## **ACTIVITY REPORT**

## **OF THE**

# STANDING SCIENTIFIC COMMITTEE FOR EEL

2014

**Report of the Standing Scientific Committee for Eel** to Inland Fisheries Ireland and the Dept. of Communications, Energy and Natural Resources

May 2015

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 2015.
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.

Glass eel	Young, unpigmented eel, recruiting from the sea into continental waters.
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. Thus, it is a confusing 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 Water Framework Directive.
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				
Anthropogenic mortality after management (A <sub>post</sub> )	Estimate of anthropogenic mortality after management actions are implemented			
Anthropogenic mortality before management (A <sub>pre</sub> )	Estimate of anthropogenic mortality before management actions are implemented			
Spawner escapement biomass after management (B <sub>post</sub> )	Estimate of spawner escapement biomass after management actions are implemented			
Spawner escapement biomass before management (B <sub>pre</sub> )	Estimate of spawner escapement biomass before management actions are implemented			
Best achievable biomass (B <sub>best</sub> )	Spawning biomass corresponding to recent natural recruitment that would have survived if there was only natural mortality and no stocking			
Pristine biomass (B <sub>o</sub> )	Spawner escapement biomass in absence of any anthropogenic impacts.			
Spawner per recruitment (SPR)	Estimate of spawner production per recruiting individual.			
%SPR	Ratio of SPR as currently observed to SPR of the pristine stock, expressed in percentage. %SPR is also known as Spawner Potential Ratio.			

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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 9<sup>th</sup> 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 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 is 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 - 2015

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 2015:

"The status of eel remains critical and ICES advises that all anthropogenic mortality (e.g. recreational and commercial fishing, hydropower, pumping stations, and pollution) affecting production and escapement of silver eels should be reduced to – or kept as close to – zero as possible."

"The annual recruitment of glass eel to European waters has increased over the last three years, from less than 1% to 3.7% of the 1960–1979 level in the 'North Sea' series, and from 5% to 12.2% in the

'Elsewhere' series. However, both recruitment indices are still below the 1960–1979 levels and there is therefore no change in the perception of the status of the stock.

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

#### National Advice

#### Glass Eel Imports:

Due to concerns relating to the possible introduction of pathogens and/or non-invasive species to Irish waters, the Standing Science Committee on Eel **advises against any introductions of live fish** imported from outside Ireland and especially from the continent. The SSCE **also advises against inter-catchment translocations** of live fish and/or water to minimise the spread of already introduced non-native species. The SSCE recommends that this advice should apply to the island of Ireland, especially in relation to transboundary catchments.

In the event of any stocking being considered contrary to this advice, it is essential that a risk analysis be undertaken and all batches should be screened for pathogens and non-native species, such screening is not a veterinary function and should be carried out by specialists.

#### Traceability:

International traceability is required to determine movements and quantities of eel between States (EU Regulation 1100/2007 – Article 12). There is no traceability scheme in place in Ireland which is required under the EU Regulation. Trade data made available to the group by the CSO for the period 2008 to 2014 were difficult to interpret and were not considered reliable making it difficult to determine the level of illegal catch.

#### **Irish EMP Management Actions 2014**

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 2014 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 in two regions which led to some seizures of gear, the most significant activity being on Lough Ree in the Shannon IRBD. No dealers transport trucks were seized in 2014 although it is likely that eel sales have occurred in the Shannon IRBD given the level of seizures of gear. Reliable trade (import/export) data remains unavailable to the SSCE.

#### 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 2012-2014 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 consistent long-term shortfall should not be carried forward indefinitely.

The total quantity of silver eel released from the three catchments was 75,192kg. The level of fishing mortalities was reported to be low.

In the River Shannon the trap and transport total of 26,438 kg represented 37.4% of silver eel production. The three year rolling average for the 2012 (35.7%), 2013 (28.2%) and 2013 (37.4%) seasons was 33.8%. Therefore the target of 30% over a three year rolling average has been attained in the 2014 season.

In the River Erne, for the period 2012-2014 it was decided by management to change the target to 50% of the silver eel production on a similar basis to that operated on the Shannon. This was more adaptable to changing eel production and facilitates incorporation of more inter-annual fluctuation. The trap and transport total (48,126 kg) represented 66.4% of silver eel production and exceeded the target (50%) by 11,880 kg

In the River Lee, following protocols successfully used since 2011, a contract fishing crew fished in Inniscarra reservoir and used only fyke-nets. A total 670 kg were trapped and transported downstream of the Inniscarra dam. The three year running average of the quantities transported has been above target since 2011.

The turbine mortality rates are being determined using acoustic tagged and tracked silver eel and these data are reported in the 2012 report to the EU (SSCE 2012). Additional data for the Erne were reported to the SSCE in 2012 (McCarthy *et al.* 2014).

For the *Shannon*, summarising the annual data gives mortality ranges of 16.6% to 25% and an overall average mortality of  $21.15 \pm 8\%$  for 104 tagged eel arriving at Ardnacrusha HPS (SSCE 2012). A general figure for eels estimated to use the bypass in recent years is 17.8% (SSCE, 2012). In 2014, it was estimated that 15.9% used the bypass old river channel.

For the *Erne*, during the 2014 silver eel season the patterns of generation and spillage at the River Erne hydropower stations were similar to those reported during the 2013 season. In the analyses of eel hydropower passage, varying mortality levels were incorporated, per calendar day, into the escapement model. These were based on dusk-dawn hydrometric data, power generation activity and results of previous years silver eel acoustic telemetry. Generation protocols and associated mortality rates have been described in previous reports. For the 2014 season different mortality rates were applied as follows: *Cliff HPS* (0%, only spillage); 7.9% (Generation plus spillage) and 26.7% (Only generation), *Cathaleen's Fall HPS*: 0% (only spillage; 7.7% (spillage plus half generation load); 15.4% spillage plus full generation load); 27.3% (only generation). Reduced overall generation levels occurred during the silver eel migration season, due to refurbishment of turbines. This resulted in relatively high spillage levels and reduced overall turbine passage mortality levels. This was estimated to have represented a cumulative 8.08% mortality of the total River Erne silver eel production or 24.2% of the migrating eel (not including the trapped and transported component) at the two dams during 2014.

#### 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, hydrodams, 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.

The EU Habitats Directive (Directive 92/43/EEC) and Water Framework Directive (2000/60/EC) both require the assessment of barriers to fish migration. In order to tackle the issue on a multispecies level IFI established a National Barrier Group in 2011. This group is building on the earlier work to develop a standardised assessment of barriers nationally and is currently evaluating an IFI survey sheet and methodology. The long term aim is to develop a national database of barriers for rating fish pass ability which in turn will provide information to target mitigation measures at the most significant obstructions.

IFI, in conjunction with OPW and the Local Authorities continue to make progress on river continuity and fish passage issues. Mitigation measures with barrier and weir removal or modification took place on a number of rivers in the ERBD in 2014.

Assisted upstream migration of juvenile eel takes place at the ESB Hydropower Stations on the Shannon (Ardnacrusha, Parteen), Erne (Cathaleens 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

No new information on water quality available for 2014.

There were 24 fish kills reported in 2014.

There was no new information on eel contamination in 2014.

Anguillicola crassus continues to spread and more than 70% of the wetted area is now infested.

#### **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

The Council Regulation (EC) No 1100/2007 sets a target for silver eel escapement to be achieved in the long-term. 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. Quantifying migrating silver eel each year 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 Shannon, Erne, Burrishoole and Fane catchments and a pilot in 2014 on the Barrow. Trials will also be carried out at other locations identified in the EMP using coghill nets, mark-recapture and technology options such as electronic counters or DIDSON technology.

#### Shannon

The Killaloe catch in 2014 was 15,122kg. Fishing was also undertaken by ESB contracted crews upstream of Killaloe and their catches (11,330kg) were also transported downstream.

Following adoption of new analytical protocols for estimation of Shannon silver eel production (MacNamara & McCarthy, 2013), the 2014 production/escapement results were 70,725kg and 62,980kg (with 21.15% turbine mortality and 15.6% bypass in the old river channel).

#### Burrishoole

Silver eel trapping was continued in Burrishoole in 2014. The main run occurred in October (71%). The total run amounted to a count of 3117 eels or a production/escapement of 580kg. The run had a mean weight of 0.186kg and was composed of 35.3% male eels

#### Erne

In the 2014 season the River Erne conservation fishery and the trap & transport programme were monitored by NUIG in conjunction with studies on silver eel production and escapement. The scientific protocols used in the 2014 season were those described in McCarthy *et al* (2014).

The trap and transport total (48,126kg) represented 66.4% of silver eel production. The silver eel production was estimated as 72,943kg and escapement as 66,525kg (91.8% of production). The combined Cliff HPS and Cathaleens Fall hydropower mortalities were estimated provisionally as 5,859kg (8% of production). In 2014 a relatively high proportion of male silver eels, also noted in 2011-2013, was observed in upper catchment sites as well as at Roscor Bridge.

#### Fane

The Fane is a relatively small catchment with the silver eel fishery located in the upper reaches of the system approximately 28 km from the coast. The Fane has a riverine wetted area of 21 ha (84 ha 2012 wetted area) 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 since 2011. The site was at the location of a previous commercial fishery until 2008. For the 2014 season, the fishing commenced in October following low water levels in August and September.

In 2013, a new tag release site was used at the mouth of the Clarebane River and additional deflector nets were used to improve fishing efficiency. A recapture rate of 20% was achieved in 2013 and using this to determine the efficiency of the fishing site gives a production of 5,755kg.

A total catch of 797kg was caught in 2014. In 2014, a mean recapture rate of 29% from two releases was determined. The length of eels caught during the season had a mean length of 47.1cm and a mean weight of 0.251kg.

#### R. 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 was previously 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. 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 will be the first riverine dominated silver eel index catchment assessed to date.

Four nets were fished from lock gates of the canal section of the River Barrow during the 2014 silver eel season. The location is upstream of Graiguenamanagh; approximately 5kms upstream from the tidal limit in 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.

The fishery was fished for 22 nights with a total catch of 174 kg. The location of the nets on the lock gates means the fishery is operated by fishing periods of high water as well as

concentrating on the nights of the new moon. A mark recapture survey was carried out with 202 eels were tagged with floy tags and released 2kms upstream of the fishing site. Seven eels were recaptured giving a recapture rate of 3.5%.

#### Other Sites

Additional studies are taking place on the Baronscourt Lakes (Tyrone) and L. Finn (Donegal) in the NWIRBD as part of a PhD study on eels through IBIS (Integrated Aquatic Resource Management between Ireland, N Ireland and Scotland - funded through the EU INTERREG IVA Programme). These studies should yield useful data.

#### **Elver Mortality**

In 2013, 5kg of elvers died in the trap at Cathaleen's Fall. In 2014, 112kg were reported dead on the 22<sup>nd</sup> April with a further 38kg in a distressed state moved back downstream and released into tidal water.

