a study to examine the potential for using this method in the future in deeper rivers, other sites were surveyed using depletion electric fishing using either handsets or boats.

A macrophyte survey was also carried out at selected sites. Surveys were carried out between July and early October (to facilitate the capture of 0+ salmonids) when stream and river flows were moderate to low. All habitats, in wadeable and deeper sections, were sampled (i.e. riffle, glide, pool). The WFD river surveys have supplied vital information on juvenile eels (<30 cm) rarely encountered by lake fyke net surveys.

6.7.2.3 Transitional Waters

A multi-method approach is used for sampling the transitional waters. Beach seining using a 30m fine-mesh net is used to capture fish in littoral areas. Beam trawling is used for specified distances (100 – 200 m) in open water areas adjacent to beach seining locations. Fyke nets were set overnight in selected areas adjacent to beach seining locations.

6.7.3 2016 Results

6.7.3.1 Lakes

A total of 19 lakes (spanning 13 catchments), were sampled with eels present in 18 lakes sampled (94% of sites; Figure 6-42). A total of 266 eels were caught during lake surveys. A mean CPUE of 0.98 was found across all lake sites. While the highest CPUE value for eels was found in MacNean Upper (Erne, CPUE = 3.67) the lowest were noted in Lough Lene (Boyne, CPUE = 0.11) and Ross Lake (Corrib, CPUE = 0.11) (Appendix 6-1). No eels were captured in Lough Tay (Ovoca). The eels ranged in length from 25.3 to 77.6 cm (Appendix 6-2,).

Lough Tay has shown decreases in eel captures from the 2009 surveys, resulting in no captures in the 2012, 2015 and 2016 surveys, (Kelly *et al*., 2016). Lough Tay is located in the Ovoca catchment approximately 50 kms from the high water mark at an altitude of 250m. There are a number of lakes present downstream (Lough Dan and the Upper and Lower lakes in Glendalough). With no major obstacles to the eels getting into this lake the lack of captures maybe due to the decrease in the distribution of eels within catchments as recruitment declines results in eels no longer pushed up into the margins or the extremities of a catchment to survive.

6.7.3.2 Rivers

A total of 193 river sites (across 21 catchments) were covered in the 2016 surveys (Figure 6-42). In 2016 fishing methodology changed depending on the site, a breakdowns of how many sites were fished with the 7 different methods is available in Table 6-7. All discussions on the results of the surveys does not include boom boats as eels are not assessed using this method. The WFD river sites had a 28% eel presence rate, with 43 sites recording eels (74% wading and 25% non-wading methodologies). A total of 86 eels were caught, ranging from 7 to 72.3 cm (Appendix 6-3 – 6-5). Densities ranged from 0.00006 to 0.1206 eels per m2 in the Maigue River (Castleroberts Br_A) and Mayne River (Snugborough_A), respectively.

Table 6-7 WFD methodology and number of sites 2016

Method	No sites
Timed wading	91
Timed nonwading	16
Boom Boats	39
Depletion wading	23
Depletion nonwading	7
Single pass nonwading	15
Separate sides nonwading	2

6.7.3.3 Transitional waters

A total of 395 eels were captured in the transitional water surveys across 9 of the 11 locations, covering all 7 of the catchments surveyed (Figure 6-42). They ranged in length from 21 to 78 cm. CPUE values for transitional water sites ranged from 0.56 (Drongawn Lough) to 6.94 (Gill Lough) (Appendix 6-6 and 6-7). No eels were captured in Barrow Suir Nore Estuary zone and Suir Estuary Lower. Fifty nine eels were caught in beach seines in the Barrow Estuary, Barrow Nore Estuary and in Lough Gill ranging in length from 4 to 29 cm.

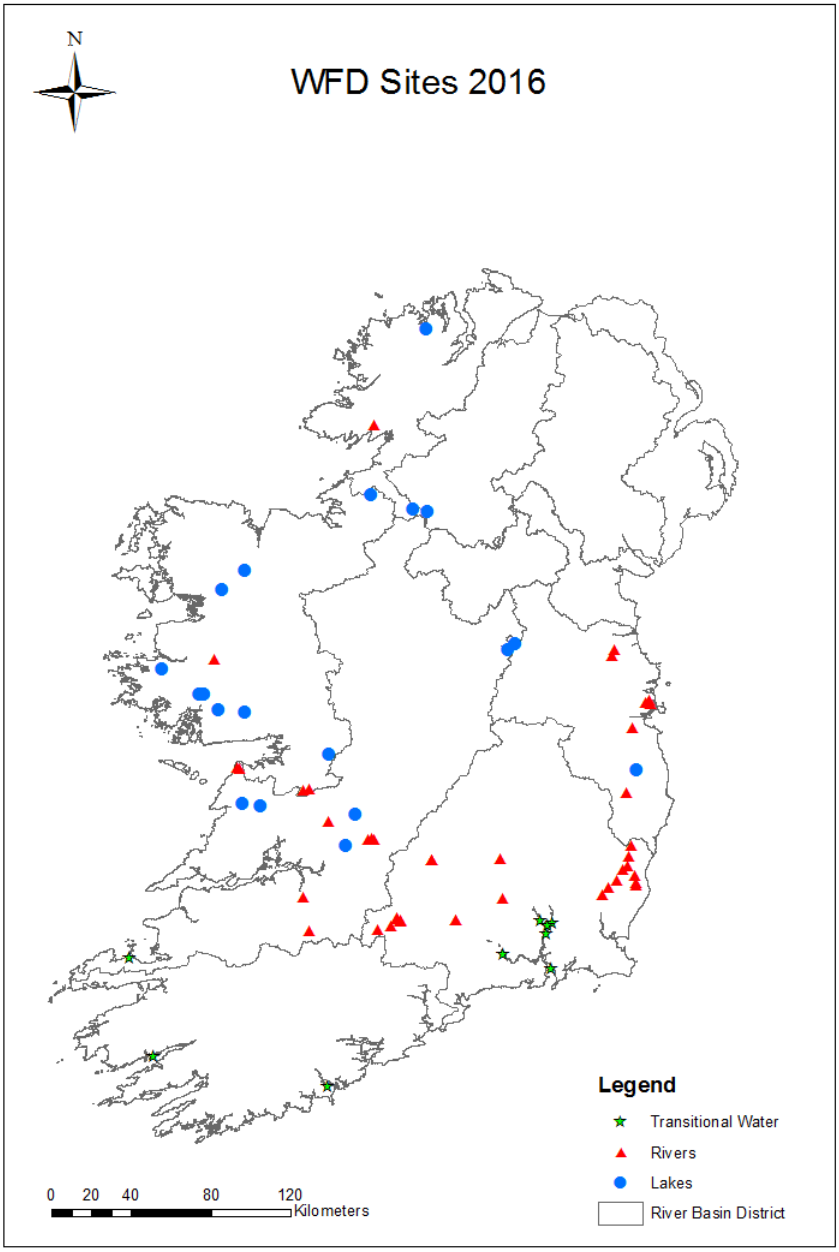

Figure 6-42 WFD locations surveyed in 2016

7 Recruitment

(refers to Ch. 7.3 of the National EMP Report, 2008)

7.1 Introduction

Many studies have focused on sampling the active phase of elver migration into freshwater (Gollock *et al*., 2011; Jessop 2000; Knights and White 1998; Moriarty 1986, Naismith and Knights 1988; O'Connor 2003; Piper *et al.,* 2012; Reynolds *et al.,* 1994). Elvers exhibit counter current behaviour once they start actively migrating upstream. This means that instead of moving with the current as they do in the estuary, they now avoid the river current which will carry them downstream. To avoid the current the elvers migrate along the banks of the river and seek out slack water. At this time the elvers are congregated in schools near the bank of the river where they can be trapped.

The sites monitored are shown in Figure 7-1.

The elver traps used on the Erne and the Shannon by the ESB are permanent brush ladders, based on the fixed ramp style traps designed by O'Leary and reported in an EIFAC technical paper on 'Eel Fishing gear and techniques in 1971, leading to holding boxes fitted with freshwater supplies. They are sited at the main hydro installations at Ardnacrusha and Parteen on the Shannon, Cathaleen's Fall on the Erne and Inniscarra Dam on the Lee. They are described in more detail in the Irish SSCE reports.

The elver traps used by IFI are also based on the fixed ramp style traps. They have been cited in various studies with modifications being made to the traps (Gollock *et al.,* 2011; Jessop 1995; Jessop 2000, Moriarty 1986, Naismith and Knights 1988). Elvers and young yellow eels will encounter the ramp and ascend due to the flow of water attracting them upstream. The elver migration season extends from April to August, with migration influenced by water temperature and river discharge. White and Knights 1997 reported not catching juveniles eels in any numbers until temperatures rose above 15-16°C in mid-June /early July, peaking at >20°C. The pattern of distribution across a season has been described as waves of runs of short duration but repeated over the season (Jessop 2000). Where possible the traps are located downstream of a structure (e.g. weir or waterfalls) in order to get a flow of water to feed the traps. The structure also acts as a bottleneck restricting the ability of elvers utilising the whole river to ascend.

The aim of the long term monitoring programme is to set up a number of sites as an index of recruitment in order to get an understanding of changes to recruitment since the implementation of the Eel Regulation. It is not intended to make assumptions on the whole catch entering the river as the proportion of elvers avoiding the traps is not known and is difficult to quantify. The elver traps sample a proportion of the elver migration in a standardised way and when operating for a number of years a trend in recruitment is recorded.

There is no authorised commercial catch of juvenile eel in Ireland, but some fishing has been authorised in the past under Sec. 18 of the Fisheries Act for enhancement of the fisheries. Catches are made at impassable barriers and this is reported in the relevant Regional Eel Management Plans.

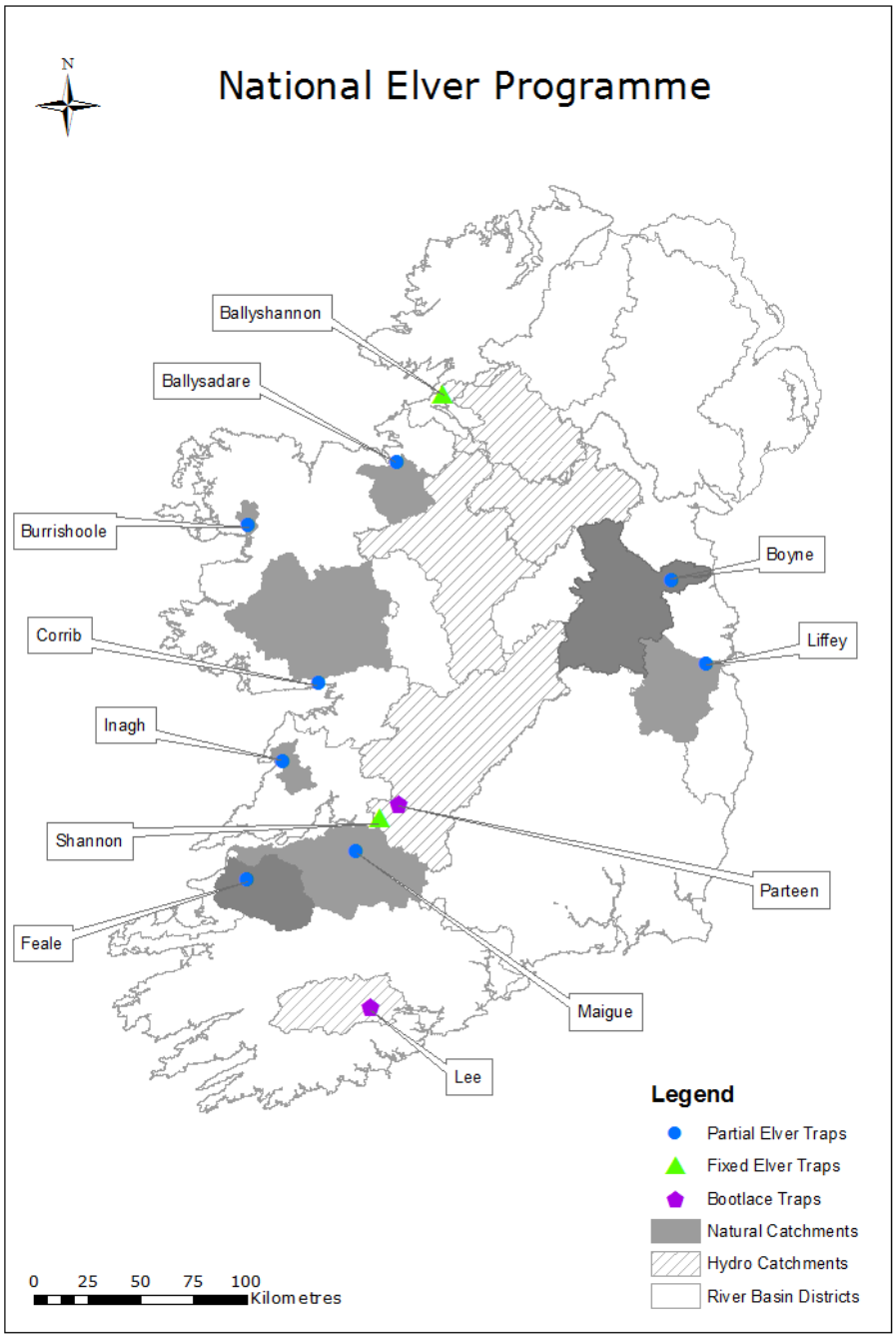

Figure 7-1: Location of recruitment monitoring stations in Ireland.