In order to comply with escapement and mortality rate reporting for the Erne and the NWIRBD, these amounts were converted into silver eel equivalents lost from the Erne catchment. Estimated losses in terms of Silver Eel Equivalent (SEE) production in the Erne were 432kg SSE in 2013 and 12,955kg SEE in 2014.

In 2014 on the R. Maigue, 7kg were reported dead with a further 3.3kg in a distressed state released back downstream. Estimated loss of silver eel production in the Maigue was 343kg SEE in 2014.

#### 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. A second objective of the yellow eel study was to carry out an indirect estimation of silver eel escapement.

#### 2014 Fyke net Survey

In 2014 intensive sampling of yellow eels took place at five locations (Burrishoole (2 lakes), Lough Muckno, L. Ramor and the South Sloblands. The standard procedure in the field was to set chains of five fyke nets joined end to end, set overnight and lifted the following morning, as described by Moriarty (1975). The sampling process in 2014 consisted of setting approximately 6-8 chains of 5 fyke nets during two or three monthly sessions of two or three nights per session.

Of the lakes sampled, the South Sloblands had the highest mean CPUE (2.53) with relatively high nightly CPUEs in L. Ramor (2.48 & 2.15) and L. Muckno (3.03) and low CPUEs were recorded in the western lakes, Bunaveela and Feeagh.

Transitional waters (Barrow, Burrishoole (Furnace, Furnace lwr)) were also surveyed in 2014 and the CPUEs were 6.87, 1.27 and 2.35 eels per net per night respectively.

Locations sampled under the Water Framework Directive gave a total of 24 lakes (spanning 16 catchments), 75 river sites (31 catchments) and 10 transitional waters (from 5 catchments) were sampled by the WFD team in 2013. Eels were present in all 20 sampled lakes (100% of sites), 54 river sites (72%) and 8 transitional waters (80%) sampled.

The WFD river sites have a 72% eel presence rate, 35% of sites have  $\leq$ 5 eels, 9% of sites caught between 5 and 10 eels and 28% had  $\geq$ 10 eels.

A total of 422 eels were caught during lake surveys (with 407 eels processed for length and weight). They ranged in length from 29.7 to 84.2 cm. The river surveys caught a total of 653 eels, ranging from 6.9 to 67.0 cm. The transitional water surveys caught a total of 428 eels. However, the catch was not processed at several sites.

#### Transboundary

An eel survey of Lower Lough Erne was carried out over one week in August 2014, at a sub-set of the full 2011 survey sites. 30 Fyke nets were set per night (standard 10m double ended 50 cm hoop Dutch fykes). Silver eels were recorded but not included in the overall count of yellow eel. Eel were released alive. Catch per Unit Effort CPUE was higher than in the 2011 survey reported in the 2012 SSCE report. It should be noted that some of the highest CPUEs recorded in the eel monitoring programme were from Lower Lough Erne in 2014 with up to 28 eels per net per night being caught.

Under The EU Interreg funded DOLMANT (development of Lake Management Tools) project, AFBI sampled in 2011 & 2012 a number of small lakes in the NWIRBD for fish, to standard Irish WFD protocols (half CEN multimesh gill netting effort, with fyke nets added for Eel, number according to lake size and depth). Eels were found at Loughs Auva, Bunerky, Derg, Formal, Golagh, Lee, Mardal, Nalughoge, Scolban, Screeby and Shivnagh, and no eels were recorded in Loughs Akibbon, Bawn, Drumgay, Jenkin, Kilturk, Nadarra, Salt and Vearty. This data is not fully quantitative but gives a picture of the general distribution of eel throughout the RBD, which appears to reflect distance from the sea, elevation and presence of natural barriers.

#### Recruitment

Monitoring of recruitment is critical to evaluating the overall success of the eel regulation and is required by ICES for stock assessment. This information is also required to assess and model changes in the future Irish eel stocks.

In 2014, 10 sites were monitored by the Electricity Supply Board, Inland Fisheries Ireland and the Marine Institute. Monitoring of glass eel (elver) migrating at Ardnacrusha (Shannon) and Cathaleens Fall (Erne) showed a significant increase in recruitment to the Erne but no increase on the Shannon.

Recruitment for the 2013 and 2014 seasons indicated that there was a general increase in the recruitment levels to Ireland in 2013. The picture was less clear in 2014 with four sites showing decreases, three sites showing increases and two sites with little change. Recruitment in Ireland followed broadly the pattern observed across Europe.

Monitoring of young yellow eel migrating at Parteen Weir (Shannon) takes place using a fixed brush trap. The catch in 2014 increased from 20kg to 365kg.

A mortality of 5kg of elver occurred on in the trap on the Erne in 2013 and 112kg in 2014. A further 38kg from the same day in 2014 were released downstream. These data have been included in the total upstream recruitment data but should be excluded in the determination of Erne/NWIRBD silver eel production and mortality rates.

A mortality of 7kg plus a moribund weight of 3.3kg was recorded in the trap on the Maigue in 2014. This mortality (10.3kg total) has been included in the total upstream recruitment data but excluded in the determination of Shannon IRBD production and mortality rates.

#### 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. This report, due before 30<sup>th</sup> June 2015, will address the following;

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

The Commission are currently working on a proposal for a new regulation of the European Parliament and of the Council amending Council Regulation (EC) No. 1100/2007 establishing measures for the recovery of the stock of eel. Some of these amendments are required to update the existing regulation in terms of its implementation and to take account of the Treaty on the Functioning of the European Union (Lisbon). It is also likely that the new Regulation will be stricter and require further changes and restrictions to eel management and science due to the continuing critical status of the stock.

#### 1.2 Standing Scientific Committee on Eel

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 (Annex 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.
- 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 2014/2015 to monitor and report on the 2014 survey years and to prepare for the 2015 reporting to the EU on the progress in implementation of the EMPs;

17 <sup>th</sup> February 2014	Swords
2 <sup>nd</sup> July 2014	Galway
13th November 2014	Galway
19 March 2015	Galway

#### 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 2014

#### 9.3.7 European Eel (reproduced from the ICES Advice 2014, Book 9) (December 2014)

#### Advice for 2015

The status of eel remains critical and ICES advises that all anthropogenic mortality (e.g. recreational and commercial fishing, hydropower, pumping stations, and pollution) affecting production and escapement of silver eels should be reduced to – or kept as close to – zero as possible.

#### Stock status

The annual recruitment of glass eel to European waters has increased over the last three years, from less than 1% to 3.7% of the 1960–1979 level in the 'North Sea' series, and from 5% to 12.2% in the 'Elsewhere' series. However, both recruitment indices are still below the 1960–1979 levels and there is therefore no change in the perception of the status of the stock.

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

#### Management plans

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 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 (EMP) 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, 2009a, 2010a) and progress in implementing EMP actions (ICES, 2013b). The EU Member States produced their first progress report in 2012. The next progress reporting is scheduled for 2015.

In 2007, eel was included in CITES Appendix II that deals with species not necessarily threatened with extinction, but for which trade must be controlled to avoid utilization incompatible with the survival of the species. The CITES listing was implemented in March 2009.

#### Biology

European eel life history is complex. The stock is panmictic and indications point at random mating of adults in the spawning area in the southwestern part of the Sargasso Sea. The newly-hatched *Leptocephalus* larvae drift with the ocean currents to the continental waters of Europe and North Africa where they metamorphose into glass eels; this dispersal is believed to be random.

The growth stage, known as yellow eel, takes place in marine, brackish, or fresh waters. This stage may last from as little as two years to several decades prior to metamorphosis to the silver eel stage and maturation. Age-at-maturity varies according to latitude, ecosystem characteristics, and density-dependent processes. The European eel life cycle is shorter for populations in the southern part of their range compared to the north, but even in the south, there are ten or more age groups of females in the silver eel run (for the entire distribution the number of age groups exceeds fifty). Silver eels are believed to spawn only once.

#### Environmental influence on the stock

Environmental conditions at the spawning grounds and during the oceanic phase are likely to affect the stock, but it is uncertain whether, and to what extent changes in these conditions have influenced the observed stock declines.

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 and Marine Strategy Framework Directives may result in improvements to the continental environment and that this may have a positive effect on the reproductive potential of silver eel.

An increased awareness of contaminants in eel, in relation to safe human consumption limits, is leading to fishery closures to protect consumers. These selective closures may lead to an increased proportion of low quality spawners in the escapement. It is likely that there is a negative relationship between contaminant loads, parasites, and diseases in eels and their spawning success. However, these effects have not been quantified.

#### The fisheries and other mortality causes

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.

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 mortality due to predators, e.g. conservation or culling of predators.

#### Effects of the fisheries on the ecosystem

The current fishery probably has little direct influence on aquatic ecosystems, with the possible exception of local bycatch issues. However, the eel is an important and frequently dominating species in the ecosystem, and its substantial reduction, whether due to fisheries or other causes, may have had a more profound effect. There is limited knowledge on the magnitude of these effects.

#### Data quality considerations

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

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. The distribution area of eel extends considerably beyond the EU, and data from countries in these other regions were not available. A complete reporting of indicators covering the range of the European eel is required for a full assessment of the stock. To facilitate this, data collection and analysis should be internationally standardized. The inclusion of the GFCM area is a welcomed development and should improve the coverage of eel stock data and assessment (GFCM, in prep.).

#### **Scientific basis**

The assessment is based on data from fisheries and scientific surveys. In the recent past monitoring trends in recruitment has been the main tool for assessing the overall status of the eel stock. Currently, reported biomass and mortality estimates have not been peer-reviewed and are not yet used in the assessment.

Assessment type	Trend analysis.
Input data	Glass eel and yellow eel recruitment indices.
Discards and bycatch	Not included.
Indicators	See above.
Other information	Landing statistics are incomplete and reporting inconsistent. Stock
	indicators are incomplete from eel management units/countries in the
	EU. Stock indicators and other data are missing from non-EU states.
	There is no international legislative requirement to collect and provide
	data for the entire stock area.
Working group report	Joint EIFAAC/ICES/GFCM Working Group on Eels (WGEEL; ICES,
· · · ·	2014).



Figure 9.3.7.1 WGEEL recruitment index: mean of estimated (GLM) glass eel recruitment for the continental North Sea and elsewhere in Europe, updated to 2014 (ICES, 2014). No series are available for glass eel in the Baltic area. Note the logarithmic scale on the y-axis. 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.



Figure 9.3.7.2 Mean of estimated (GLM) yellow eel recruitment and smoothed trends for Europe updated to 2014 (ICES, 2014. Note the logarithmic scale on the y-axis.

#### **3** National Advice

#### 3.1 Glass Eel Imports

#### 3.1.1 Current Situation

**Ireland:** currently glass eels are not imported into Ireland and the capture of glass eels in Ireland is prohibited by law (1959 Fisheries Act, Sec. 173). Fishing for juvenile eel is also prohibited under the current conservation bye-laws.

**Northern Ireland:** The policy in Northern Ireland is different to that in Ireland. Glass eel have been imported, mostly from the Severn, into Lough Neagh since the collapse in local recruitment in 1984.

Glass eel imports to Northern Ireland are transported under conditions imposed by UK and Northern Ireland fish diseases legislation and are certified free of notifiable diseases and parasites at source before import. On receipt at the stocking site (Lough Neagh), a batch is retained and held in aquarium conditions for two weeks as a check on viability and the quality of the shipment.

#### 3.1.2 Advice

The concern was raised at a SSCE meeting in 2012 that glass eels had been imported from the European continent for stocking in Lough Neagh. Traditionally, these were sourced from the Severn UK, but with recent low catches, additional stock were imported from the Biscay area. The SSCE is concerned that both pathogens and other non-native species may be inadvertently be introduced with any stocking of live fish, but there is particular concern with introductions from the continent. The transport medium (e.g. ice, water, slime) can also be a source of non-native species and/or pathogens.

Due to concerns relating to the possible introduction of pathogens and/or non-invasive species to Irish waters, the Standing Science Committee on Eel **advises against any introductions of live fish** imported from outside Ireland and especially from the continent. The SSCE **also advises against inter-catchment translocations** of live fish and/or water to minimise the spread of already introduced non-native species. The SSCE recommends that this advice should apply to the island of Ireland, especially in relation to transboundary catchments.

In the event of any stocking being considered contrary to this advice, it is essential that a risk analysis be undertaken and all batches should be screened for pathogens and non-native species, such screening is not a veterinary function and should be carried out by specialists. Full quarantine in isolated units should be considered, as carried out by Sweden for example.

#### **3.2 Eel Traceability**

International traceability is required to determine movements and quantities of eel between States (EU Regulation 1100/2007 – Article 12). There is no traceability scheme in place in Ireland which is required under the EU Regulation.

Trade data were available to the SSCE from the CSO although it was difficult to determine reliability of the data.

Currently there is no mechanism in place to ensure that imports and exports of eels can be recorded and cross-checked between reciprocal countries.

#### 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. 303 of 2009, 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 2015.

- 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 (Annex 2).

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 2012, Minister O'Dowd signed a new byelaw (C.S. 312/2012) on the 7<sup>th</sup> December prohibiting the fishing for eel in Ireland and the possession of eel caught in Ireland (Annex 2).

#### 4.2.2 Action 1a: Report closure of fishery

All management regions confirmed a closure of the eel fishery for 2014 seasons with no commercial or recreational licences issued (Annex 3). In the transboundary region, there were no licences issued and no legal fishery in the Foyle and Carlingford areas in 2014.

The eel fishery, with the exception of the strictly managed L. Neagh, also remained closed in N. Ireland in 2014.

#### 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 (Annex 3: Table 4.1).

Two regions have reported some level of illegal fishing which led to gear and equipment seizures (ShIRBD, NWIRBD). The most significant activity appeared to be in the Shannon IRBD with 54 fyke nets and 2000m of longline seized on L. Ree. Eleven x 10m night lines were also seized on Doon Lake. Twenty fyke nets were seized on the erne system in the NWIRBD.

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 mentioned previously.

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.

#### Northern Ireland:

No 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

No new information available to the SSCE in 2014.

Some former commercial fishermen were employed on a contract basis for conservation silver eel trap and transport and also on some surveys of yellow and silver eel.

	ERBD	L AGENCY	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	None	Low	Low	Medium(some L. Ree)	None	Low-nil	Low-nil
Number of gear seizures	0	2	3	6	0	0	0
Gear types seized	-	Angling rods	20 fyke nets	~ 54 Fykes, 2110m longline	-	-	-
Number of eel dealer interceptions	0	0	0	0	0	0	0
Estimated tonnage on board:	-	-	-	-	-	-	-
Declared origin of cargos:	-	-	-	-	-	-	-

 Table 4-1: Details of illegal activity within the regions and Northern Ireland, 2014

#### 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 period 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 longterm shortfall could not be carried forward indefinitely.

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

#### 4.3.1.1 2014 Trap and Transport Results

The total amounts of silver eel trapped and transported in each of the three rivers in 2014 are presented in Table 4.2. The separate detail sheets of the amounts transported from each site on each date are presented as an annex to this report (Annex 4).

In the River Shannon the trap and transport total of 26,438 kg represented 37.4% of silver eel production. The three year rolling average for the 2012 (35.7%), 2013 (28.2%) and 2013 (37.4%) seasons was 33.8%. Therefore the target of 30% over a three year rolling average has been attained in the 2014 season.

In the R. Erne, for the period 2012-2014 it was decided by management to change the target to 50% of the silver eel production on a similar basis to that operated on the Shannon. This is more adaptable to changing eel production and facilitates incorporation of more inter-annual fluctuation. The trap and transport total (48,126 kg) represented 66.4% of silver eel production and exceeded the target (50%) by 11,880 kg.

In the River Lee, following protocols successfully used in 2011, 2012 and 2013, a contract fishing crew was authorized to fish on behalf of ESB in the two Lee reservoirs and in Lough Allua. In 2014 they confined their fishing to the Inniscarra reservoir and used only fyke-nets. Analysis of their fishing reports, ESB collection weight records and direct observations on selected catches indicated that 670 kg were trapped and transported. Eels were all released to the River Lee downstream of the Inniscarra dam (Fig. 4.1). NUIG researchers monitored the fishing activities and examined representative Inniscarra catches on 29/07/2014. Size frequency distributions of eel samples obtained from Inniscarra reservoir in 2014 are illustrated in Figure 4.2. The combined catches for 2012, 2013 and 2014 (234 kg, 824 kg and 670 kg) totalled 1,728 kg. A shortfall in 2012 catches, relative to the EMP 500 kg target, was compensated for by the increased catches in 2013 and 2014.

Examination of a sample (N-30) by NUIG, using 5 silver status criteria adopted for the 2011, 2012 and 2013 SSCE reports, indicated that 29 (96.7%) of the sample of the 2014 Inniscarra reservoir eels could be regarded as potential natural migrants. Use of another 2014 sample (N=118) in which field observations were made on just two criteria (body colouration and cloacal aperture) suggested that 90.7% (=93.7% of the biomass) the eels could be designated as having at least one clear indication of their potential silver eel status.

It was calculated that at least 627.8kg of potential spawners (93.7% of catch) had been transported and released below the river section affected by the hydroelectricity production dams.

A decline in fyke-net CPUE, reported by the fishing crew in 2012, was not confirmed by either 2013 or 2014 analyses of catch records. The poor eel catch in 2012 seems to have been due to poor environmental conditions in the fishing period rather than stock decline. In 2014 the entire catch was obtained in just 6 fishing nights and some exceptionally high catches were obtained in areas heavily ground-baited for a coarse angling competition.



Figure 4-1: Carrigadrohid HPS and Inniscarra HPS on the River Lee.



Figure 4-2: Relative size frequency distributions [%] of eels caught in Inniscarra reservoir in the 2014 season.

Catchment	Year	T&T Target	Amount Transported (kg)	Relation to target	Status	3 yr Running Average
R. Shannon	2009	30% of run (Bbest)	23,730	31%	Achieved	37%
R. Shannon	2010	30% of run (Bbest)	27,768	40%	Achieved	38%
R. Shannon	2011	30% of run (Bbest)	25,680	39%	Achieved	34%
R. Shannon	2012	30% of run (Bbest)	24,228	36%	Achieved	34%
R. Shannon	2013	30% of run (Bbest)	22,561	28%	Not achieved	33%
R. Shannon	2014	30% of run (Bbest)	26,438	37%	Achieved	37%
R. Erne	2009	22t	9,383	42.6	Not achieved	
R. Erne	2010	34t	19,334	56.9	Not achieved	46.9
R. Erne	2011	39t	25,405	65.1	Not achieved	59.3
R. Erne	2012	50% of run (Bbest)	34,660	51.2%	Achieved	57.1%
R. Erne	2013	50% of run (Bbest)	39,319	53.6%	Achieved	60.0%
R. Erne	2014	50% of run (Bbest)	48,126	66.4%	Achieved	66.4%
R. Lee	2009	0.5t	79	16%	Not achieved	73%
R. Lee	2010	0.5t	278	56%	Not achieved	81%
R. Lee	2011	0.5t	731	146%	Achieved	119%
R. Lee	2012	0.5t	234	46%	Not achieved	115%
R. Lee	2013	0.5t	824	165%	Achieved	149%
R. Lee	2014	0.5t	670	134%	Achieved	134%
Na	tional	Annual Totals				
Total	2009		33,192			
Total	2010		47,348			
Tatal	2011		E1 01(			

Table 4-2: Total amounts (t) of silver eel trapped and transported in the Shannon, Erne and Lee, 2009-2014, and the success relative to the targets set in the EMPs. Note change of target on the Erne in 2012.

1 N 0	ational Annual Totals	
Total	2009	33,192
Total	2010	47,348
Total	2011	51,816
Total	2012	59,118
Total	2013	62,704
Total	2014	75,234

#### 4.3.2 Action 2b: Quantify Turbine Mortality

#### 4.3.2.1 Shannon

In the 2014 silver eel migration season there was high spillage at the Parteen Regulating Weir. It has been estimated (Fig. 5.6) by NUIG that 15.93% of the eels migrating downstream of Killaloe are likely to have travelled via the old river route. The hydropower dam passage mortality for the remaining (84.07%) silver eels that are assumed to have entered the Ardnacrusha headrace canal was estimated using the 21.15% rate determined by NUIG using acoustic telemetry in 2008-2011. As in the 2013 season, one turbine was removed for refurbishment and an equivalent amount of water was discharged via the Ardnacrusha spillway, up until 21st December 2014. However, it was not possible to estimate the extent to which this may have reduced turbine passage mortality as no telemetry was undertaken during 2014.

#### 4.3.2.2 Erne

For the *Erne*, during the 2014 silver eel season the patterns of generation and spillage at the River Erne hydropower stations were similar to those reported during the 2013 season. In the analyses of eel hydropower passage, varying mortality levels were incorporated, per calendar day, into the escapement model. These were based on dusk-dawn hydrometric data, power generation activity and results of previous years silver eel acoustic telemetry. Generation protocols and associated mortality rates have been described in previous reports. For the 2014 season different mortality rates were applied as follows: *Cliff HPS* (0%, only spillage); 7.9% (Generation plus spillage) and 26.7% (Only generation), *Cathaleen's Fall HPS*: 0% (only spillage; 7.7% (spillage plus half generation load); 15.4% spillage plus full generation load); 27.3% (only generation). Reduced overall generation levels occurred during the silver eel migration season, due to refurbishment of turbines. This resulted in relatively high spillage levels and reduced overall turbine passage mortality levels. This was estimated to have represented a cumulative 8.08% mortality of the total River Erne silver eel production, or 24.2% of the migrating eel (not including the trapped and transported component) at the two dams during 2014.