7.2 0+ Recruitment

There is no authorised commercial catch of juvenile eel in Ireland, but some fishing has been authorised in the past under Sec. 18 of the Fisheries Act for enhancement of the fisheries. Catches are made at impassable barriers and this is reported in the relevant Regional Eel Management Plans.

7.2.1 Shannon & Erne

Long-term monitoring of elver migrating at Ardnacrusha (Shannon) and Cathaleen's Fall (Erne) is undertaken by the ESB (Figure 7-2). In the Erne recruitment has shown an increase each year since 2011 with the highest catch in 2016.

Major refurbishment of the Erne elver traps was undertaken in early 2015 and this may have improved the efficiency of the Erne traps thereby likely introducing a discontinuity into the time series. A third new trap was also installed and the data for this trap are being handled and reported separately in order to preserve the original time series.

Data for the Ardnacrusha Shannon trap have been low in recent years. 2016 saw a marked improvement in recruitment in the Shannon in both glass eel (elvers) and young yellow eel.

Major refurbishment of the Shannon Ardnacrusha trap took place in early 2017 with a new water supply and brushes on the ladder.

7.2.2 Other Locations

Long-term monitoring of migrating elvers also takes place at on the Feale, Inagh and Maigue Rivers and fishing was also previously undertaken in the Shannon Estuary for glass eels (Tables 7-1-7-2).

Additional elver monitoring is shown in Table 7-2 for sites on the Ballysadare and the Corrib, and Table 5.2 also gives summary data on length and weight for all the locations monitored by IFI.

The new Maigue elver trap was made operational around the 11th April. For the 2017 elver season the 3 traps were operating simultaneously (2 old traps and 1 new trap located upstream). The recruitment of elvers into the Maigue system was very low this year with only 9.26 kg caught, the traps started capturing elvers on the 6th May but the majority of the catch arrived in 1 night and in 1 trap with 9 kg caught on the 14th June. All trap were operated until the 30th August. Water levels in the Maigue consisted of numerous flood events with water levels rising and then falling back to summer levels. The 14th June corresponds to falling water level.

The Inagh trap was installed around the 10th April 2017 and the first catch of elvers was the 13th April. The total catch of elvers was 19kg for elvers and 1.1 kg for yellows. The majority of the catch was captured during April and May corresponding to the low water levels. June, July and August had a number of flood events which would have prevented the elvers migrating upstream.

The Feale trap was installed around the 13th April with the first catch of elvers on the 29th April. The total catch of elvers was 6.4 kg and 8.2 kg for yellow eels. The majority of the catch was captured over 3 nights (20th to the 22nd June) and July and August were marked with flood events and very little catches. The trap was monitored until the 2nd September.

The Corrib trap is still catching elvers as of the 19th September 2017, this late recruitment pattern was witnessed last year but not captured in the trap. The Corrib elver trap will continue to be monitored over the next few weeks.

A new trap was installed in the fish pass at the Ballysadare falls with an improved water supply to ensure trap was operational despite the fish pass sluice gate being closed. The trap was installed on the 6th April and started catching elvers on the 4th May. The total catch of elvers for the season was 16 kg with 22kg of yellow eels. The trap was operated until the 28th August. The majority of the elver catch (87%) was captured in May. As this trap is situated within a fish pass, when the sluice gate is closed the trap appears to be catching a greater proportion of the run compared with a trap located along the bank of a natural river.

7.2.3 Summary of 2017 Season

Recruitment for the 2015 season indicated that there was a general decrease in the recruitment levels to Ireland in 2015 compared to 2014. The Erne was the only location to show an increase but it should be noted that this site also received considerable refurbishment of the traps.

Recruitment for the 2016 season showed a general increase in the recruitment levels to Ireland in 2016 compared to 2015, particularly on the West coast. There was a marked improvement on the Shannon. There was little change in the catch in the Liffey traps on the East coast.

Recruitment for the 2017 season showed a general drop in the recruitment levels to Ireland in 2017 compared to 2016, in spite of many of the elver traps receiving upgrades, new climbing media etc.

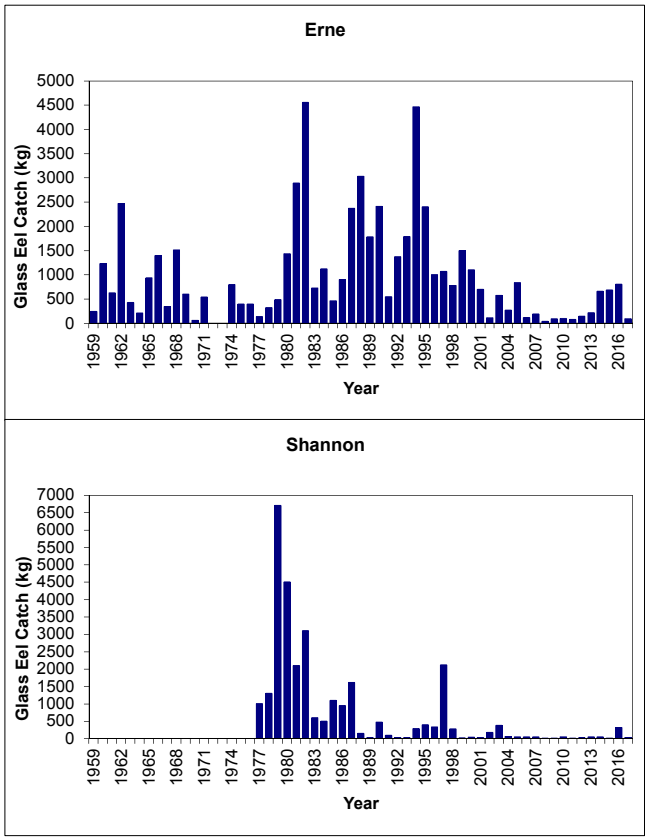

Figure 7-2: Annual elver catches (t) in the traps at Ardnacrusha (Shannon) and Cathaleen's Fall (Erne) – data from ESB. Full trapping of elvers took place on the Erne from 1980. Erne 2015 onwards does not include the additional new trap.

Table 7-1: Glass eel catches (kg), 1985 to 2016 (blanks = not fished).

Year	Erne	Shannon Ardnacrusha	R Feale	R Maigue	Inagh R	Sh. Estuary Glass Eels	R. Liffey Fish Pass	R. Liffey Weir
1985	463	1093	503					
1986	898	948						
1987	2367	1610						
1988	3033	145						
1989	1781	27						
1990	2409	467						
1991	546	90						
1992	1371	32						
1993	1785	24						
1994	4463	287	70	14				
1995	2400	398	0	194				
1996	1000	332	0	34	140			
1997	1065	2120	407	467	188	616		
1998	782	275	81	8	11	484		
1999	1500	18	135	0	0	416		
2000	1100	39	174	0	120	43		
2001	699	27	58	2	18	1		
2002	113	178	116	5		37		
2003	576	378	36	72	111	147		
2004	269	58.126	0	0	24	1		
2005	838	41.36	0	1	0	41		
2006	118	42	1	0	4	3		
2007	189	45	0	0	39	12		
2008	38.7	7	0	0	83	2		
2009	88.3	7.75	42					
2010	96.6	49.7	20	3	1	3		
2011	74.34	7.239	7	5	15			
2012	145.71	22.525	47		*		0.5	0.2
2013	214.7	46.615	68	14	44		1.1	2.7
2014	659.37	45.085	5	29**	40		0.3	0.3
2015	686.17	11.42	3	15	25		0.2	0.2
2016	803.73	317.2	30.5	29	51		0.4	
2017	94.95	29.7	15	9	20		0.5	

* trap flooded, ** partial trapping effort to avoid mortality due to large run

Table 7-2: Recruitment data for the years 2010 – 2017.

Location	Year	Total Wt. Elvers (g)	Est. No. Elvers	Av Wt. Elver (g)	Total Wt. Yellow Eels (g)	Est. No. Yellow Eels	Av. Wt. Yellow Eel (g)
Ballysadare Old Trap	2013	924	2,640	0.35	4,612	1,005	4.59
	2014	842	2,148	0.35	873	203	4.51
	2015						
	2016	600	1,714	0.35	327	72	4.57
Ballysadare new Trap	2017	16,128	30,897	0.522	22,278	4,170	5.343
Corrib pipe trap	2010	29,696	95,254	0.33	7,401	728	9.83
	2011	4,189	11,970	0.35	24,493	3,244	7.55
	2012	2,383	5,168	0.34	7,487	1,143	8.55
C Ramp and pipe	2013	14,260	42,064	0.34	12,520	2,149	5.41
Corrib Ramp trap	2013	10,168	29,994	0.34	0	0	-
	2014	2,891	8,998	0.32	374	55	2.46
	2015	12,321	38,502	0.32			
	2016						
	2017						
Feale Old Trap	2010	20,361	42,161	0.48			
	2011	1,099	3,139	0.35	6,298	834	7.55
	2012	35,975	102,785	0.35	10,860	1,601	5.47
	2013	44,661	71,854	0.62	23,313	6,133	4.31
	2014	3,224	6,466	0.48	1,343	301	4.88
	2015	712	1,468	0.46	1,900	471	4.57
	2016	20,452	10,411		6,493	1,833	
Feale New Trap	2017	6,441	7,906	0.468	8,212	1,732	4.602
Inagh Old Trap	2010	1,417	2,931	0.5			
	2011	8,168	23,338	0.35	7,134	945	7.55
	2012						
	2013	31,069	88,641	0.35	12,581	4,089	3.07
	2014	34,894	90,153	0.39	4,690	1,152	4.25
	2015	20,131	67,132	0.3	4,775	1,582	2.98
	2016	45,138	150,327		5,684	1,907	
Inagh New Trap	2017	19,192	54,834	0.35	1,134	431	
Liffey IFI	2012	213	608	0.35	-	-	-
	2013	2,742	7,849	0.35	-	-	-

Location	Year	Total Wt. Elvers (g)	Est. No. Elvers	Av Wt. Elver (g)	Total Wt. Yellow Eels (g)	Est. No. Yellow Eels	Av. Wt. Yellow Eel (g)
	2014	285	746				
	2015	270	629	*0.43*	-	-	-
	2016	22	72				
Liffey MI	2012	454	1,298	0.35	-	-	-
	2013	1,144					
	2014	311	1,402			4	
	2015	159	690				
	2016	83	360				
	2017	11	49	0.23	507	106	4.78
Maigue Old Trap	2010	2,772	5,650	0.42	-	-	-
	2011	5,061	13,678	0.37	54	7	7.55
	2012						
	2013	14,032	39,665	0.35	19	3	6.4
	2014	29,020	78,042	0.37	-	-	-
	2015	15,050	40,229	0.37	173	20	8.69
	2016	28,883	96277		165	59	
	2017	9,105	30,350	0.3	155		
Maigue New	2017	19	63				

7.3 Young Yellow Eel Recruitment

Monitoring of juvenile yellow eel migrating at Parteen Regulating Weir (Shannon) and Inniscarra on the R. Lee takes place using fixed brush traps.

The data for Parteen is presented in Figure 7-3 and the electronic tables. In 2009 and 2010, due to maintenance work by ESB at the Parteen regulating weir the discharge patterns were less favourable than in 2008. This may partly account for the poor catches recorded in 2009 & 2010. However, catches in the original Parteen hatchery trap continued to decline in 2011, 2012 and 2013. The catch in 2015 was 301.1kg and in 2016 it was 890kg.