#### 4.3.3 Action 2c: Engineered Solution

Preliminary silver eel deflection experiments, using weir-mounted LED floodlights, were undertaken at Killaloe in 2014. A more extensive series of eel deflection experiments are planned for the autumn 2015 at Killaloe and some other sites.

#### 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. In order to tackle the issue on a multispecies level IFI established a National Barriers Group in 2011. This group is building on the earlier work to develop a standardised assessment of barriers nationally and is currently evaluating an IFI survey sheet and assessment methodology. The long term aim is to develop a national database of barriers for rating fish pass ability which in turn will provide information to target mitigation measures at the most significant obstructions.

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

#### IFI Barrier mitigation work in 2014

A small rock ramp was constructed at a bridge apron on the Tuckmill Stream in County Wicklow to eliminate a vertical barrier of approximately one metre and a slope of approximately one in ten through the bridge (Figure 4.3).



Figure 4-3: Tuckmill Stream

#### Planned works for 2015

Planning permission has been granted for the removal of the existing fish pass and the construction of a new rock ramp structure at a weir on the R. Castletown in Castletown, County Laois. A contractor has been appointed, however, due to planning and environmental constraints, construction work will not commence until July 2015 (Fig. 4.4).



Figure 4-4: Castletown weir.

In cooperation with Waterways Ireland, Inland Fisheries Ireland have issued tender documents for the hire of consulting engineers to design fish passes at six weirs on the River Barrow. These are: Carlow Weir, Ballyellen Lower Weir, Millford Weir, Maganey Weir, Bagenalstown Weir and Lower Tinahich Weir. A consultant engineer has been appointed and work has commenced on the engineering and environmental surveys for the designs. This project will take a number of years to complete, however, it is expected that the design options will be complete and a planning application will be lodged in early 2015.

IFI in conjunction with Tipperary County Council have agreed to replace the Lismalin Bridge on the Kings River and, as part of the construction of a replacement bridge, this structure will be dismantled and the river bed regraded and stabilised to remove this vertical barrier. Environmental and engineering reports have been completed but in-stream works will not take place until July 2015. A number of other projects are also planned for 2015, including, engineering and technical reports for the removal of Clondulane Weir on the River Blackwater.

#### Monaghan Bridges Project

IFI staff in the Eastern River Basin District and North Western International River Basin District working in County Monaghan received training in the IFI barrier assessment form in 2013. The project is one of the actions in the current Heritage Plan for the county. The aim of the project is to carry out an ecological survey of bridges and culverts in the county to identify any impediments to fish passage and other animals and to identify measures to remedy these impediments. This is a follow up from the successful completion of a similar assessment carried out in County Wicklow in 2012. This project is in the final stages and is due to be completed in early 2015.

#### 4.4.2 Action 3b: New potential barriers

There is no new information since the 2012 report. The 'Guidelines for Small Scale Hydro Schemes' is being revised and is due to be published.

#### 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 (Cathaleens 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 2014. The catches shown in Figure 7-2 & Table 7-1 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

Management Actio	n No. 4: Improve water quality	
Action 4a: Ensure c	ompliance with the Water Framework Directive	
Timescale: 2015		
Review: 2012, 2015,	2018	
Monitoring Actions	: Include eel in the fish monitoring elements of the WFD	
Undertake further e	eel quality monitoring (EUFP7 EELIAD)	

#### 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 objectives of the Water Framework Directive (WFD) are 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. A major programme is under way to achieve this target, with monitoring beginning in Dec 2006. National regulations for implementing the directive were put in place in 2003. The WFD reporting and monitoring runs on a six year cycle, so the next opportunity to assess whether water quality is improving will be with the publication of the second River basin management Plans (RBMP) in 2015. These publications are not available at this time, and are unlikely to be completed by the end of 2015.

In the interim period, the Environmental Protection Agency (EPA) compile statistics on water quality in Ireland, the most recent of which covers the period 2007-2009 (McGarrigle et al. 2011). The ecological quality of monitored water bodies was determined using a combination of biological and physicochemical metrics. 1550 river water bodies were included in this report, with 52% being classified as being of high or good ecological status. 26 river sites were classified as having bad ecological status. 105 (47.3%) lakes were of high or good status with the majority, 38.3 per cent, being in the latter category. A total of 121 transitional and coastal water bodies were assessed between 2007 and 2009 for WFD status classification. Of these, 55 were classed as either high (16%) or good (30%) ecological status with the remainder being classed as moderate or worse. Sewage and diffuse agricultural sources continue to be the main threat to the quality of Ireland's waters.

The Irish EPA reports (summarised above) refer to waterbodies within seven RBD's (Eastern, Neagh Bann, North Western, South Eastern, Shannon, South Western, Western). The Neagh Bann, Shannon and North Western IRBD'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 most of the Neagh Bann RBD is not included in the Irish Eel Management Plan reports. Therefore, the implementation of the WFD in the Northern Irish part of the North Western IRBD is also of interest in this report, as it is the major international RBD which is considered in this eel management report. Interim classification of the ecological quality of the North Western IRBD (north of the border) indicates that the majority of waterbodies are of high, good or moderate quality. However, it is noted that 60% of rivers, 81% of lake area, all transitional waters and all coastal waterbodies, will need to have their status improved to meet the requirements of the WFD (NIEA NSSHARE 2008)

#### 4.5.2 WFD monitoring – fish

Inland Fisheries Ireland (previously the Central and Regional Fisheries Boards) has been assigned the responsibility by the EPA 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. While this data will be included in the overall assessment of the second cycle of WFD reporting for 2015, summary reports are available (www.wfdfish.ie). The most relevant of these summary reports is the report for 2013 (Kelly et al. 2014). In 2013, a comprehensive fish surveillance monitoring programme was conducted, with 63 river sites, 24 lakes and 2 transitional waters successfully surveyed throughout the country (Table 4.3). Eel are ubiquitous across all sites, and were found in 83.3% of lakes surveyed and 69.8% of rivers.

Period		No. of sites surveyed	% High	% Good	% Moderate	% Poor	% Bad
2013	Rivers	63	6	26	28	3	0
	Lakes	24	6	8	1	6	2
	Transitional water	10	0	6	4	0	0

Table 4-3: Interim assessment of Irish waterbodies according to fish metrics, measured in 2013 and as part of the WFD monitoring program carried out by Inland Fisheries Ireland (Kelly et al. 2014).

#### 4.5.3 Fish Kills

There were 24 reported fish kills in 2014 (IFI preliminary data). This was lower than the 52 in 2013 and compared to 10 reported fish kills in 2012 (IFI in 2012), and 31 in 2011 (IFI 2011). The majority of these fish kills were attributed to a cause other than those related to agriculture, industry or local authority infrastructure.

#### 4.5.4 Eel Contaminants

The EPA carried out surveillance monitoring in 2007-2009 of 180 river sites and 76 lake sites for what are known as dangerous substances i.e. priority substances and priority hazardous substances. Monitoring was undertaken at each site with a frequency of 12 times per year once the programme commenced in mid-2007. Generally, the occurrence of environmentally significant metals was found to be low in Ireland. In addition, the levels of priority pollutants (plant protection products, biocides, metals and other groups such as combustion byproducts, polyaromatic hydrocarbons (PAHs), and the flame retardants polybrominated diphenyl ethers (PBDEs)) were generally very low with very few exceedances being found (McGarrigle et al. 2011). This data confirms that bioaccumulation of toxins of eels in Ireland is likely to be less significant than in other EU countries.

#### 4.5.5 Prevalence of Anguillicola crassus

No new data available in 2014.

#### 5 Silver Eel Assessment, 2014

(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 and Fane catchments (Table 5.1). A pilot study was carried out on the Barrow in 2014. It is proposed to survey a series of additional index locations on a three year rolling basis. Figure 5.1 shows the sampling locations in 2014.

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) and
- 3. Estimate silver eel escapement indirectly using yellow eels.

In Ireland escapement and mortality is calculated for two ESB 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 and the Barrow in the South East.

Catchment	Priority	2012	2013	2014	Method		
Corrib	High				Coghill net / Mark-recapture		
Erne	High	$\checkmark$	$\checkmark$	$\checkmark$	Coghill net / Mark-recapture		
Shannon	High	$\checkmark$	$\checkmark$	$\checkmark$	Coghill net / Mark-recapture		
Burrishoole	High	$\checkmark$	$\checkmark$	$\checkmark$	Trap		
Mask	Medium				Coghill net / Mark-recapture		
Muckno	High	$\checkmark$	$\checkmark$	$\checkmark$	Coghill net / Mark-recapture		
Waterville	Medium			$\sqrt{*}$	Fish Counter		
ANOTHER	High		$\checkmark$	$\sqrt{*}$	Coghill net / Mark-recapture		

Table 5-1:	The	locations	identified	in	the	Irish	EMP	where	silver	eel	escapement	will	be
assessed.													



Figure 5-1: Silver eel monitoring locations, 2014.

#### 5.2 Shannon

The silver eel populations of the River Shannon remain among the better researched examples in Europe, due to the availability of long-term fishery records and on-going research activities (e.g. MacNamara and McCarthy, 2013). In the 2014 season the conservation fishery and the trap & transport programme were again monitored by NUIG. This scientific monitoring work was undertaken in conjunction with analyses of silver eel production and escapement rates for the river system.

#### 5.2.1 Catch

The 2014 fishing season for eels on the River Shannon extended from 1<sup>st</sup> September to 8<sup>th</sup> December for the conservation sites in the upper Shannon (Fig. 5.2). At Killaloe eel weir test fishing during September and October showed no migration was occurring in the low flow conditions. As discharge increased at the beginning of November the main silver eel migration started with the first catches at Killaloe occurring on 10<sup>th</sup> November 2014. A total of 73 nights were fished and the final fishing event took place on 26<sup>th</sup> January 2014. During the 2014 season 11,330 kg was captured at the upstream sites and 15,122 kg was captured at Killaloe. The relative catch contribution from the upstream sites to the ESB silver eel trap and transport programme in 2014 is summarised in Figure 5.3.

The pattern of downstream migration at Killaloe was reflected in the daily catches recorded at the eel fishing weir. These data are graphically presented, in relation variation in discharge and to the lunar cycle, in Figure 5.4. Between the first catch on 10<sup>th</sup> November and the end of the first quarter of the lunar cycle on 3<sup>rd</sup> December a total of 9,992 kg was captured, representing 66.1% of the total seasonal catch. The increase in catches coincided with a sustained increase in discharge to >400 m3·s<sup>-1</sup>. The remaining 33.9% (5,130 kg) was captured in two small peaks during December 2014 and January 2015.


Figure 5-2: The River Shannon, with silver eel fishing sites and release point indicated.



Figure 5-3: Proportion of annual Trap and Transport caught at the five River Shannon fishing sites (Athlone 1 = Jolly Mariner & Athlone 2 = Yacht Club).



Figure 5-4: Killaloe weir eel catch (kg), discharge (m<sup>3</sup>·s<sup>-1</sup>) pattern and lunar cycles during 2014 season.

### 5.2.2 Escapement

The 2014 season results are presented in Figure 5.6. The protocols used in the basic model for calculation of silver eel production and escapement for the River Shannon, 2014, have been outlined in previous reports. The silver eel production was estimated by NUIG as 70,725 kg, using Killaloe catch data and results of mark-recapture experiments. Prior to the commencement of the 2014 silver eel season major upgrading works were carried out on the fishing weir at Killaloe. All of the remaining manually lifted wattle nets were replaced with hydraulically operated nets (Fig. 5.5). In contrast to some previous fishing seasons, where weir efficiency was compromised by high river discharge, capture efficiency during the 2014 season remained constant through the fishing period and at a higher overall level. A total of 593 silver eels were tagged using FLOY tags during the 2014 fishing season. Of these 151 were recaptured giving a seasonal mean efficiency of 25.46%. This is an increase in efficiency over the recent (2009-2012) mean efficiency of 22.47%, when the weir fished with a combination of both hydraulically and manually lifted nets.



Figure 5-5: Killaloe weir on the Shannon River.

Silver eel production was estimated, following previously adopted protocols to have been 70,725 kg in the 2014 season. Details of the analysis are presented in Figure 5.6. Escapement was estimated to be 62,980 kg (89.05% of production) and mortalities at Ardnacrusha were estimated to be 6,950 kg (9.8% of production). The trap and transport total (26,438 kg) represented 37.4% of silver eel production. The three year rolling average for the 2012 (35.7%), 2013 (28.2%) and 2013 (37.4%) seasons was 33.8%. Therefore the target of 30% over a three year rolling average has been attained in the 2014 season.

Use of alternative analytical protocols, developed for recent studies on the Shannon by MacNamara and McCarthy (2013), give somewhat lower production and escapement biomass estimates. Similar to the 2012 and 2013 silver eel season, size frequency data recorded in 2014 is not considered to be fully representative of the seasonal variation. However, the seasonal variation in sex ratio data described previous reports was up-dated with 2014 data and this allowed for production to be estimated. The analytical protocols used in this New Model (2008-2014) gave results which were similar to those presented above, i.e. estimated production of 70,424 kg and estimated escapement of 62,577 kg. These results also provided a slightly increased estimate of the percentage (37.5%) of production used in the T&T programme.



Figure 5-6: A summary of the analyses of silver eel production and escapement in the River Shannon during the 2014 eel migration season.

### 5.2.3 Length

Size frequency distributions for samples examined at the conservation fishing sites in the 2014 season are illustrated in Figure 5.7. Variations in eel size and sex ratios along the river system, in 2014, were similar to those reported in previous years. The upper Shannon sites produce almost exclusively female eels (>430 mm) with only Killaloe eel weir catching significant quantities of male eels (<430 mm). The sizes of female eels decreased the further downstream the catch site (Fig. 5.7), a trend consistent with previous years.



Figure 5-7: Length relative frequencies [%] of eels captured at River Shannon conservation fishing sites in the 2014 eel migration season.

### 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, 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; 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

Silver eel trapping was continued in 2014. The main run (71%) occurred in October (Table 5.2). Figure 5.9 shows the daily counts of silver eels. The total run amounted to 3117 eels, or a production of 580kg. As in other years, the highest proportion of the total catch (85%) was made in the Salmon Leap trap.

	Salmon Leap	Mill Race	Total	%
June	0	0	0	0.0
July	51	6	57	1.8
August	393	74	467	15.0
September	100	14	114	3.7
October	1854	349	2203	70.7
November	127	9	136	4.4
December	122	15	137	4.4
Jan. 2015	3	0	3	0.1
February			0	0.0
March			0	0.0
April			0	0.0
May			0	0.0
Total	2650	467	3117	

Table 5-2: Timing and numbers of the 2014 silver eel run in the Burrishoole.



Figure 5-9: Daily counts of downstream migrating silver eel in the Burrishoole.

## 5.3.2 Length, weight & sex

Sampling of individual eels (n = 651) gave an average length of 45.0cm (range: 29.2 – 101.5cm) and an average weight of 195.7g. The length frequency distribution is presented in Figure 5.10 along with those for 2012 and 2013 for comparison.

Counts of silver eel between the years 1971 (when records began) and 1982 averaged 4,400, fell to 2,200 between 1983 and 1989 and increased again to above 3,000 in the '90s (Fig. 5.11). There was an above average count in 1995, possibly contributed to by the exceptionally warm summer. The count in 2001 of 3875 eel was the second highest recorded since 1982. The average weight of the eels in the samples has been steadily increasing from 95 g in the early 1970s to 216 g in both the 1990s and the 2000s (Fig. 5.11). The annual count and average weight in 2010 and 2011 were both below the mean for the last decade.

In 2012, the majority of the eel run was sampled (n=3317; 99.5%). The run increased from 1969 in 2011 to 3335 in 2012 and the average weight decreased from 180 to 163.5g. The sex ratio changed from 24% to 45% over the past five years. Male eels have remained the same length over the past 15 years (36cm) whereas the females have changed from 53cm (1997-2005) to 50cm (2008-2012) and they were 49.2cm in 2012. In 2013, the migration was 3623 eels and 1332 were sampled. The mean weight was 157.3g and the proportion of male eels was similar to that in 2012 at 45.7%.

In 2014, the migration was 3114 eels and 651 were sampled. The mean weight was 195.7g and the proportion of male eels was 35.7%, lower than the previous three years and similar to the average for the past decade (34.5%).



Figure 5-10: Length frequency of sub-samples of silver eels trapped in the downstream traps, 2012 (n=3317), 2013 (n=1329) and 2014 (n=650). 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

In 2009 analysis of downstream migrating silver eel population dynamics in the River Erne was complicated by: lack of reliable historical fishery data; delayed fishery closure in part of the river system; absence of an effective monitoring site in the lower part of the river and the need for development of appropriate research protocols. Establishment in 2010 of an experimental fishing weir, scientifically monitored by NUIG, at Roscor Bridge resulted in significant progress. Estimates of both silver eel production and escapement rates were obtained in the 2010, 2011, 2012 and 2013 seasons and these have been reported previously.

In the 2014 season the River Erne conservation fishery and the trap & transport programme were again monitored by NUIG team. This was undertaken in conjunction with studies on silver eel production and escapement. The scientific protocols used in the 2014 season were those described in previous reports and publications (e.g. McCarthy *et al* 2014).

# 5.4.1 Catch

The fishing activities of River Erne (Fig. 5.12) contract crews (N=7) at the authorized fishing sites (Fig. 5.13) were all monitored by NUIG in 2014, though additional scientific studies were undertaken at Roscor Bridge. The fishing season on the Erne started on 17<sup>th</sup> August and finished on 2<sup>nd</sup> December 2014 (with the exceptions of the Roscor Bridge experimental weir). The percentage contributions to the trap and transport programme in 2014 from each of the fishing sites are indicated in Figure 5.14. Four sites (Urney, Portora, Ferny Gap, Roscor Bridge) cumulatively contributed almost 75% of the total catches for 2014. The variation in Roscor Bridge experimental fishing weir daily catches is illustrated (Fig. 5.15) in relation to lunar cycles and variation in discharge. The fishing season at Roscor Bridge extended from 15<sup>th</sup> October 2014 to 28<sup>th</sup> January 2015 and a total of 98 nights were fished at that location. Fishing at the other sites ended at the beginning of December 2014.



Figure 5-12: Roscor Bridge and Portora Gates silver eel fishing sites on the R. Erne.



Figure 5-13: Map of River Erne catchment with conservation fishing sites, release point and hydropower dams indicated.



Figure 5-14: Proportions of the River Erne trap and transport catch obtained by different fishing crews in the 2014 season.



Figure 5-15: Variation in daily catches at the Roscor Bridge eel weir in relation to lunar cycle and discharge during 2014 season (the threshold discharge of  $130m^{3}\cdot s^{-1}$  used in population analyses is indicated by a red line).

### 5.4.2 Escapement

For the Erne, during the 2014 silver eel season the patterns of generation and spillage at the River Erne hydropower stations were similar to those reported during the 2013 season. In the analyses of eel hydropower passage, varying mortality levels were incorporated, per calendar day, into the escapement model. These were based on dusk-dawn hydrometric data, power generation activity and results of previous years silver eel acoustic telemetry. Generation protocols and associated mortality rates have been described in previous reports. For the 2014 season different mortality rates were applied as follows: *Cliff HPS* (0%, only spillage); 7.9% (Generation plus spillage) and 26.7% (Only generation), *Cathaleen's Fall HPS*: 0% (only spillage; 7.7% (spillage plus half generation load); 15.4% spillage plus full generation load); 27.3% (only generation). Reduced overall generation levels occurred during the silver eel migration season, due to refurbishment of turbines. This resulted in relatively high spillage levels and reduced overall turbine passage mortality levels. This was estimated to have represented a cumulative 8.08% mortality of the total River Erne silver eel production or 24.2% of the migrating eel (not including the trapped and transported component) at the two dams during 2014.

The 2014 season River Erne silver eel population study results are summarized in Figure 5.16. The silver eel production was estimated by NUIG as 72,493 kg and escapement was estimated to be 66,525 kg (91.8% of production). The trap and transport total (48,126 kg) represented 66.4% of silver eel production and exceeded the target (50%) by 11,880 kg. The 2014 calculations were based on estimations of production at Roscor Bridge and the threshold discharge of 130 m<sup>3</sup>·s<sup>-1</sup>, described in the 2012 report, was used in the analyses. A series of 4 mark-recapture experiments (4 batches of FLOY-tagged eels, N=165) were undertaken at Roscor Bridge. Batches of marked fish were released at dusk at the established release point upstream. All four batches were released in high flow (>130 m<sup>3</sup>·s<sup>-1</sup>). The efficiency of the Roscor Bridge index nets was estimated to have been 25.5% in high flow conditions during this season. The low flow (<130 m<sup>3</sup>·s<sup>-1</sup>) weir efficiency experiment was not possible; therefore the 2013 estimate (8%) was used. The mark-recapture efficiency estimates were used, together with index net catch and hydrometric data, to calculate the biomass of eels approaching Roscor Bridge for each fishing date. Using catch data for this site and for the upstream sites, the silver eel production for the River Erne was calculated (Fig. 5). In the 2014 season the production was estimated to have been 72,493 kg.

The increased capture efficiency recorded in high discharge in 2014 was due to improvements that the fishing crew made to the net system. Additional mark-recapture experiments are planned for 2015 to see if an increase in low discharge capture efficiency has also been achieved. If this is shown to have occurred, the 2014 calculations may have to be re-visited and some, relatively small, reductions in both silver eel production and escapement estimates may be appropriate.