A new trap was installed in 2012 on the Shannon at Parteen, on the opposite bank (Co. Clare). The catch was 6.6kg and 6.8kg in 2013 and 7.8kg in 2014. The Co. Clare trap and a new one installed in 2015 near the hatchery (Tipperary) trapped 26.95kg in 2015 and 23.1kg in 2016.

In 2017, the main catch was 121 kg and the new traps catch 15kg.

In 2010, less than one kg was recorded in the Inniscarra trap on the River Lee and in 2011, 48kg were recorded. The catch has declined since 2011 with only 0.6kg recorded in 2014 and 0.94kg in 2015. The catch remained low in 2016 (1.1kg) and in 2017 it was 13.3kg.

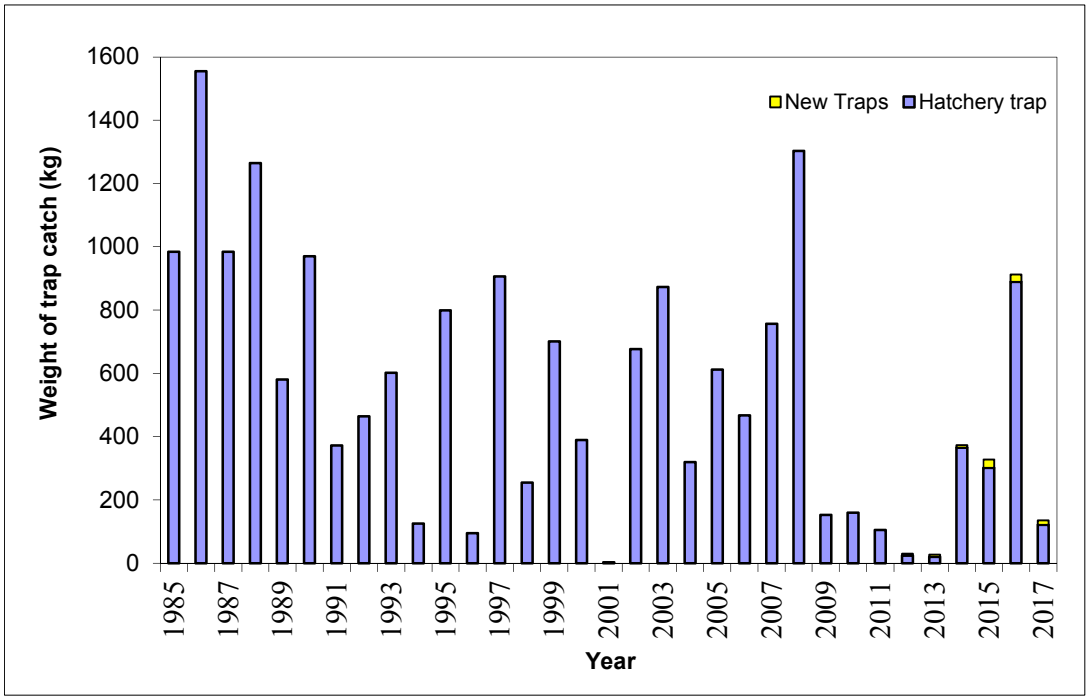

Figure 7-3: Juvenile yellow eel catches (kg) at Parteen Weir, 1985 to 2017. From 2012, a second trap was installed on the opposite bank (Clare) and in 2015 near the hatchery (Tipperary) and these data are included in the graph as separate bars.

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Appendix 1: Members of the Standing Scientific Eel Committee 2017

The SSCE is comprised of the following representatives:

Dr. Russell Poole (Chair)	Marine Institute
Dr. Paddy Boylan	Loughs Agency
Dr. Denis Doherty	Electric Ireland
Dr. Elvira de Eyto	Marine Institute
Dr. Paddy Gargan	Inland Fisheries Ireland
Dr. Milton Matthews	Inland Fisheries Ireland
Dr. Ciara O'Leary (Secretary)	Inland Fisheries Ireland
Dr. Sam Shepard	Inland Fisheries Ireland
Dr. Robert Rosell	Agri-Food & Bioscience Institute, N. Ireland (for issues relating to the transboundary plans)

Invited Contributors – 2017

Dr. Derek Evans	Agri-Food & Bioscience Institute, N. Ireland
Dr. Kieran McCarthy	NUI Galway

Appendix 2: Members of the Technical Expert Group on Eel 2018

The TEGE is comprised of the following representatives:

Dr. Russell Poole	Marine Institute
Dr. Paddy Boylan	Loughs Agency
Dr. Denis Doherty	Electric Ireland
Dr. Paddy Gargan	Inland Fisheries Ireland
Dr. Ciara O'Leary	Inland Fisheries Ireland
Dr. Colm Fitzgerald	Inland Fisheries Ireland
Dr. Derek Evans	Agri-Food & Bioscience Institute, N. Ireland

Appendix 3: Conservation of Eel Fishing Bye-law No. C.S. 319, 2015

I, Joe McHugh, Minister of State at the Department of Communications, Energy and Natural Resources, in exercise of the powers conferred on me by section 57 of the Inland Fisheries Act 2010 (No. 10 of 2010) and the Energy and Natural Resources (Delegation of Ministerial Functions) Order 2014(S.I. No. 585 of 2014), at the request of Inland Fisheries Ireland, and for the purpose of giving full effect to the State's Eel Management Plan under Council Regulation (EC) No. 1100/2007 of the 18 September 2007[1], hereby make the following bye-law:

1. (1) This Bye-law may be cited as the Conservation of Eel Fishing Bye-law No. C.S. 319, 2015.

(2) This Bye-law comes into operation on the day after the day of its making and ceases to have effect on 30 June 2018.

2. (1) Notwithstanding anything contained in any bye-law fixing the annual close season, it is prohibited for a person -

(a) to take, or attempt to take, or to fish for or to attempt to fish for, or to aid or assist in the taking or fishing for, eel, or

[1] OJ No. L248, 22.09.2007, p.17.

(b) to be in possession of or sell or offer for sale or reward, or to purchase eel caught or taken by any means,

in any fishery district.

(2) In this Article "eel" means eel of the species *Anguilla anguilla*.

3. The Conservation of Eel Fishing Bye-Law No. C.S. 312, 2012 is revoked.

GIVEN under my hand,

23 November 2015.

JOE MCHUGH

Joe McHugh,

Minister of State at the Department of Communications,

Energy and Natural Resources.

EXPLANATORY NOTE

(This is not part of the Bye-law and does not purport to be a legal interpretation).

This Bye-law prohibits the taking, or attempting to take, fishing for or attempting to fish for, aiding or assisting the taking of or fishing for, eel in any fishery district in the State. It also prohibits being in possession of, selling or offering for sale or reward, or purchasing eel caught or taken by any means in any fishery district in the State.

FOOTNOTE

Section 57 (7) of the Inland Fisheries Act, 2010 provides that any person aggrieved by this Bye-law may within 28 days after its publication in the Iris Oifigiúil, appeal against same to the High Court.

Appendix 4: Reports on Fisheries closures, illegal fishing and other management actions from the IFI RBD's and Loughs Agency.

1. IE_East

River District Basin: **Eastern/NeaghBann (International) River Basin Districts**

Date: **1 Jan- 31 Dec 2017**

Management Action 1. Reduction of Fishery to achieve EU target

Confirm fishery ceased under **Conservation of Eel Fishing Bye-law No. C.S. 312, 2012**:

The eel fishery in the Eastern/NeaghBann (International) RBD remained closed throughout 2017.

Confirm no licences issued in 2009 under Conservation of Eel Fishing (Prohibition on Issue of Licences) Bye-law No. 858, 2009:

No eel fishing licences were issued by the Eastern/NeaghBann (International) RBD during 2017. No eel fishing licences were issued by the Eastern/Neagh Bann_____ RBD during 2016.

IFI RESEARCH DIVISION

IFI licences were issued to trap eels relating to research activity in IFI Dublin again in 2017 (covering both Eastern / Neagh Bann (International) River Basin Districts). Ex-commercial eel fishermen were contracted by IFI Research Division to undertake surveys. Results are awaited from IFI research Division.

Estimated level of illegal fishing:

Insert No. of alleged or confirmed reports

The level of illegal activity was low for 2017 in the IFI Dublin area. Illegal activity targeting eels was not recorded. Patrols concentrated on lakes throughout the Region.

Number of gear seizures: **0**

Gear types seized: **N/A**

Insert quantity/length of gear seized

Number of Eel Dealer Interceptions: **0**

Estimated tonnage on board: **N/A** Declared origin(s) of cargos:

Describe Action taken:

General impression of levels of illegal activity since the cessation of the commercial fishery:

Low levels of illegal activity recorded, any eels recorded were a by-product when coarse fish were found in nets (however very few eels found in any nets in 2017)

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?:

(If 'Yes', please insert quantity transported).

What was the total catch transported (kg)?:

Was there any evidence of illegal trading of eel in conjunction with the T&T programme:

General impression of the programme:

Management Action 3. Ensure Upstream Migration at Barriers

(List any sites etc where barriers removed or elver access improved etc)

All applications for infrastructural and other developments which could impact on upstream migrations are reviewed and submissions are made to ensure that the free passage of fish is maintained. Natural barriers to upstream migration arising from floods etc were removed.

Management Action 4. Improve Water Quality

Extensive and well documented water and habitat protection and improvement measures are ongoing as a component of IFI's core remit.

Many thanks for taking the time to respond.

2. IE_NorW

River District Basin: **North West River Basin District**

Date: **1 Jan- 31 Dec 2017**

Management Action 1. Reduction of Fishery to achieve EU target

Confirm fishery ceased under **Conservation of Eel Fishing Bye-law No. C.S. 312, 2012**:

The eel fishery in the NWRBD remained closed throughout 2017.

Confirm no licences issued in 2009 under Conservation of Eel Fishing (Prohibition on Issue of Licences) Bye-law No. 858, 2009:

No eel fishing licences were issued by IFI for the NWRBD during 2017.

Estimated level of illegal fishing: **Low**

Main catchments where illegal activity occurred: **3**

Drumanybeg lake (River Erne)

Garfinny Lake (River Erne)

Inishmuck, Lough Oughter (River Erne)

Number of gear seizures:

Gear types seized:

7 sets of fyke nets from Drumanybeg lake (River Erne)

6 sets of fyke nets from Garfinny Lake (River Erne)

An Eel barrel & Eel poke (storage net) from Inishmuck, L. Oughter (River Erne)

- 80 eels released from eel poke

Number of Eel Dealer Interceptions: **Nil**

Estimated tonnage on board: **Nil**

Declared origin(s) of cargos: **Nil**

Describe Action taken: **Nil**

General impression of levels of illegal activity since the cessation of the commercial fishery:

Low levels of illegal activity

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?: **Yes**

(If 'Yes', please insert quantity transported). **44,538 kg**

(see Table 1)

What was the total catch transported (kg)?: **44,538 kg**

Was there any evidence of illegal trading of eel in conjunction with the T&T programme:

None

General impression of the programme:

IFI staff attended with ESB staff and fishermen on silver eel collection days at five locations throughout the R. Erne catchment:-

Upper Erne- Urney bridge and Lough Gowna

Lower Erne- Roscor bridge, Ferny Gap (2 km east of Roscor bridge) and (3) Portora

Silver eels were transported to Ballyshannon and released into the tailrace below ESB hydropower station at Cathaleen's Fall at the head of the Erne estuary.

The programme worked well with good co-operation between ESB, IFI and contracted fishermen.

Management Action 3. Ensure Upstream Migration at Barriers

(List any sites etc where barriers removed or elver access improved etc)- None

All applications for infrastructural and other developments which could impact on upstream migrations are reviewed and submissions are made to ensure that the free passage of fish is maintained.

Management Action 4. Improve Water Quality

Regular environmental patrols carried out.

Many thanks for taking the time to respond.

7 sets of fyke Nets seized on Drumanny Beg Lake, Erne catchment in May.

Six sets of fyke nets seized at Garfinny Lake (Lough Oughter), Erne catchment in June.

An unauthorised eel storage barrel seized at Naheelis on Lough Oughter, Erne catchment in May.