#### 5.4.3 Length and weight

Information compiled in the 2014 season on size frequency distributions of catches at River Erne conservation fishing sites is summarized in Figure 5.17. There was a high proportion of male silver eels observed in 2014, also noted in 2011-2014, in the upper catchment sites as well as at Roscor Bridge.



Figure 5-16: A summary of the analysis of silver eel production and escapement in the River Erne during the 2014 eel migration season.



Figure 5-17: Length relative frequencies [%] of eels captured at River Erne conservation fishing sites in the 2014 eel migration season.

# 5.5 Fane

The Fane is a relatively small catchment with the silver eel fishery located in the upper reaches of the system approximately 28 km from the coast. The Fane has a riverine wetted area of 84 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 in 2011 and has been fished each year since (Fig. 5.18 & 5.19). The site was the location of a commercial fishery until 2008.

## 5.5.1 Silver Eel Catch

The Fane silver eel fishery did not fish in August or September 2014 due to low water levels (Fig. 5.20). An increase in water levels resulted in 6 nights of fishing in October resulting in a catch of 190 kg (Table 5.3). A flood in early November (outside the moon phase) resulted in a catch of 60 kg for 4 nights fishing. The second flood of the month occurred on the 12<sup>th</sup> November and the nets were set for 15 consecutive nights resulting in a catch of 547 kg. This catch is less than the catch recorded in 2013 but is higher than the catch of 2011 and 2012. The flood during the November dark was greater than the 2013 flood with higher water levels recorded however the catch was not as high.



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



Figure 5-19: Coghill net fishing for silver eels in the Clarebane River, 2013.

Year	Month	Nights Fished	Weight eels (kgs)
	October	9	277
2011	December	4	13
	Total	13	290
	August	5	65
	September	3	79
2012	October	9	253
2012	November	4	44
	December	1	7
	Total	22	448
	October	3	28
2013	November	16	1123
	Total	19	1151
	October	6	190
2014	November	19	607
	Total	25	797

Table 5-3: Fane Silver eel fishery catch data 2011 - 2014



Figure 5-20: Water level and moon phase for the 2014 silver eel season.

### 5.5.2 Escapement /Mark Recapture Study

In order to determine the efficiency of the fishing site a mark recapture study is undertaken. The aim of the study is to estimate what proportion of the eel population is caught at the fishing site and, therefore the total population migrating downstream.

In 2012 three release sites were assessed in order to determine the efficiency of the silver eel fishery. The first location was in the Clarebane River 150 metres upstream of the nets (Figure 5-18). The second location was in the Fane River flowing into Lough Muckno. The third location was in the lake by Whites Island. The second and third locations were also used in 2011.

Recapture rates for the 3 sites were low for 2012 with a number of eels remaining within the system and migrating the following month and year. The average within year mark recapture rate is 9% (8%, 10% and 8% for the three locations). This increases to 21% when eels that migrated the following year are included in the analysis.

The within year mark recapture percentage is adjusted to remove the eels that migrated the following year from the preceding years calculation. The overall recapture rate includes all eels tagged and all eel recaptured irrespective of year.

In 2013 and 2014 a new release location was chosen as a result of the 2 year MR study undertaken in 2011 and 2012. This location is at the mouth of the Clarebane River as it leaves Lough Muckno, approximately 450m from the fishing site. For the 2013 season it was decided to close the free gap by diverting the eels into the nets on either side as it was not possible to add an additional net to the gap. This measure was taken as a result of the low mark recapture rate for 2012 season (9%) and the potential of eels to bypass the nets by using the free gap.

A higher mark recapture result was recorded for the new location over the 2 years with a preliminary within year mark recapture rate of 26% and an overall recapture rate of 30%.

The response of selected eels to cease migration and remain in the area until the next dark could be a result of the 'startle response' reported by Richkus and Dixon (2003). They found that when eels tagged with acoustic tags encountered an obstacle they would swim upstream. Currently we do not know the proportion of eels displaced during the tagging study that delayed migration compared with the eels that managed to bypass the nets on the second meeting. Further investigation is needed and will be carried out over the next few years. Therefore the MR results reported here are subject to change as tagged eels are recaptured over the coming years.

Location	Year	Tagged	Recaptured within Yr	within Yr MR %	Total Recapture	Overall MR %
u/s fishery	2012	470	34	8%	92	20%
River	2011	173	47	29%	57	33%
River	2012	286	26	10%	52	18%
Lake	2011	160	23	15%	34	21%
Lake	2012	119	8	8%	28	24%
Mouth River	2013	303	61	22%	91	30%
Mouth River	2014	272	80	29%		
A	verage MR	8 % all locat	tions	18%		24%
А	verage MF	R% Mouth F	River	26%		30%

Table 5-4: Mark Recapture preliminary results 2011 – 2014.

## 5.5.3 Eel Biology

Morphometric measurements were taken on 1,177 eels (>75% of the total catch). The length of eels caught during the season ranged from 31.4 cm to 96 cm with an average length of 47.1 cm (Table 5.5). The weight ranged from 0.05 kg to 2.09 kg with an average weight of 0.251 kg. There was no difference in the population structure of eels caught over the 4 years (Fig. 5.21).



Figure 5-21: Length Frequency of silver eels in the Fane catchment, 2011-2014.

Year	No. eels	Av Length (cm)	Min Length (cm)	Max Length (cm)	Av weight (kgs)	Min Weight (kgs)	Max Weight (kgs)
2014	1334	50.4	30.4	95.0	0.292	0.045	1.721
2013	1165	49.2	30.8	96.6	0.289	0.030	1.952
2012	1541	47.1	31.4	96.0	0.251	0.050	2.090
2011	1433	43.8	30.4	91.7	0.187	0.044	1.709
2005	200	45.7	31.0	90.0	0.174	0.060	1.063

Table 5-5: Length and Weight data for Silver eels from the Fane catchment.

Table 5-6 : Biological data for silver eels from Fane catchment, nc = not checked

Year	Total eels	No. females	No. males	% female	% male	% prevalence A. crassus	Mean Intensity A. crassus	Count A. crassus
2014	19	4	15	21	79	68	7.92	103
2013	152	48	104	32	68	53	3.94	319
2012	212	118	94	56	44	27	3.66	271
2011	158	47	110	30	70	28	3.70	167
2005	100	27	73	27	73	nc	nc	nc

## 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 will be the first riverine dominated silver eel index catchment assessed to date.

Four nets will be fished from lock gates of the canal section of the River Barrow at one location during the silver eel season (Figs. 5.22 & 5.23). The location fished is upstream of the town of Graiguenamanagh; approximately 5kms upstream from the tidal limit (estuary) in the River Barrow. This means that over 99% of the River Barrow freshwater 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 fishing locations within the Barrow Catchment for 2014.



Figure 5-23: Location of research silver eel fishery on Barrow canal.

# 5.6.1 Eel catch

The new location was fished in 2014 as a pilot study to determine possible catch levels. The fishery was fished for 22 nights with a total catch of 174 kg (Table 5-7). The location of the nets on the lock gates means the fishery is operated by fishing the flood waters as opposed to concentrating on the nights of the new moon.

Table 5-7	7: Barrow	silver eel	catch	for 2014
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Session	Count	Catch (kg)
August	2	0.280
Oct_1_flood	110	12.647
Oct_2_moon	646	86.078
Oct_Nov_3_flood	425	67.129
Nov_4_flood	40	7.759
Total	1223	173.893

#### 5.6.2 Mark Recapture

A mark recapture survey was carried out at the site. Two hundred and two eels were tagged with floy tags and released 2kms upstream of the fishing site. Seven eels were recaptured giving a recapture rate of 3.5%. Four of the recaptures eels were caught later that night and 3 of the eels were caught 9 days later. It was planned to repeat the mark recapture study again within the season but this did not materialise due to the nature of the site and distribution of the catch within the season. A second Mark recapture study will be undertaken in 2015 with eels released within the canal section to determine how many eels are caught by the nets on the lock gates.

## 5.6.3 Eel Biology

The size structure of the catch consisted of a large number of small eels. The contracted fisher commented that the size of eels had changed around 2007 – 2008 with an increase in smaller eels being caught in the fishery. There was a pilot stocking project in 1990 and 1991 with elvers from the River Feale being stocked in the River Barrow. The time scale would fit with the maturation of these stocked elvers changing the length structure in 2007. The average age of a silver eel in Ireland is 18 years; in 2007 the stocked elvers would have been 16/17 years in freshwater and by 2014 the stocked eels would be 24/25. Age data from the catch data will clarify whether the stocked eels are influencing the catch. The silver eels ranged in length from 33 cm to 76 cm with an average length of 44 cm, the eels ranged in weight from 0.06 kg to 0.613 kg with an average weight of 175g (Fig. 5.24 and Table 5.8).

Preliminary data shows a 61% male, 39% female breakdown however the sample size is small n=51 (Table 5.9 and Fig. 5.25). The prevalence rate of *A. crassus* is high at 73% with an infection intensity of 6 nematodes per eel. In 2012; 94 yellow eels from Levitstown canal upstream of our fishing site were brought back to the laboratory for further analysis. The sex ratio was 96% female, 1% male and 3% young eel. The prevalence rate for *A. crassus* was 68% with a mean intensity of 4.11 nematodes per worm.



Figure 5-24: Length frequency of silver eels caught in 2014 on the Barrow canal.



Figure 5-25: Sex distribution of sacrificed silver eels collected from Barrow River 2014.

Table 5-8: Lei	ngth and V	Weight data	for Silver and	vellow eels	from the l	Barrow catchments
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Location	Year	Life stage	No. Eels Dissected	Mean length (cm)	Min. lengt h (cm)	Max. lengt h (cm)	Mean wt (Kg)	Min. wt (Kg)	Max. wt (Kg)
Freshwater	2014	Silver	811	41.4	27.6	76.2	0.140	0.033	0.742
Estuarine	2009	Yellow	100	42.5	22.5	65.0	0.200	0.021	0.980
Freshwater	2012	Yellow	94	43.3	30.1	65.6	0.152	0.042	0.555

Table 5-9: Biological data from yellow and silver eels from the Barrow catchment.

Locatio n	Year	Stage	No. female	No. male	No. imm	% female	% male	% imm	% prevalence A. crassus	Mean Intensity A. crassus	Count A. crassus
F'water	2014	Silver	20	31	0	39	61	0.00	72.55	6.11	226
Estuary	2009	Yellow	67	33	0	67	33	0	60.6	4.5	270
F'water	2012	Yellow	90	1	3	96	1	3	68.09	4.11	263

# 5.7 Baronscourt

As part of a PhD study on eels through IBIS (Integrated Aquatic Resource Management between Ireland, N Ireland and Scotland - funded through the EU INTERREG IVA Programme) the dynamics of eel within the Baronscourt Lakes, Co Tyrone in the Foyle catchment was examined. Field work took place during 2012 and 2013 and is currently being written up with an aim for completion by June 2015. The study involved extensive fyke netting and PIT tagging of yellow eels and also monitoring of silver eel migration. For further information please visit www.loughs-agency.org/ibis.

# 5.8 Elver Mortality Silver Eel Equivalents

# 5.8.1 Erne

In 2013, 5kg of elvers were recorded as a mortality in the trap at Cathaleen's Fall. In 2014, 112kg were reported dead on the 22<sup>nd</sup> April with a further 38kg in a distressed state moved back downstream and released into tidal water.

In order to comply with escapement and mortality rate reporting for the Erne and the NWIRBD, these amounts were converted into silver eel equivalents lost from the Erne catchment, using a similar method to the calculation used by WGEEL for stocking.

The WGEEL Silver Eel Equivalent (SEE) method uses the following parameters:

- 80% natural mortality occurs at settlement, typically between pigment stages VIAII and VIAIII.
- An instantaneous lifetime mortality of 0.14 yr<sup>-1</sup> (Dekker, 2000)
- 50:50 sex ratio with males maturing at 11 years and 114g mean weight and females maturing at 19 years and 679.5g mean weight
- For the Erne, it was assumed that 75% of the elvers in the trap in April have survived the 80% mortality, based on elver pigment stages in April 1999 (Matthews et al., 2001). Therefore the 80% settlement mortality was only applied to 25% of the weight of dead elver.

Provisional estimated losses for the Erne were 432kg SEE in 2013 and 12,955kg SSE in 2014.

# 5.8.2 Maigue

In 2014 on the R. Maigue, 7kg were reported dead with a further 3.3kg in a distressed state released back downstream. To determine the potential loss to the system, the ICES SEE method was applied as follows:

- 80% mortality occurs at settlement, typically between pigment stages VIAII and VIAIII.
- An instantaneous lifetime mortality of 0.14 yr<sup>-1</sup> (Dekker, 2000)
- 50:50 sex ratio with males maturing at 16 years and 80g mean weight and females maturing at 20 years and 238g mean weight (Corrib age data and Burrishoole weight data)
- For the Maigue, it was determined from pigment stages that 100% of the elvers in the trap have passed the 80% settlement mortality stage. Therefore the 80% settlement mortality was not applied.

The loss in the Maigue was provisionally estimated to be 343kg SEE in 2014.

### 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 2012 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 hydroacoustics), rivers (electro-fishing and fyke nets) and transitional waters (fyke nets, seine nets & beam trawls) in 2012 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 2012, 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 2012 – 2015 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.

### 6.1 Yellow Eel Survey 2014

The eel fyke net surveys involve intensive fyke netting using 'standard summer fykes' set in chains. In order to standardise the influence of environmental conditions and ensure the catch reflects the actual eel population as suggested by Harley et al 2001, lakes were surveyed between June and September each year, with the surveys carried out over 2-3 visits. The nets were randomly assigned to the lake using a trap builder in Density 4 (Efford \*\*) to remove operator bias and ensure good coverage of the area. Lough Ramor and Lough Muckno were surveyed once in 2014 along with the South Sloblands. The repeat survey had to be cancelled due to unforeseen circumstances. A semi quantitative electrofishing survey was undertaken in the Kells Blackwater in order to determine the extent of eel distribution in the rivers and

tributaries around Lough Ramor. The river Barrow was netted for eels as part of an ongoing acoustic survey of the upper Barrow transitional waters.

In the field there are two life stages encountered: the yellow resident stage and the silver stage. Stage determination is based on skin colour: an eel that displays a silver belly well separated from a black dorsal region by the lateral line is considered at the 'silver stage'. However eels are found with intermediate features so additional measurements are recorded (ICES, 2009).

- Eye measurements: horizontal and vertical right eye is measured (not just the iris but the whole visible eye, mm).
- Pectoral fin measurements (corresponds to the tip of the fin to the greatest possible length, mm).
- Total body length (cm),
- Wet body weight (kg),
- State of lateral line (presence of black corpuscles),
- Presence of metallic colouration (i.e. bronze),
- Dorso-ventral colour differentiation.

For each night's fishing, as many live samples as possible were measured for weight, length, and morphological features associated with silvering. At each location approximately 100 eels (~50 per session) were sacrificed for further analysis in the laboratory. Total length (to nearest cm), weight (to nearest g) and silvering characteristics were determined on site. Otoliths were removed for age evaluation (cracking and burning - Christensen 1964, Hu & Todd 1981, Moriarty 1983 and Graynoth 1999), gonads for sex determination (macroscopically), swimbladders for evaluation of nematode parasite, *Anguillicola crassus* (Kuwahara, Niimi & Hagaki, 1974) and stomachs for diet composition.

During dissections, each eel is examined for the presence of the swimbladder parasite, with percentage prevalence, mean intensity of infection per eel, maximum burden per eel, maximum weight of infections and total parasite count across the dissected eels, all recorded. In the last two years, two indices for investigating swimbladder tissue health have also been used. The Swimbladder Degenerative Index (SDI), (Lefebrve *et al.* 2002) is a qualitative index which scores, swimbladder tissue transparency, presence of pigment and/or exudate and the thickness of the swimbladder wall (Molnár *et al.* 1994), in order to grade the health of the organ on a scale of 1-6. Slight damage is depicted by scores of 1-2, while moderate damage scores 3-4. Score of 5-6 being the most severely damaged. The second index used is the Length Ratio Index (LRI), (Palstra *et al.* 2007). This index is far more quantitative than SDI and relies on a measurement of the length of the swimbladder during dissection. This value of swimbladder length is divided by the total length of the eel and the resulting score is the length ratio index (LRI). Values range from 0.2 to 0.0, with increasing damaged approaching zero. When compared to values of SDI, LRI values of approximately 0.2 - 0.15 depict slight damage. Values of 0.14 - 0.09 denoted moderate damage. Finally, severe damage is demonstrated in values less than 0.08.

A second objective of the yellow eel study was to carry out an indirect estimation of silver eel escapement. A long-term tagging programme was initiated in key lakes sampled since 2009. In Lough Derg, all yellow eels captured in the fyke nets were tagged using Trovan Passive Integrated Transponders (PIT tags). The detection of these tagged eels in the silver eel run over subsequent years will provide information regarding the maturation rate of the yellow eel population.

Location	Water body	Life stage	1	2.1	3	4	5	6	7	2012	2013	2014
Meelick Bay, L. Derg	Lake	Yellow		$\checkmark$								
Erne	Lake & River	Yellow		$\checkmark$	ULE WFD							
Barrow R.	River	Yellow		$\checkmark$								
Blackwater	River	Yellow			$\checkmark$		$\checkmark$	$\checkmark$			+	
Nore R.	River	Yellow			$\checkmark$		$\checkmark$	$\checkmark$			WFD	
L. Ramor	Lake	Yellow			$\checkmark$			$\checkmark$				$\checkmark$
Kells Blackwater Catchment	River	Yellow		$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$			$\checkmark$
L. Ree	Lake	Yellow		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			WFD	
L. Feeagh	Lake	Yellow		$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	
L. Gill	Lake	Yellow			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$				WFD
L. Inchiquin	Lake	Yellow					$\checkmark$	$\checkmark$		+		
L. Key	Lake	Yellow		$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$			$\checkmark$	
Dromore L. (Fergus)	Lake	Yellow			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$				+
L. Bunny	Lake	Yellow			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		WFD		
L. Arrow	Lake	Yellow			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		WFD		
South Sloblands	Lagoon	Yellow			$\checkmark$		$\checkmark$	$\checkmark$				$\checkmark$
Lady's Island	Lagoon	Yellow			$\checkmark$		$\checkmark$	$\checkmark$				+
Lough Furnace	Brackish lagoon	Yellow		$\checkmark$			$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$
Blackwater Estuary	T. water	Yellow					$\checkmark$	$\checkmark$				+
Fane	River & Lake	Yellow		$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

Table 6-1: Monitoring Programme 2012-2014.

+ locations not surveyed under the 3 year eel monitoring programme;

The Blackwater River and Estuary will be designated an index catchment for the 2015-2017 monitoring programme. Inchiquin Lake will be surveyed in 2015.



Figure 6-1: Locations of yellow eel survey work 2014.

## 6.1.1 Lough Muckno

Lough Muckno is upstream within the Fane catchment. It has a surface area of 325 ha and depths reaching up to 20 m. The 2014 survey yielded somewhat different results, with lower catches overall but more comparable with other lakes surveyed under the EMP programme. The weather conditions were particularly calm and there was a moderate algal bloom on the lake which may have affected the catch. Over the course of 3 nights fished, with eight chains of five fyke nets (Fig. 6.2), 221 eels were caught presenting a CPUE of 1.8. The eels ranged in length from 32.7 to 76.1 cm and in weight from 0.050 to 0.834 kg, with a total recorded weight of 52.71 kg (Table 6.4 and Fig. 6.3). No eels were retained for dissection during this survey.



Figure 6-2: Locations of fyke nets sampled on L. Muckno, 2014. (Inset: Map of Ireland with Fane catchment (shaded) and the Irish part of the Neagh-Bann International River Basin District (outlined)).



Figure 6-3: Length distribution for yellow eel in L. Muckno survey 2014.

## 6.1.2 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 and a maximum depth of approximately 6 m. The outflow of Lough Ramor is the Kells Blackwater and discharges into the Boyne River. Lough Ramor was sampled for 6 nights during the summer of 2014 (Fig. 6.4). In total, 214 eels were caught with a CPUE of 1.78 (Table 6.4). The eels ranged in length from 23.1 to 81.8 cm and in weight from 0.050 to 1.141 kg, with a total catch weight of 56.2 kg (Table 6.4 and Fig. 6.5).

A total of 99 eels were sacrificed during the survey, 88% of which were female, 10% were male and 1% was identified as immature (intersexual) individuals (Table 6.5 and Fig. 6.6). There was a high prevalence of *A. crassus* with a rate of 83.84% and a mean intensity of 9.66 parasite per eel (Figure 6.7). The total parasite count among the sacrificed eels was 802 individuals. The Swimbladder Degenerative Index (SDI) and Length Ratio Index (LRI) were applied to the sacrificed eels from Lough Ramor in order to assess swimbladder condition. A high degree of damage is noted when SDI values reach 5-6, while the LRI demonstrates severe damage in values less than 0.06. Both indices however, suggested only slight/moderate damage to the swimbladders, with an SDI modal of 1 and an LRI modal of 0.18 (Figures 6.8). Palstra *et al.* (2007) suggested that the ability of eels to complete the spawning migration would decrease with large parasite infections and/or severe swimbladder tissue damage. This suggests that swimbladder tissue in the eels examined was relatively healthy despite the high prevalence and mean intensities of infection noted. As with Lough Muckno, the main food type recorded during stomach content examination was chironomid larvae.



Figure 6-4: Locations of fyke nets sampled on L. Ramor, 2014. (Inset: Map of Ireland with Boyne catchment (shaded) and Eastern River Basin District (outlined)).



Figure 6-5: Length frequency of yellow eels captured at L. Ramor, 2014.