Table 1- ESB Silver eel trap and truck programme on R. Erne (2017)

Month	Weight (kg)
January	5,425
February	Nil
March	Nil
April	Nil
May	Nil
June	Nil
July	Nil
August	Nil
September	9,760
October	21,177
November	3,611
December	4,565

TOTAL	44,538

3. IE_Shan

River District Basin: **Shannon River Basin District**

Date: **1 Jan- 31 Dec 2017**

Management Action 1. Reduction of Fishery to achieve EU target

Confirm fishery ceased under **Conservation of Eel Fishing Bye-law No. C.S. 312, 2012**:

The eel fishery in the Shannon RBD remained closed throughout 2017.

Confirm no licences issued in 2009 under Conservation of Eel Fishing (Prohibition on Issue of Licences) Bye-law No. 858, 2009:

No eel fishing licences were issued by the Shannon RBD during 2017.

Estimated level of illegal fishing:

Medium

Insert No. of alleged or confirmed reports

Main catchments where illegal activity occurred:

Some unconfirmed reports of illegal fishing on Lough Ree and the River Inny. Fyke nets recovered on Lough Ree and River Inny.

In the Lower Shannon it was low for 2017. Early in the year there were two seizures both on Lough Derg. Despite numerous patrols and dragging there was no evidence during the silver eel migration. There were no reports received for possible eel fishing/poaching.

Number of gear seizures:	Gear types seized:
River Inny	**Fyke nets x 13 – 400m**
Lough Ree	**Fyke nets x 6 – 180m**
Lough Derg	**Fyke nets x 2 - 75m**

Number of Eel Dealer Interceptions: 0

Estimated tonnage on board:	n/a	Declared origin(s) of cargos:

Describe Action taken:

General impression of levels of illegal activity since the cessation of the commercial fishery:

Illegal activity is likely ongoing on lakes throughout the Shannon system. There is still evidence of illegal fishing on Lough Derg, Ree and the River Inny, based on fyke net seizures. Evidence of illegal activity previously on Strokestown lakes and East Clare lakes. It is likely there was more long-line illegal fishing than fyke net fishing in summer 2017, due to seizures of fykes and associated economic impact.

Photo: Fyke nets from the River Inny.

Photos: Six working fyke nets, worth €1500, were found at three locations on the mid-western side of Lough Ree. Sixty-four eel, four pike, seven perch, one specimen bream and twelve roach were released alive from these nets.

Photo: A selection of the nets that were recovered from the river Inny upstream of Float Bridge by anglers during the month of December and handed into the Mullingar office.

Photo: Fyke net seized from Lough Derg.

Photos: Fyke net taken at Coos bay, Lough Derg.

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?: Yes

From Athlone and Killaloe

What was the total catch transported (kg)?:

Month	Weight (Kg)	Trap Transport season
January	5,180	2016/2017
February	703	2016/2017
March	5,089	2016/2017no TT
April		no TT
May		no TT
June		no TT
July		no TT
August	0	no TT
September	1,703	2017/2018
October	4,921	2017/2018
November	1,582	2016/2012017/20187
December	2,398	2017/2018
Total	21,576	

Was there any evidence of illegal trading of eel in conjunction with the T&T programme: No

General impression of the programme: Worked well. Text alerts were accurate. Nets should be labelled clearly. ESB facilitated monitoring visits during 2017 by two individuals. ESB provided maps with the fishing locations of the fishermen but there should also be locations marked for the storage of the eels captured. This has been requested for the last two years but too general a location is being provided.

Eels collected at Finea, Lough Sheelin.



Photos: Eel scanning and releases in December


Photos: Eel release from Killaloe weir at Parteen

Management Action 3. Ensure Upstream Migration at Barriers

(List any sites etc where barriers removed or elver access improved etc)

Planning permission was granted for a rock ramp solution to improve fish passage on a sluice and weir at the River Bunowen, Ahsacragh. Works are due to commence in summer 2018 subject to available funding. Stakeholders were briefed and public meetings held during the planning consultation stage.

Photos: SNIFFER survey underway at Ahascragh (Bunowen River).

FINAL PASSABILITY ASSESSMENT FOR SITE: Ahascragh weir		UPSTREAM MIGRATION				DOWSTREAM MIGRATION			
		No barrier 1	Partial barrier Low impact 0.6	Partial barrier High impact 0.3	Complete barrier 0.0	No barrier 1	Partial barrier Low impact 0.6	Partial barrier High impact 0.3	Complete barrier 0.0
Adult Salmon (AS)	current conditions				X	X			
	high flows			X		X			
Adult Trout (AT)	current conditions				X	X			
	high flows			X		X			
Cyprinids (C)	current conditions				X	X			
	high flows			X		X			
Adult Lamprey (AL)	current conditions				X				
	high flows				X				
Juvenile Eel (JE)	current conditions			X					
	high flows			X					
Juvenile Salmonids (JS)	current conditions				X	X			
	high flows			X		X			
Juvenile Lamprey (JL)	current conditions					X			
	high flows					X			
Adult Eel (AE)	current conditions					X			
	high flows					X			

FINAL PASSABILITY ASSESSMENT FOR SITE: Ahascragh weir		UPSTREAM MIGRATION				DOWSTREAM MIGRATION			
		No barrier 1	Partial barrier Low impact 0.6	Partial barrier High impact 0.3	Complete barrier 0.0	No barrier 1	Partial barrier Low impact 0.6	Partial barrier High impact 0.3	Complete barrier 0.0
Adult Salmon (AS)	current conditions				X	X			
	high flows			X		X			
Adult Trout (AT)	current conditions				X	X			
	high flows			X		X			
Cyprinids (C)	current conditions				X	X			
	high flows			X		X			
Adult Lamprey (AL)	current conditions				X				
	high flows				X				
Juvenile Eel (JE)	current conditions			X					
	high flows			X					
Juvenile Salmonids (JS)	current conditions				X	X			
	high flows			X		X			
Juvenile Lamprey (JL)	current conditions					X			
	high flows					X			
Adult Eel (AE)	current conditions					X			
	high flows					X			

Photo: SNIFFER assessment for the barrier at Ahascragh.

Fish Transferred


Photos: River Fergus upstream of Corofin, going dry and completely dry

A feature of the River Fergus as it runs over the karst it goes dry if the water table drops. This is monitored by officers and fish are removed by electrofishing if necessary, and released further downstream in deeper waters.

Date	Salmon	Trout	Pike	Eels	Perch	Lamprey
1/5/17	12	350	0	0		
3/5/17	13	115	5	50	10	1
9/5/17	9	300		3		

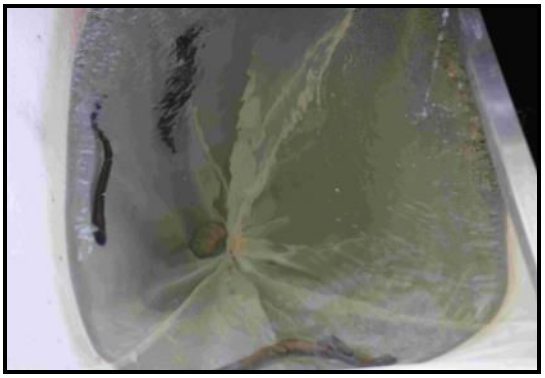

Photos: Releasing fish further downstream on River Fergus

Elver Monitoring – IFI Limerick

All three ShRBD index monitoring site elver traps were upgraded on the Rivers Feale, Maigue and Inagh ahead of the 2017 season. IFI Officers monitored these traps daily from the date of installation to the cessation of the runs. Elver traps remained in place for August but there were no catches recorded.

River	Date of installation	Kg of elvers	Kg of elvers	Kg of elvers	Kg of elvers	Kg of elvers

		April	May	June	July	Total
Inagh	04/2017	10.499	9.018	0.221	0.018	19.756
Feale	04/2017	0	1.600	13.443	0.010	15.053
Maigue	04/2017	0.030	0.600	9.010	0.000	9.731
Maigue @ fish counter	04/2017	0	0	0.140	0.000	0.140
Total		10.529	11.218	22.814	0.028	44.589

Photos: Elver trap installed on Maigue and river lamprey in the net


Photos: Elver traps installed on Feale and Inagh

Management Action 4. Improve Water Quality

Many thanks for taking the time to respond.

4. IE_SouE

River District Basin: **SE River Basin District**

Date: **1 Jan- 31 Dec 2017**

Management Action 1. Reduction of Fishery to achieve EU target

Confirm fishery ceased under **Conservation of Eel Fishing Bye-law No. C.S. 312, 2012**:

The eel fishery in the SERBD remained closed throughout 2017.

Confirm no licences issued in 2009 under Conservation of Eel Fishing (Prohibition on Issue of Licences) Bye-law No. 858, 2009:

No eel fishing licences were issued by the SERBD during 2017.

Estimated level of illegal fishing:

Insert No. of alleged or confirmed reports

Main catchments where illegal activity occurred:

NIL

Number of gear seizures:

NIL

Gear types seized:

Insert quantity/length of gear seized

Number of Eel Dealer Interceptions: **NIL**

Estimated tonnage on board:

Declared origin(s) of cargos:

Describe Action taken:

General impression of levels of illegal activity since the cessation of the commercial fishery:

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?: **N/A**

(If 'Yes', please insert quantity transported).

What was the total catch transported (kg)?:

Was there any evidence of illegal trading of eel in conjunction with the T&T programme:

General impression of the programme:

Management Action 3. Ensure Upstream Migration at Barriers

(List any sites etc where barriers removed or elver access improved etc)

No specific eel passes.

Management Action 4. Improve Water Quality

Many thanks for taking the time to respond.

5. IE_SouW

River District Basin: **SW River Basin District**

Date: **1 Jan- 31 Dec 2017**

Management Action 1. Reduction of Fishery to achieve EU target

Confirm fishery ceased under **Conservation of Eel Fishing Bye-law No. C.S. 312, 2012**:

The eel fishery in the SWRBD remained closed throughout 2017.

Confirm no licences issued in 2009 under Conservation of Eel Fishing (Prohibition on Issue of Licences) Bye-law No. 858, 2009:

No eel fishing licences were issued by the SWRBD during 2017.

Estimated level of illegal fishing: **NIL**

Insert No. of alleged or confirmed reports

Main catchments where illegal activity occurred:

Number of gear seizures: Gear types seized:

Insert quantity/length of gear seized

Number of Eel Dealer Interceptions: **NIL**

Estimated tonnage on board:

Declared origin(s) of cargos:

Describe Action taken:

General impression of levels of illegal activity since the cessation of the commercial fishery:

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?: **542 kg transported on R. Lee**

(If 'Yes', please insert quantity transported).

What was the total catch transported (kg)?:

Was there any evidence of illegal trading of eel in conjunction with the T&T programme:

General impression of the programme:

Management Action 3. Ensure Upstream Migration at Barriers

(List any sites etc where barriers removed or elver access improved etc) **None**

Management Action 4. Improve Water Quality

Many thanks for taking the time to respond.

6. IE_West

River District Basin: Western River Basin District (Sligo, Ballina, Ballinakill, Connemara & Galway Fishery districts)

Date: 1 Jan- 31 Dec 2017

Management Action 1. Reduction of Fishery to achieve EU target

Confirm fishery ceased under **Conservation of Eel Fishing Bye-law No. C.S. 312, 2012**:

The eel fishery in the Western RBD remained closed throughout 2017.

Confirm no licences issued in 2009 under Conservation of Eel Fishing (Prohibition on Issue of Licences) Bye-law No. 858, 2009:

No eel fishing licences were issued by the Western RBD during 2017.

Estimated level of illegal fishing: **Extremely low**

Insert No. of alleged or confirmed reports

Main catchments where illegal activity occurred: **One alleged report of activity on Lough Corrib and evidence of illegal activity on Lough Mask where one 30m fyke net was seized.**

Number of gear seizures: Gear types seized:

Insert quantity/length of gear seized

1 fyke net **30m**

Number of Eel Dealer Interceptions: **None**

Estimated tonnage on board: **N/A** Declared origin(s) of cargos: **N/A**

Describe Action taken: **N/A**

General impression of levels of illegal activity since the cessation of the commercial fishery:

Effectively non-existent in the WRBD

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?:

(If 'Yes', please insert quantity transported). **NO**

What was the total catch transported (kg)?: **N/A**

Was there any evidence of illegal trading of eel in conjunction with the T&T programme: **N/A**

General impression of the programme: **N/A**

Management Action 3. Ensure Upstream Migration at Barriers

(List any sites etc where barriers removed or elver access improved etc) Improvements were completed at Ballisodare, Galway Weir and on the Moy at Ballina Weir. These included improved elver trapping facilities at Ballisodare and Galway and improvements to elver passage on the Moy in Ballina which proved very effective.

Management Action 4. Improve Water Quality

IFI continues to investigate pollution reports, monitors planning and forestry applications, reviews infrastructural works and provides input to Local Authority Development Plans and the WFD all aimed at protecting water quality.

Many thanks for taking the time to respond.

IE_NWIRBD – Loughs Agency

River District Basin: ____NW_____River Basin District

Date: 1 Jan- 31 Dec 2017

Management Action 1. Reduction of Fishery to achieve EU target

Confirm fishery ceased under **Conservation of Eel Fishing Bye-law No. C.S. 312, 2012**:

The eel fishery in the Loughs Agency part of the NWRBD remained closed throughout 2017.

(The Foyle Area and Carlingford Area (Conservation of Eels) Regulations 2009)

Confirm no licences issued in 2009 under Conservation of Eel Fishing (Prohibition on Issue of Licences) Bye-law No. 858, 2009:

No eel fishing licences were issued by the Loughs Agency in the NWRBD during 2017.

Estimated level of illegal fishing:

Insert No. of alleged or confirmed reports

Main catchments where illegal activity occurred:

Number of gear seizures:

Gear types seized:

Insert quantity/length of gear seized

Number of Eel Dealer Interceptions:

Estimated tonnage on board:

Declared origin(s) of cargos:

Describe Action taken:

General impression of levels of illegal activity since the cessation of the commercial fishery:

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?:

(If 'Yes', please insert quantity transported).

What was the total catch transported (kg)?:

Was there any evidence of illegal trading of eel in conjunction with the T&T programme:

General impression of the programme:

Management Action 3. Ensure Upstream Migration at Barriers

(List any sites etc where barriers removed or elver access improved etc)

Installation of eel pass on River Faughan barrier

Management Action 4. Improve Water Quality

Many thanks for taking the time to respond.

IE_NWIRBD – DAERA??

Appendix 5: Silver Eel Trap and Transport Tables: Erne, Shannon and Lee

Appendix 5- 1 River Shannon Silver Eel Weekly Collection Sheet 2017/18

Wk No.	Week Ending	Jolly Mariner, Athlone	Yacht Club, Athlone	Kilaloe Eel Weir	Others (see comment)	Total for Week
Catch Quota per Location		8 Tonnes	2 Tonnes	No Quota		
1	09/09/17	0	0	N/F		0
2	16/09/17	0	0	N/F		0
3	23/09/17	1427	276	N/F		1703
4	30/09/17	0	0	0		0
5	07/10/17	340	184	0		524
6	14/10/17	0	0	0		0
7	21/10/17	1062	270	757		2089
8	28/10/17	1471	235	602		2308
9	04/11/17	420	124	203		747
10	11/11/17	0	0	16		16
11	18/11/17	209	137	0		346
12	25/11/17	0	0	473		473
13	02/12/17	0	0	680		680
14	09/12/17	0	0	30		30
15	16/12/17	0	0	425		425
16	23/12/17	46	140	165		351
17	30/12/17	Not Fishing	Not Fishing	912		912
18	06/01/18	Not Fishing	Not Fishing	1062		1062
19	13/01/18	Not Fishing	Not Fishing	1327		1327
20	20/01/18	Not Fishing	Not Fishing	500		500
21	27/01/18	Not Fishing	Not Fishing	1052		1052
22	03/02/18	Not Fishing	Not Fishing	1280		1280
23	10/02/18	Not Fishing	Not Fishing	807		807
24	17/02/18	Not Fishing	Not Fishing	105		105
25	24/02/18					0
26	03/03/18					0
27	10/03/18					0
28	17/03/18					0
29	24/03/18					
30	31/03/18					
Total to Date(kg)		4975	1366	10396	0	16737

Appendix 5- 2 River Erne Silver Eel Weekly Collection Sheet 2017/18

Week No.	Week Ending	Lisnaskea	Ferny Gap	Portora Gates	Urney Bridge	Roscor Bridge	Lough Gowna	Total for Week
1	**09/09/2017**	0	0	484	0	N/F	0	484
2	**16/09/2017**	0	2653	607	0	N/F	0	3260
3	**23/09/2017**	819	983	483	974	N/F	0	3259
4	**30/09/2017**	455	1112	314	876	N/F	0	2757
5	**07/10/2017**	413	0	365	524	N/F	0	1302
6	**14/10/2017**	0	487	103	37	N/F	0	627
7	**21/10/2017**	433	2625	1370	2866	1343	2599	11236
8	**28/10/2017**	1260	858	1674	2818	825	2745	10180
9	**04/11/2017**	309	194	101	357	79	0	1040
10	**11/11/2017**	0	0	0	0	0	0	0
11	**18/11/2017**	0	486	198	282	0	0	966
12	**25/11/2017**	344	631	202	314	635	193	2319
13	**02/12/2017**	1283	608	1170	1175	217	0	4453
14	**09/12/2017**	135	129	65	0	0	0	329
15	**16/12/2017**	Not Fishing	638	Not Fishing	Not Fishing	345	Not Fishing	983
16	**23/12/2017**	Not Fishing	165	Not Fishing	Not Fishing	110	Not Fishing	275
17	**30/12/2017**							
18	**06/01/2018**							
19	**13/01/2018**							
20	**20/01/2018**							
21	**27/01/2018**							
22	**03/02/2018**							
23	**10/02/2018**							
24	**17/02/2018**							
25	**24/02/2018**							
26	**03/03/2018**							
27	**10/03/2018**							
28	**17/03/2018**							
29	**24/03/2018**							
30	**31/03/2018**							
Total to Date(kg)		**5451**	**11569**	**7136**	**10223**	**3554**	**5537**	**43470**

Appendix 5- 3 River Lee Silver Eel Weekly Collection Sheet 2017/18

Week No.	Week Ending	Inniscarra Reservoir	Comment
1	19/08/2017	N/A	Nets set on 17/8/17
2	26/08/2017	210	Released at Iniscarra Graveyard
3	02/09/2017	332	Released at Iniscarra Graveyard
4	09/09/2017		
5	16/09/2017		
6	23/09/2017		
7	30/09/2017		
8	07/10/2017		
9	14/10/2017		
10	21/10/2017		
11	28/10/2017		
12	04/11/2017		
13	11/11/2017		
14	18/11/2017		
15	25/11/2017		
16	02/12/2017		
17	09/12/2017		
18	16/12/2017		
19	23/12/2017		
20	30/12/2017		
21	06/01/2018		
22	13/01/2018		
23	20/01/2018		
24	27/01/2018		
25	03/02/2018		
26	10/02/2018		
27	17/02/2018		
28	24/02/2018		
29	03/03/2018		
30	10/03/2018		
31	17/03/2018		
32	24/03/2018		
33	31/03/2018		
34	07/04/2018		
Total to Date(kg)		542	

Appendix 6: Water Framework Directive

Appendix 6- 1 WFD Lake summary data, 2016

RBD	Catchments	Lake name	No. Night	No. Net	No. Eels	CPUE	Average Length	Min Length (cm)	Max Length (cm)	Average weight (kg)	Min weight (kg)	Max Weight (kg)	Total Weight (kg)
ERBD	Boyne	Bane, Lough	2	9	5	0.56	43.6	25.3	63	0.237	0.0533	0.491	1.185
ERBD	Boyne	Lene, Lough	2	18	2	0.11	61.9	51.3	72.5	0.501	0.214	0.788	1.002
ERBD	Ovoca	Tay, Lough	1	9	0	0	na	na	na	na	na	na	na
NWIRBD	Ballintra	Glen Lough	2	9	10	1.11	43.26	36.9	53	0.152	0.079	0.301	1.515
NWIRBD	Erne	Macnean Lower, Lough	2	9	5	0.56	59.64	57.8	60.5	0.376	0.343	0.3905	1.877
NWIRBD	Erne	MacNean Upper, Lough	2	9	33	3.67	50.14	33.5	76.5	0.264	0.069	0.693	8.701
SHIRBD	Shannon	Derg, Lough	7	36	57	1.58	47.51	35.4	71.2	0.211	0.047	0.869	12.05
SHIRBD	Fergus	Inchiquin Lough	3	18	28	1.56	47.32	28	31.5	0.191	0.0815	0.039	5.359
SHIRBD	Inagh	Lickeen Lough	2	9	4	0.44	46.9	37.50	54	0.211	0.099	0.331	0.844
SHIRBD	Shannon	Parteen Basin	2	9	17	1.89	46.04	35.50	57.1	0.179	0.009	0.3316	3.047
WRBD	Coastal	Ardderry Lough	2	9	5	0.56	43.76	38.4	50.8	0.150	0.078	0.225	0.749
WRBD	Moy	Beltra Lough	2	9	20	0.22	38.46	29.5	60	1.067	0.035	0.395	2.134
WRBD	Moy	Conn, Lough	3	27	33	1.22	49.15	35.8	77.6	0.245	0.076	0.872	8.099
WRBD	Garvogue	Glenade Lough	2	9	5	0.56	51.14	37.6	62.9	0.265	0.078	0.526	1.325
WRBD	Dawros	Kylemore Lough	2	9	4	0.44	45.55	35	60.8	0.198	0.0825	0.433	0.792
WRBD	Corrib	Lettercraffroe Lough	1	9	8	0.89	52.99	40.50	77.1	0.299	0.097	0.922	2.394
WRBD	Kilcolgan	Rea, Lough	2	9	20	2.22	53.71	42.60	68.4	0.279	0.136	0.556	5.586
WRBD	Corrib	Ross Lake	2	9	1	0.11	70.5	70.50	70.5	0.618	0.618	0.618	0.618
WRBD	Coastal	Shindilla, Lough	2	9	9	1	38.93	32.00	53.1	0.107	0.059	0.249	0.961

Appendix 6- 2 WFD Lake length frequency data, 2016

RBD	Catchments	Lake name	No. Eels	20-29cm	30-39cm	40-49cm	50-59cm	60-69cm	70-79cm	>80cm
ERBD	Boyne	Bane, Lough	5	1	1	1	1	1	0	0
ERBD	Boyne	Lene, Lough	2	0	0	0	1	0	1	0
ERBD	Ovoca	Tay, Lough	0	0	0	0	0	0	0	0
NWIRBD	Ballintra	Glen Lough	10	0	4	5	1	0	0	0
NWIRBD	Erne	Macnean Lower, Lough	5	0	0	0	2	3	0	0
NWIRBD	Erne	MacNean Upper, Lough	33	0	5	12	10	5	1	0
SHIRBD	Shannon	Derg, Lough	57	0	5	34	14	3	1	0
SHIRBD	Fergus	Inchiquin Lough	28	0	3	14	11	0	0	0
SHIRBD	Inagh	Lickeen Lough	4	0	1	1	2	0	0	0
SHIRBD	Shannon	Parteen Basin	17	0	3	11	3	0	0	0
WRBD	Coastal	Ardderry Lough	5	0	1	3	1	0	0	0
WRBD	Moy	Beltra Lough	20	1	12	6	0	1	0	0
WRBD	Moy	Conn, Lough	33	0	3	20	5	3	2	0
WRBD	Garvogue	Glenade Lough	5	0	1	1	1	2	0	0
WRBD	Dawros	Kylemore Lough	4	0	1	2	0	1	0	0
WRBD	Corrib	Lettercraffroe Lough	8	0	0	3	4	0	1	0
WRBD	Kilcolgan	Rea, Lough	20	0	0	5	13	2	0	0
WRBD	Corrib	Ross Lake	1	0	0	0	0	0	1	0
WRBD	Coastal	Shindilla, Lough	9	0	7	1	1	0	0	0

Appendix 6- 3 WFD River summary data, 2016

RBD	Catchment	River	Site	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
SERBD	Suir	Aherlow (Moneynaboola) River	Moneynaboola_A	38	38	38	n.a	n.a	n.a	n.a
SERBD	Suir	Aherlow (Rossadrehid) River	Dromamarka Br._A	32.1	32.1	32.1	n.a	n.a	n.a	n.a
SERBD	Suir	Anner River	Killusty Wood_A	34.4	34.4	34.4	n.a	n.a	n.a	n.a
SERBD	Suir	Ara River	Ara Br._A	32.75	29	44	n.a	n.a	n.a	n.a
SERBD	Suir	Ara River	Bansha Castle_A	34.55	32	37.1	n.a	n.a	n.a	n.a
SERBD	Suir	Ara River	Bansha_A	27.3	27.3	27.3	n.a	n.a	n.a	n.a
SERBD	Suir	Ara River	Grallagh_A	32.16	30.5	34.5	n.a	n.a	n.a	n.a
SERBD	Slaney	Bann, River	Bann Br._A	72.3	72.3	72.3	0.7765	0.7765	0.7765	0.7765
SERBD	Slaney	Bann, River	Doran's Br._A	14.86	14.5	15.1	n.a	n.a	n.a	n.a
SERBD	Slaney	Bann, River	Grovemill_A	24.2	24.2	24.2	0.025	0.025	0.025	0.025
SERBD	Slaney	Bann, River	Island Br._A	27	27	27	0.026	0.026	0.026	0.026
SERBD	Slaney	Bann, River	Margerry's Br._A	21.2	15	27.4	0.00725	0.0055	0.009	0.0145
SERBD	Slaney	Bann, River	Milseoge Br._A	26.15	20.3	32	0.0111	0.0111	0.0111	0.0111
SERBD	Slaney	Bann, River	Tinnabaum_A	20	20	20	0.011	0.011	0.011	0.011
SHIRBD	Caher	Caher River	Br. 2 km d/s Formoyle_A	22.5	22.5	22.5	n.a	n.a	n.a	n.a
SHIRBD	Caher	Caher River	Murroogh_A	23	20	26	n.a	n.a	n.a	n.a
SERBD	Nore	Dinin River	Dinin Br._A	24.35	16.2	35.3	0.0261	0.0067	0.0765	0.209
ERBD	Liffey	Dodder, River	Bushy Park_A	33.33	29.3	37.2	0.0635	0.0414	0.0832	0.1906
NWIRBD	Eany Water	Eany Water	Just d/s Eany Beg/More confl_A	30	30	30	n.a	n.a	n.a	n.a
ERBD	Ovoca	Glenealo River	Br. d/s Upper Lake_A	30.675	28.2	34	n.a	n.a	n.a	n.a
SHIRBD	Shannon Lwr	Killmastulla (Erinagh) River	Gortnacleha_A	11.7	11.7	11.7	n.a	n.a	n.a	n.a

RBD	Catchment	River	Site	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
SHIRBD	Shannon Lwr	Killmastulla (Garryclogher) River	Garryclogher_A	19.7	19.7	19.7	n.a	n.a	n.a	n.a
SHIRBD	Shannon Lwr	Killmastulla River	Carrow Br._A	30.3	30.3	30.3	n.a	n.a	n.a	n.a
SERBD	Nore	King's (Kilkenny) River	Killinny_A	32.5	32.5	32.5	0.0425	0.0425	0.0425	0.0425
SHIRBD	Shannon Est Sth	Maigue, River	Castleroberts Br._A	27.8	27.8	27.8	0.0265	0.0265	0.0265	0.0265
SHIRBD	Shannon Est Sth	Maigue, River	Fort Bridge East_A	12	12	12	n.a	n.a	n.a	n.a
ERBD	Mayne	Mayne (Cuckoo) River	Limekiln Lane_A	11	11	11	n.a	n.a	n.a	n.a
ERBD	Mayne	Mayne River	Snugborough_A	16.52	7	37.2	0.0279	0.0011	0.1	0.1394
ERBD	Mayne	Mayne River	Wellfield Br._A	21.2	21.2	21.2	n.a	n.a	n.a	n.a
ERBD	Nanny	Nanny (Meath) (Hurley) River	Boolies Little_A	28	28	28	n.a	n.a	n.a	n.a
ERBD	Nanny	Nanny (Meath), River	Knockisland_A	10	9	11	n.a	n.a	n.a	n.a
SERBD	Owenavorragh	Owenavorragh River	Ballyminaun_A	11.6	11.6	11.6	n.a	n.a	n.a	n.a
SERBD	Owenavorragh	Owenavorragh River	Coolock Beg_A	17	17	17	0.006	0.006	0.006	0.006
SERBD	Owenavorragh	Owenavorragh River	Killanagh_A	10.1	10.1	10.1	n.a	n.a	n.a	n.a
WRBD	Corrib	Owenbrin River	Tullymore_A	33.3	33.3	33.3	n.a	n.a	n.a	n.a
WRBD	Kinvarra	Owendalluleegh River	Br. SE Killafeen_A	30.3	28.1	32.5	0.0328	0.032	0.0336	0.0656
WRBD	Kinvarra	Owendalluleegh River	Dereen_A	23	23	23	n.a	n.a	n.a	n.a
SHIRBD	Shannon Lwr	Scariff (Anamullaghaun) River	Anamullaghaun Br._A	41	41	41	n.a	n.a	n.a	n.a
ERBD	Coastal	Sluice River	Portmarnock Racetrack_A	20.5	20.5	20.5	n.a	n.a	n.a	n.a
SERBD	Suir	Suir, River	Rossestown_A	35.25	25	48	n.a	n.a	n.a	n.a
SERBD	Suir	Suir, River	Rossestown_B	29.33	22	42	n.a	n.a	n.a	n.a

Appendix 6- 4 WFD River Survey and Density data, 2016

RBD	Catchment	River Name	River Site	Methodology	No. Sets/Boats	No. Runs	Area (m^2)	Density (no./m^2)	No. Eels	Total Weight (kg)
ERBD	Avoca	Glenealo River	Br. d/s Upper Lake_A	D,W	3	3	240	0.016684	4	n.a
ERBD	Boyne	Athboy (Bunboggan) River	Bunboggan_A	T,W	1	1	64	n.a	0	n.a
ERBD	Boyne	Athboy River	Br. nr Clonleasan Ho_A	D,W	2	2	235	n.a	0	n.a
ERBD	Boyne	Blackwater (Kells) (Corratinner) River	Corratinner North_A	T,W	1	1	110	n.a	0	n.a
ERBD	Boyne	Blackwater (Kells), River	Beagh Glebe_A	T,W	1	1	203	n.a	0	n.a
ERBD	Boyne	Blackwater (Kells), River	Gallon_A	T,W	1	1	230	n.a	0	n.a
ERBD	Boyne	Blackwater (Kells), River	Killinkere Br._A	T,W	1	1	230	n.a	0	n.a
ERBD	Dodder	Dodder, River	Bohernabreena_A	D,W	3	3	283	n.a	0	n.a
ERBD	Dodder	Dodder, River	Bushy Park_A	D,W	3	3	354	0.008464	3	0.1906
ERBD	Dodder	Dodder, River	Firhouse_A	D,W	2	3	236	n.a	0	n.a
ERBD	Dodder	Dodder, River	Knocklyon_A	D,W	2	3	282	n.a	0	n.a
ERBD	Dodder	Dodder, River	Mount Carmel Hospital_A	D,W	3	3	360	n.a	0	n.a
ERBD	Dodder	Dodder, River	Oldbawn_A	D,W	3	3	309	n.a	0	n.a
ERBD	Mayne	Mayne (Cuckoo) River	Limekiln Lane_A	T,W	1	1	43	0.023378	1	n.a
ERBD	Mayne	Mayne River	Snugborough_A	T,W	1	1	58	0.121528	7	0.1394
ERBD	Mayne	Mayne River	Wellfield Br._A	T,W	1	1	70	0.028571	2	n.a
ERBD	Nanny	Nanny (Meath) (Hurley) River	Boolies Little_A	T,W	1	1	150	0.006686	1	n.a
ERBD	Nanny	Nanny (Meath) (Hurley) River	New Br. (North)_A	T,W	1	1	119	n.a	0	n.a
ERBD	Nanny	Nanny (Meath) (Hurley) River	Rathfeigh_A	T,W	1	1	187	n.a	0	n.a
ERBD	Nanny	Nanny (Meath), River	Knockisland_A	T,W	1	1	187	0.016033	3	n.a
ERBD	Nanny	Nanny (Meath), River	Reask West_A	T,W	1	1	159	n.a	0	n.a
ERBD	Sluice	Sluice River	Portmarnock Racetrack_A	T,W	1	1	70	0.014205	1	n.a
NBIRBD	Dee	White River (Louth)	Athclare_A	D,W	2	3	233	n.a	0	n.a

RBD	Catchment	River Name	River Site	Methodology	No. Sets/Boats	No. Runs	Area (m²)	Density (no./m²)	No. Eels	Total Weight (kg)
NBIRBD	Dee	White River (Louth)	Coneyburrow Br._B	D,W	3	3	353	n.a	0	n.a
NBIRBD	Dee	White River (Louth)	Dunleer_A	D,W	2	3	244	n.a	0	n.a
NBIRBD	Dee	White River (Louth)	Gibber's Br._A	D,W	1	3	147	n.a	0	n.a
NBIRBD	Dee	White River (Louth)	Martinstown Br._A	D,W	1	3	177	n.a	0	n.a
NBIRBD	Dee	White River (Louth)	Martinstown Wood_A	T,W	1	1	95	n.a	0	n.a
NWIRBD	Eany	Eany Beg	Drumagraa_A	T,W	1	1	150	n.a	0	n.a
NWIRBD	Eany	Eany More	Drumboarty_A	T,W	1	1	349	n.a	0	n.a
NWIRBD	Eany	Eany Water	Just d/s Eany Beg/More confl_A	SP,NW	2	1	636	0.001572	1	n.a
NWIRBD	Erne	Annalee River	0.2km d/s Cavan R confl_A	SS,NW	4	2	2750	n.a	0	n.a
NWIRBD	Erne	Annalee River	Drumaraw_A	SS,NW	4	1	5182	n.a	0	n.a
NWIRBD	Erne	Cullies River	Br. nr Kilbrackan House_A	D,W	2	2	294	n.a	0	n.a
NWIRBD	Erne	Waterfoot River	Letter Br._A	D,W	3	3	277	n.a	0	n.a
SERBD	Nore	Dinin River	Dinin Br._A	D,W	3	3	290	0.027583	8	0.209
SERBD	Nore	King's (Kilkenny) (Tullaroan) River	Bigmeadow_A	T,W	1	1	146	n.a	0	n.a
SERBD	Nore	King's (Kilkenny) (Tullaroan) River	Killaloe Br._A	T,W	1	1	154	n.a	0	n.a
SERBD	Nore	King's (Kilkenny) River	Kells Br._A	SP,NW	2	1	3936	n.a	0	n.a
SERBD	Nore	King's (Kilkenny) River	Killinny_A	SP,NW	2	1	3082	0.000324	1	0.0425
SERBD	Owenavorragh	Owenavorragh River	Ballycanew Br._A	T,W	1	1	197	n.a	0	n.a
SERBD	Owenavorragh	Owenavorragh River	Ballyminaun_A	D,W	3	1	394	0.002535	1	n.a
SERBD	Owenavorragh	Owenavorragh River	Coolock Beg_A	T,W	1	1	161	0.006227	1	0.006
SERBD	Owenavorragh	Owenavorragh River	Killanagh_A	T,W	1	1	209	0.004789	1	n.a
SERBD	Slaney	Bann, River	Bann Br._A	T,W	1	1	295	0.003396	1	0.7765
SERBD	Slaney	Bann, River	d/s Ballingarry Wood_A	T,W	1	1	252	n.a	0	n.a

RBD	Catchment	River Name	River Site	Methodology	No. Sets/Boats	No. Runs	Area (m²)	Density (no./m²)	No. Eels	Total Weight (kg)
SERBD	Slaney	Bann, River	Doran's Br._A	T,W	1	1	732	0.004098	3	n.a
SERBD	Slaney	Bann, River	Grovemill_A	T,W	1	1	154	0.00648	1	0.025
SERBD	Slaney	Bann, River	Island Br._A	T,W	1	1	597	0.001674	1	0.026
SERBD	Slaney	Bann, River	Margerry's Br._A	T,W	1	1	366	0.005467	2	0.0145
SERBD	Slaney	Bann, River	Milltown Br._A	T,W	1	1	503	n.a	0	n.a
SERBD	Slaney	Bann, River	Milseoge Br._A	T,W	1	1	348	0.005747	2	0.0111
SERBD	Slaney	Bann, River	Pallis Br._A	T,W	1	1	99	n.a	0	n.a
SERBD	Slaney	Bann, River	Tinnabaum_A	T,W	1	1	107	0.00932	1	0.011
SERBD	Suir	Aherlow (Assaroola) River	u/s Aherlow Confl._A	T,W	1	1	108	n.a	0	n.a
SERBD	Suir	Aherlow (Clydagh) River	Gortaclivore_A	T,W	1	1	160	n.a	0	n.a
SERBD	Suir	Aherlow (Galbally) River	Galbally_A	T,W	1	1	147	n.a	0	n.a
SERBD	Suir	Aherlow (Knockanebrack) River	Knockanebrack_A	T,W	1	1	117	n.a	0	n.a
SERBD	Suir	Aherlow (Knockastakeen) River	Rossadrehid Br._A	T,W	1	1	135	n.a	0	n.a
SERBD	Suir	Aherlow (Moneynaboola) River	Moneynaboola_A	T,W	1	1	132	0.007591	1	n.a
SERBD	Suir	Aherlow (Rossadrehid) River	Dromamarka Br._A	T,W	1	1	151	0.006609	1	n.a
SERBD	Suir	Aherlow (Toureen) River	Toureen Peacaun_A	T,W	1	1	95	n.a	0	n.a
SERBD	Suir	Aherlow River	Ardrahin_A	T,W	1	1	229	n.a	0	n.a
SERBD	Suir	Aherlow River	Ashgrove Br._A	SP,NW	2	1	1656	n.a	0	n.a
SERBD	Suir	Aherlow River	Ballybrien North_A	T,W	1	1	77	n.a	0	n.a
SERBD	Suir	Aherlow River	Gortnafurra_A	T,W	1	1	137	n.a	0	n.a
SERBD	Suir	Aherlow River	Killardy Br._A	SP,NW	2	1	4368	n.a	0	n.a
SERBD	Suir	Aherlow River	Lyre_A	T,W	1	1	122	n.a	0	n.a
SERBD	Suir	Aherlow River	Moor Abbey_A	T,W	1	1	344	n.a	0	n.a
SERBD	Suir	Aherlow River	North of Ballydavid_A	T,W	1	1	328	n.a	0	n.a

RBD	Catchment	River Name	River Site	Methodology	No. Sets/Boats	No. Runs	Area (m^2)	Density (no./m^2)	No. Eels	Total Weight (kg)
SERBD	Suir	Aherlow River	Pollagh East_A	SP,NW	1	1	3782	n.a	0	n.a
SERBD	Suir	Aherlow River	South of Drangan Beg_A	T,W	1	1	507	n.a	0	n.a
SERBD	Suir	Aherlow River	u/s Assaroola Confl._A	T,W	1	1	134	n.a	0	n.a
SERBD	Suir	Anner River	Killusty North_A	T,NW	1	1	1067	n.a	0	n.a
SERBD	Suir	Anner River	Killusty Wood_A	T,NW	1	1	1140	0.000878	1	n.a
SERBD	Suir	Anner River	Killusty_A	D,NW	1	2	1016	n.a	0	n.a
SERBD	Suir	Anner River	Killusty_A	T,NW	1	1	866	n.a	0	n.a
SERBD	Suir	Anner River	South of Killusty Br._A	T,NW	1	1	647	n.a	0	n.a
SERBD	Suir	Anner River	West of Killusty Ringfort_A	T,NW	1	1	721	n.a	0	n.a
SERBD	Suir	Ara River	Ara Br._A	D,NW	1	2	806	0.008684	7	n.a
SERBD	Suir	Ara River	Ara Br._A	T,NW	1	1	850	0.001176	1	n.a
SERBD	Suir	Ara River	Bansha Castle_A	T,NW	1	1	767	0.002607	2	n.a
SERBD	Suir	Ara River	Bansha_A	D,NW	1	2	1011	n.a	0	n.a
SERBD	Suir	Ara River	Bansha_A	T,NW	1	1	928	0.001077	1	n.a
SERBD	Suir	Ara River	Grallagh_A	T,NW	1	1	1133	0.002649	3	n.a
SERBD	Suir	Ara River	Lismacue_A	T,NW	1	1	1139	n.a	0	n.a
SERBD	Suir	Cromoge (Fishmoyne) River	Magherareagh_A	T,NW	1	1	499	n.a	0	n.a
SERBD	Suir	Cromoge (Fishmoyne) River	Pollagh_A	SP,NW	1	1	1390	n.a	0	n.a
SERBD	Suir	Cromoge (Fishmoyne) River	Pollagh_A	T,NW	1	1	994	n.a	0	n.a
SERBD	Suir	Suir, River	Aughall Middle_A	SP,NW	1	1	398	n.a	0	n.a
SERBD	Suir	Suir, River	Eastwood_A	SP,NW	1	1	514	n.a	0	n.a
SERBD	Suir	Suir, River	Knocknageragh Br._A	D,NW	1	2	564	n.a	0	n.a
SERBD	Suir	Suir, River	Knocknageragh Br._A	T,NW	1	1	798	n.a	0	n.a
SERBD	Suir	Suir, River	Rossestown_A	D,NW	1	2	1301	0.004613	6	n.a
SERBD	Suir	Suir, River	Rossestown_A	T,NW	1	1	1759	0.000568	1	n.a

RBD	Catchment	River Name	River Site	Methodology	No. Sets/Boats	No. Runs	Area (m^2)	Density (no./m^2)	No. Eels	Total Weight (kg)
SERBD	Suir	Suir, River	Rossestown_B	T,NW	1	1	1691	0.001775	3	n.a
SERBD	Suir	Suir, River	Rossestown_C	T,NW	1	1	1561	n.a	0	n.a
SHIRBD	Caher	Caher River	Br. 2 km d/s Formoyle_A	D,W	2	2	206	0.004864	1	n.a
SHIRBD	Caher	Caher River	Derrynavanagh_A	T,W	1	1	642	n.a	0	n.a
SHIRBD	Caher	Caher River	Murroogh_A	T,W	1	1	405	0.004943	2	n.a
SHIRBD	Maigue	Maigue, River	Ballybane_A	T,W	1	1	142	n.a	0	n.a
SHIRBD	Maigue	Maigue, River	Bruree_A	T,W	1	1	413	n.a	0	n.a
SHIRBD	Maigue	Maigue, River	Castleroberts Br._A	SP,NW	2	1	15415	6.49E-05	1	0.0265
SHIRBD	Maigue	Maigue, River	Fort Bridge East_A	T,W	1	1	155	0.006466	1	n.a
SHIRBD	Shannon	Ballydangan River	Br. u/s Shannon R. Confl_A	BB	1	1	189	n.a	0	n.a
SHIRBD	Shannon	Ballyfinboy River	Ballinderry Br._A	T,W	1	1	172	n.a	0	n.a
SHIRBD	Shannon	Ballyfinboy River	Br. just u/s L. Derg_A	D,W	3	3	215	n.a	0	n.a
SHIRBD	Shannon	Cross River	Br. u/s Shannon River_A	BB	1	1	1805	n.a	0	n.a
SHIRBD	Shannon	Kilcrow River	Ballyshrule Br._A	SP,NW	2	1	1541	n.a	0	n.a
SHIRBD	Shannon	Killmastulla (Erinagh) River	Gortnacleha_A	T,W	1	1	49	0.020576	1	n.a
SHIRBD	Shannon	Killmastulla (Garryclogher) River	Garryclogher_A	T,W	1	1	67	0.014869	1	n.a
SHIRBD	Shannon	Killmastulla River	Cappadine_A	T,W	1	1	265	n.a	0	n.a
SHIRBD	Shannon	Killmastulla River	Carrow Br._A	T,W	1	1	79	0.012606	1	n.a
SHIRBD	Shannon	Killmastulla River	Erinagh Br._A	T,W	1	1	129	n.a	0	n.a
SHIRBD	Shannon	Nenagh River	Ballysoilshaun Br._A	D,NW	1	3	758	n.a	0	n.a
SHIRBD	Shannon	Scariff (Anamullaghaun) River	Anamullaghaun Br._A	T,W	1	1	111	0.009016	1	n.a
SHIRBD	Shannon	Scariff (Corra) River	Gortavrulla_A	T,W	1	1	242	n.a	0	n.a
SHIRBD	Shannon	Scariff (Trib) River	Scarrif West_A	T,W	1	1	124	n.a	0	n.a
SHIRBD	Shannon	Scariff River	Little Br._A	T,W	1	1	123	n.a	0	n.a

RBD	Catchment	River Name	River Site	Methodology	No. Sets/Boats	No. Runs	Area (m^2)	Density (no./m^2)	No. Eels	Total Weight (kg)
SHIRBD	Shannon	Scarrif (Cloghan) River	Core Br._A	T,W	1	1	145	n.a	0	n.a
SHIRBD	Shannon	Scarrif (Glenbonniv) River	Derrynahelia_A	T,W	1	1	129	n.a	0	n.a
SHIRBD	Shannon	Shannon (Canal-Cut), River	Athlone Canal_A	BB	1	1	1520	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Ballyleague Br. Lanesboro_A	BB	2	1	6248	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Ballyleague Br. Lanesboro_A	BB	1	1	2528	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Ballyleague Br. Lanesboro_A	BB	1	1	3720	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Battle Br. Lock_A	BB	1	1	1640	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Battle Br._B	BB	1	1	4432	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Battle Br._C	BB	1	1	3432	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Bishops Islands_A	BB	1	1	3592	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Bogganfin_A	BB	1	1	4384	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Bunaribba_A	BB	1	1	2656	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Carrickobreen_A	BB	1	1	4144	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Carrickynaghtan_A	BB	2	1	9584	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Carrickynaghtan_A	BB	1	1	4712	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Carrickynaghtan_A	BB	1	1	4872	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Cleaheen_A	BB	1	1	5312	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Cloniff_A	BB	1	1	5184	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Clonmacnoise: at Jetty_A	BB	1	1	4680	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Cloonfad_A	BB	1	1	4120	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Coolumber_A	BB	1	1	6152	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Creevagh_A	BB	1	1	6480	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Curley's Island Backwater_A	BB	1	1	1576	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	d/s of Costello's Island_A	BB	1	1	5160	n.a	0	n.a

RBD	Catchment	River Name	River Site	Methodology	No. Sets/Boats	No. Runs	Area (m²)	Density (no./m²)	No. Eels	Total Weight (kg)
SHIRBD	Shannon	Shannon (Upper), River	Devenish Island_A	BB	1	1	3112	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Hartley_A	BB	1	1	4448	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Hillquarter_A	BB	1	1	4536	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Kilnacarrow_A	BB	2	1	10760	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Kilnacarrow_A	BB	1	1	5752	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Kilnacarrow_A	BB	1	1	5008	n.a	0	n.a
SHIRBD	Shannon	Shannon (Upper), River	Shannonbridge Railway Br._A	BB	1	1	5456	n.a	0	n.a
SHIRBD	Shannon	Tullamore River	Br. SW of Ballycowen Br._A	D,NW	1	3	803	n.a	0	n.a
SHIRBD	Suck	Suck, River	Ballyforan Br._A	SP,NW	1	1	14150	n.a	0	n.a
SHIRBD	Suck	Suck, River	Ballyforan Forest_A	BB	1	1	5344	n.a	0	n.a
SHIRBD	Suck	Suck, River	Cloonagh_A	BB	1	1	3240	n.a	0	n.a
SHIRBD	Suck	Suck, River	Cloondacarra Br._A	SP,NW	2	1	2230	n.a	0	n.a
SHIRBD	Suck	Suck, River	Cloontrask Forest_A	SP,NW	2	1	6903	n.a	0	n.a
SHIRBD	Suck	Suck, River	Harristown_A	SP,NW	2	1	3072	n.a	0	n.a
SHIRBD	Suck	Suck, River	u/s Shannon Confl._A	BB	1	1	3128	n.a	0	n.a
WRBD	Corrib	Glensaul (Ballybanaun Mountain) River	Carheen_A	T,W	1	1	112	n.a	0	n.a
WRBD	Corrib	Glensaul (Derryveeny) River	Derryveeny_A	T,W	1	1	115	n.a	0	n.a
WRBD	Corrib	Glensaul (Sruffaunnagreeve) River	Sruffaunnagreeve_A	T,W	1	1	53	n.a	0	n.a
WRBD	Corrib	Glensaul (Tourmakeady) River	Tourmakeady_A	T,W	1	1	300	n.a	0	n.a
WRBD	Corrib	Glensaul River	Garrangarra_A	T,W	1	1	160	n.a	0	n.a
WRBD	Corrib	Glensaul River	Greenaun_A	T,W	1	1	177	n.a	0	n.a
WRBD	Corrib	Glensaul River	Tonaglanna_A	T,W	1	1	25	n.a	0	n.a
WRBD	Corrib	Glensaul River	Tourmakeady Forest_A	T,W	1	1	258	n.a	0	n.a

RBD	Catchment	River Name	River Site	Methodology	No. Sets/Boats	No. Runs	Area (m^2)	Density (no./m^2)	No. Eels	Total Weight (kg)
WRBD	Corrib	Owenbrin (Nadirkmore) River	Ford_A	T,W	1	1	702	n.a	0	n.a
WRBD	Corrib	Owenbrin River	Barnahowna_A	T,W	1	1	1001	n.a	0	n.a
WRBD	Corrib	Owenbrin River	Br. u/s L. Mask_A	D,W	3	3	532	n.a	0	n.a
WRBD	Corrib	Owenbrin River	d/s Dirkbeg Lough_A	D,W	1	1	143	n.a	0	n.a
WRBD	Corrib	Owenbrin River	Dirkbeg Hill_A	T,W	1	1	151	n.a	0	n.a
WRBD	Corrib	Owenbrin River	Killateeaun_A	T,W	1	1	560	n.a	0	n.a
WRBD	Corrib	Owenbrin River	Shanvallycahill_A	T,W	1	1	493	n.a	0	n.a
WRBD	Corrib	Owenbrin River	Shanvallycahill_B	T,W	1	1	738	n.a	0	n.a
WRBD	Corrib	Owenbrin River	Tullymore_A	T,W	1	1	977	0.001023	1	n.a
WRBD	Corrib	Srah River	Drain_A	T,W	1	1	93	n.a	0	n.a
WRBD	Corrib	Srah River	Shangort_A	T,W	1	1	158	n.a	0	n.a
WRBD	Corrib	Srah River	Srah Br._A	T,W	1	1	206	n.a	0	n.a
WRBD	Corrib	Srah River	Srah East_A	T,W	1	1	129	n.a	0	n.a
WRBD	Corrib	Srah River	Tawnagh Hill_A	T,W	1	1	116	n.a	0	n.a
WRBD	Corrib	Srah River	Tawnagh Junction_a	T,W	1	1	84	n.a	0	n.a
WRBD	Corrib	Srah River	u/s Treatment Plant_A	T,W	1	1	121	n.a	0	n.a
WRBD	Moy	Castlebar River	Br. 2.5 km d/s Castlebar_A	T,W	1	1	166	n.a	0	n.a
WRBD	Moy	Moy, River	Bunnafinglas Confl._A	BB	1	1	4456	n.a	0	n.a
WRBD	Moy	Moy, River	Bunnafinglas South_A	BB	1	1	6272	n.a	0	n.a
WRBD	Moy	Moy, River	Bunnafinglas West_A	BB	1	1	3800	n.a	0	n.a
WRBD	Moy	Moy, River	Cloonacool Br._A	T,W	1	1	343	n.a	0	n.a
WRBD	Moy	Moy, River	Cloonbaniff Br._C	D,W	3	3	385	n.a	0	n.a
WRBD	Moy	Moy, River	Curragh_A	BB	1	1	3576	n.a	0	n.a
WRBD	Moy	Moy, River	Leitrim North_A	T,W	1	1	213	n.a	0	n.a
WRBD	Moy	Moy, River	Moorbrook_A	BB	1	1	3624	n.a	0	n.a

RBD	Catchment	River Name	River Site	Methodology	No. Sets/Boats	No. Runs	Area (m^2)	Density (no./m^2)	No. Eels	Total Weight (kg)
WRBD	Moy	Moy, River	Rathbaun_A	BB	1	1	5800	n.a	0	n.a
WRBD	Moy	Moy, River	Sessuecommon_A	T,W	1	1	383	n.a	0	n.a
WRBD	Moy	Owendalluleegh River	Br. SE Killafeen_A	D,W	3	3	514	0.003894	2	0.0656
WRBD	Moy	Owendalluleegh River	Dereen_A	T,W	1	1	734	0.001362	1	n.a
WRBD	Moy	Owendalluleegh River	Killafeen Field_A	T,W	1	1	475	n.a	0	n.a

T,W-Timed, Wading, **T,NW**-Timed, Non-Wading, **DW**-Depletion, Wading, **D,NW**-Depletion, Non-Wading, **SP,NW**-Single Pass, Non-Wading, **SS,NW**-Separate Sides, Non-Wading, **BB** – Boom Boat

Appendix 6- 5 WFD River length frequency data, 2016

RBD	Catchments	River Name	River Site	No. Eels	5-9 cm	10-19 cm	20-29 cm	30-39 cm	40-49 cm	50-59 cm	60-69 cm	70-79 cm	>80 cm
ERBD	Liffey	Dodder, River	Bushy Park_A	3	0	0	1	2	0	0	0	0	0
ERBD	Ovoca	Glenealo River	Br. d/s Upper Lake_A	4	0	0	2	2	0	0	0	0	0
ERBD	Mayne	Mayne (Cuckoo) River	Limekiln Lane_A	1	0	1	0	0	0	0	0	0	0
ERBD	Mayne	Mayne River	Snugborough_A	7	2	3	1	1	0	0	0	0	0
ERBD	Mayne	Mayne River	Wellfield Br._A	1	0	0	1	0	0	0	0	0	0
ERBD	Nanny	Nanny (Meath) (Hurley) River	Boolies Little_A	1	0	0	1	0	0	0	0	0	0
ERBD	Nanny	Nanny (Meath), River	Knockisland_A	3	1	2	0	0	0	0	0	0	0
ERBD	Coastal	Sluice River	Portmarnock Racetrack_A	1	0	0	1	0	0	0	0	0	0
NWIRBD	Eany Water	Eany Water	Just d/s Eany Beg/More confl_A	1	0	0	0	1	0	0	0	0	0
SERBD	Suir	Aherlow (Moneynaboola) River	Moneynaboola_A	1	0	0	0	1	0	0	0	0	0
SERBD	Suir	Aherlow (Rossadrehid) River	Dromamarka Br._A	1	0	0	0	1	0	0	0	0	0
SERBD	Suir	Anner River	Killusty Wood_A	1	0	0	0	1	0	0	0	0	0
SERBD	Suir	Ara River	Ara Br._A	8	0	0	1	6	1	0	0	0	0
SERBD	Suir	Ara River	Bansha Castle_A	2	0	0	0	2	0	0	0	0	0
SERBD	Suir	Ara River	Bansha_A	1	0	0	1	0	0	0	0	0	0
SERBD	Suir	Ara River	Grallagh_A	3	0	0	0	3	0	0	0	0	0
SERBD	Slayney	Bann, River	Bann Br._A	1	0	0	0	0	0	0	0	1	0
SERBD	Slayney	Bann, River	Doran's Br._A	3	0	3	0	0	0	0	0	0	0
SERBD	Slayney	Bann, River	Grovemill_A	1	0	0	1	0	0	0	0	0	0
SERBD	Slayney	Bann, River	Island Br._A	1	0	0	1	0	0	0	0	0	0
SERBD	Slayney	Bann, River	Margerry's Br._A	2	0	1	1	0	0	0	0	0	0
SERBD	Slayney	Bann, River	Milseoge Br._A	2	0	0	1	1	0	0	0	0	0

RBD	Catchments	River Name	River Site	No. Eels	5-9 cm	10-19 cm	20-29 cm	30-39 cm	40-49 cm	50-59 cm	60-69 cm	70-79 cm	>80 cm
SERBD	Slayney	Bann, River	Tinnabaum_A	1	0	0	1	0	0	0	0	0	0
SERBD	Nore	Dinin River	Dinin Br._A	8	0	3	3	2	0	0	0	0	0
SERBD	Nore	King's (Kilkenny) River	Killinny_A	1	0	0	0	1	0	0	0	0	0
SERBD	Owenavorragh	Owenavorragh River	Ballyminaun_A	1	0	1	0	0	0	0	0	0	0
SERBD	Owenavorragh	Owenavorragh River	Coolock Beg_A	1	0	1	0	0	0	0	0	0	0
SERBD	Owenavorragh	Owenavorragh River	Killanagh_A	1	0	1	0	0	0	0	0	0	0
SERBD	Suir	Suir, River	Rossestown_A	7	0	0	3	2	2	0	0	0	0
SERBD	Suir	Suir, River	Rossestown_B	3	0	0	2	0	1	0	0	0	0
SHIRBD	Caher	Caher River	Br. 2 km d/s Formoyle_A	1	0	0	1	0	0	0	0	0	0
SHIRBD	Caher	Caher River	Murroogh_A	2	0	0	2	0	0	0	0	0	0
SHIRBD	Shannon Lwr	Killmastulla (Erinagh) River	Gortnacleha_A	1	0	1	0	0	0	0	0	0	0
SHIRBD	Shannon Lwr	Killmastulla (Garryclogher) River	Garryclogher_A	1	0	1	0	0	0	0	0	0	0
SHIRBD	Shannon Lwr	Killmastulla River	Carrow Br._A	1	0	0	0	1	0	0	0	0	0
SHIRBD	Shannon Est Sth	Maigue, River	Castleroberts Br._A	1	0	0	1	0	0	0	0	0	0
SHIRBD	Shannon Est Sth	Maigue, River	Fort Bridge East_A	1	0	1	0	0	0	0	0	0	0
SHIRBD	Shannon Lwr	Scariff (Anamullaghaun) River	Anamullaghaun Br._A	1	0	0	0	0	1	0	0	0	0
WRBD	Corrib	Owenbrin River	Tullymore_A	1	0	0	0	1	0	0	0	0	0
WRBD	Kinvarra	Owendalluleegh River	Br. SE Killafeen_A	2	0	0	1	1	0	0	0	0	0
WRBD	Kinvarra	Owendalluleegh River	Dereen_A	1	0	0	1	0	0	0	0	0	0

Appendix 6- 6 WFD Transitional Waters summary data, 2016

RBD	Catchments	Transitional Water	No. Nights	No. Net nights	No. Eels	CPUE	Average Length (cm)	Min. Length (cm)	Max. Length (cm)
SERBD	Barrow	Barrow Nore Upper	1	6	14	2.33	36.5	23	60
SERBD	Barrow	Barrow Estuary, Upper	1	15	30	2.00	38.26	26	61
SERBD	Barrow	New Ross Port	2	9	24	2.67	39	21	78
SERBD	Nore	Nore Estuary	1	15	14	0.93	42.71	30	57
SERBD	Suir	Suir Estuary Lower	1	12	0	0.00	na	na	na
SERBD	Suir	Suir Estuary, Middle	1	18	109	6.06	44.83	27	72.2
SERBD	Suir	Suir Estuary, Upper	1	9	6	0.67	53.86	30.6	71.5
SERBD	Barrow	Barrow Suir Nore Estuary		9	0	0.00	na	na	na
SWRBD	Coastal	Gill, Lough	1	18	125	6.94	34.83	21	58
SWRBD	Coastal	Drongawn Lough	2	18	10	0.56	37.83	23	57
SWRBD	Bandon	Bandon Estuary, Lower	1	6	6	1.00	39.15	21.4	56.5

Appendix 6- 7 WFD transitional waters length frequency data, 2016

RBD	Catchment	Axis	No. eels	0-9 cm	10-19 cm	20-29 cm	30-39 cm	40-49 cm	50-59 cm	60-69 cm	70-79 cm	>80 cm
SERBD	Barrow	Barrow Estuary, Upper	30	0	0	5	17	3	3	2	0	0
SERBD	Barrow	Barrow Nore Upper	11	0	0	2	6	1	1	1	0	0
SERBD	Barrow	New Ross Port	24	0	0	5	10	4	4	0	1	0
SERBD	Nore	Nore Estuary	14	0	0	0	2	10	2	0	0	0
SERBD	Suir	Suir Estuary, Middle	107	0	0	6	40	24	27	8	2	0
SERBD	Suir	Suir Estuary, Upper	3	0	0	0	1	0	1	0	1	0
SWRBD	Bandon	Bandon river	6	0	0	1	3	0	2	0	0	0
SWRBD	Coastal	Drongawn Lough	10	0	0	1	6	2	1	0	0	0
SWRBD	Coastal	Gill, Lough	118	0	0	31	62	16	9	0	0	0