Figure 6-6: Sex distribution of sacrificed yellow eels in L. Ramor, 2014.



Figure 6-7: *Anguillicola crassus* infection intensity for sacrificed yellow eels collected from L. Ramor, 2014.



Figure 6-8: a. Swimbladder Degenerative Index (SDI) b. Length Ratio Index (LRI) results for swimbladder condition among sacrificed yellow eels collected from L. Ramor, 2014

#### 6.1.3 Burrishoole

Bunaveela Lough (Fig. 6.9) is located in the upper reaches of the catchment. 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 2014 (3 July 2014), with chains of 10 nets fished at three sites. In total 11 eels were caught with a catch per unit of effort of 0.37 eels/net/night (Table 6.4). The average length was 47.3cm and ranged in length from 35.7cm to 61.1cm. No eels were PIT tagged.

Lough Feeagh (Fig.6.9) 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 2014 (09-10 July 2014), with chains of 10 nets fished at six sites for one night each. In total, 47 eels were caught with a catch per unit effort (CPUE) of 0.78 eels/net/night (Table 6.4). The eels average length was 41.5cm and ranged in length from 30.6cm to 54.8cm, with a total weight of 6.37kgs caught in the two nights. None of the catch was PIT tagged and no previously tagged eel were taken.



Figure 6-9: Map of Burrishoole showing the lakes surveyed.

# 6.2 Transboundary Yellow Eel

## 6.2.1 Lower Lough Erne

An eel survey of Lower Lough Erne was carried out over one week in August 2014, at a subset of the full 2011 survey sites. 30 Fyke nets were set per night (standard 10m double ended 50 cm hoop Dutch fykes). Silver eels were recorded but not included in the overall count of yellow eel. Eel were released alive. Catch per Unit Effort CPUE was higher than in the 2011 survey reported in the 2012 SSCE report. It should be noted that some of the highest CPUEs recorded in the eel monitoring programme were from Lower Lough Erne in 2014. Summary data on the catch is given in Table 6.2 and the lengths in Figure 6.10.

lift date	Silver eel	Yellow eel	YE CPUE			
			(Catch/2ends)			
21/07/2014	5	97	3.23			
22/07/2014	3	307	10.23			
23/07/2014	12	547	18.23			
25/07/2014	8	849	28.30			
25/07/2014	11	746	24.87			
Length mean		50.7 cm				
Length range		32.3-69.7 cm				
Mean CPUE 201	4		16.97			
Mean CPUE 201	1 for					
comparison			14.9			

Table 6-2: Catch per unit effort in Lower Lough Erne Yellow eel survey 2014 from30 standard double-ended fyke nets



Figure 6-10: Length frequency for yellow eel from Lower Lough Erne, 2014.

# 6.2.2 DOLMANT Lakes Survey

Under The EU Interreg funded DOLMANT (development of Lake Management Tools) project, AFBI sampled in 2011 & 2012 a number of small lakes in the NWIRBD for fish, to standard Irish WFD protocols (half CEN multimesh gill netting effort, with fyke nets added for Eel, number according to lake size and depth). Eels were found at Loughs Auva, Bunerky, Derg, Formal, Golagh, Lee, Mardal, Nalughoge, Scolban, Screeby and Shivnagh, and no eels were recorded in Loughs Akibbon, Bawn, Drumgay, Jenkin, Kilturk, Nadarra, Salt and Vearty (Table 6.3). This data is not fully quantitative but gives a picture of the general distribution of eel throughout the RBD, which appears to reflect distance from the sea, elevation and presence of natural barriers. The distribution of lakes samples, along with lakes for which IFI supplied similar data to DOLMANT, is shown in Figure 6.11.

				CPUE (per m of net) 1 double end	BPUE (g per m of net), 1 double end
LAKE	EASTING	NORTHING	DATE	tyke=10m	tyke=10m
Akibbon	206896	418593	23/07/2012	0.000	0.000
Auva	153857	381171	29/08/2012	0.019	0.000
Bawn	230191	307155	15/08/2012	0.000	0.000
Bunerky	218696	318564	06/08/2012	0.025	0.000
Formal	204760	347379	11/09/2012	0.005	1.593
Golagh	196531	366167	21/08/2012	0.002	1.203
Jenkin	248326	339967	26/06/2012	0.000	0.000
Kilturk	237220	325827	05/09/2012	0.000	0.000
Lee	196261	365404	18/07/2012	0.003	0.000
Mardal	195199	367462	25/07/2012	0.005	0.000
Nadarra	248599	339468	31/08/2012	0.000	0.000
Nalughogue	236549	324267	08/09/2011	0.039	9.899
Salt	212440	426229	03/07/2012	0.000	0.000
Scolban	199718	360581	20/09/2011	0.013	0.402
Shivnagh	200408	367384	21/08/2012	0.024	0.000
Vearty	199344	365958	20/09/2012	0.000	0.000

Table 6-3: Eel CPUE and BPUE in lakes in NWIRBD sampled, DOLMANT Project 2011-2012.


Figure 6-11: Map of lakes sampled in the DOLMANT project.

## 6.2.3 Lough Finn NWIRBD

Further to the IBIS eel study another element was based on Lough Finn in Co Donegal. This part of the PhD examined the movement of Broad and Narrow head eels within the lough using acoustic tags during the summer of 2013. The study also involved tagging 20 migrating silver eels with acoustic tags and tracking their movement downstream until they entered the North Atlantic Ocean off the north coast of Ireland attempting to identify potential areas of mortality. These are currently being written up with an aim for completion by June 2015. For further information please visit <u>www.loughs-agency.org/ibis</u>.

# 6.3 Transitional Waters

# 6.3.1 South Sloblands Wexford

South Sloblands is a brackish lagoon on southern shores of Wexford Harbour on the Slaney catchment (transitional waters), located near Drinagh and Wexford Town. The sloblands lie below sea level, on flat land covering 1,000 ha. The South Slobland lagoon itself has a surface area of 52.06 ha and was particularly shallow, with an average depth at sampling points of 2.7 m. The eel populations of the South Sloblands were previously examined on a regular basis by C. Moriarty. Moriarty (1973, Department of Agriculture and Fisheries, Fishery Leaflet No. 48), reported that the eels of South Sloblands had been subjected to intense commercial fishing for two successful years, and as a result were showing low stocks and would take years to recover. It was suggested to the fishery owners to abandon fishing for five years to permit recovery. The author went on to report that in 1970, a fyke netting survey

of the South Sloblands had yielded a catch of 408 eels. Just two years later (1972), that catch had reduced to 15 eels. In 2010, the South Sloblands were sampled by the EMP for a single night using a total of 30 nets (two chains of 5 and two chains of 10). That survey caught only 24 eels. A repeat sampling with an increased effort has resulted in a higher total catch. The lagoon was sampled by EMP during the summer of 2014 for two nights, using 30 fyke nets (six chains of 5) (Fig. 6.12). A total of 147 eels were caught, reflecting a CPUE of 5.07. The eels ranged in length from 28.6 to 66.5 cm and in weight from 0.032 to 0.708 kg, with a total catch weight for the two days of 24.24 kg (Table 6.4 and Fig. 6.13). No eels were retained for dissection during these surveys.



Figure 6-12: Locations of fyke nets sampled on South Sloblands, 2014. (Inset: Map of Ireland with Slaney catchment (shaded) and South Eastern River Basin District (outlined)).



Figure 6-13: Length frequency of yellow eels captured at South Sloblands, 2014.

#### 6.3.2 R. Barrow Transitional Waters

The River Barrow was the first river fyke netted by the EMP, and this is the third year of sampling this catchment The catchment area is approximately 14,103ha (Fig. 6.14), and is a recognized Special Area of Conservation (SAC) in Ireland.

In July 2014, the river was sampled for a single night upstream of New Ross with fyke nets set in chains of five. The aim of the survey was to capture 10 large eels for the telemetry study. A total of 206 eels were captured. The length of the catch ranged from 22.6 to 75.4 cm and weight ranged from 0.052 to 1.806 kg, with a total catch weight of 60.407 kg (Table 6.4; Fig. 6.15). No eels were retained for dissection during this survey.

In 2014, a second acoustic study site was chosen downstream of the 2012/2013 location and upstream of New Ross. The decision to move locations was due to the concern that another 10 large (>55cm) eels would not be found within the initial study site. In the new location additional receivers were installed around 500m apart in order to determine an accurate calculation of distances travelled during the normal core foraging behaviour. Ten large female eels were captured and fitted with acoustic tags and released at the centre of the study site. Monitoring of the movements of these individuals will continue via stationary receiving stations and mobile detectors (hand-held equipment) in order to further examine territoriality and site fidelity in this population.



Figure 6-14: Survey locations on the tidal R. Barrow, 2014.



Figure 6-15: Length frequency of yellow eels captured on R. Barrow, 2014 (6 sites upstream of New Ross).

## 6.3.3 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 (Lwr L. Furnace) (Fig. 6.9). 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 2014 (16-17 July 2014), with chains of 10 nets fished at six sites for one night each, and one night (23 July 2014) 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, 76 eels were caught with a catch per unit effort (CPUE) of 1.27 eels/net/night (Table 6.4). The eels average length was 41.6cm and ranged in length from 30.4cm to 78.0cm, with a total weight of 12.0kgs caught for the 2 nights (Table 10.1).

In Lwr Lough Furnace, 47 eels were caught with a catch per unit effort (CPUE) of 2.35 eels/net/night (Table 6.4). The eels average length was 45.0cm and ranged in length from 21.9cm to 78.0cm, with a total weight of 5.05kgs caught.

Site	Dates	No. Eels	Nets*Nights	CPUE	Total Weight (kg)	Mean Length (cm)	Min. Length (cm)	Max. Length (cm)	Mean Weight (kg)	Min. Weight (kg)	Max. Weight (kg)
Lough Muckno	02/09/2014	121	40	3.03	28.556	50.4	33.7	76.1	0.236	0.059	0.834
	03/09/2014	64	40	1.60	14.831	49.4	32.7	74.9	0.232	0.050	0.758
	04/09/2014	36	40	0.90	9.332	50.8	36.4	72.3	0.259	0.076	0.755
	2014	221	120		52.710	50.2	32.7	76.1	0.238	0.050	0.834
Lough Ramor	19/8/2014	99	40	2.48	26.645	51.5	23.1	75.5	0.269	0.65	0.912
	20/8/2014	86	40	2.15	22.747	51.7	34.2	81.8	0.265	0.051	1.141
	21/8/2014	29	40	0.73	6.809	48.0	32.8	78.4	0.235	0.059	1.032
	2014	214	120		56.201	51.1	23.1	81.8	0.263	0.051	1.141
South Sloblands	12/8/2014	71	29	2.45	11.437	42.4	29.0	59.8	0.161	0.032	0.533
	13/8/2014	76	29	2.62	12.798	42.9	28.6	66.5	0.168	0.042	0.708
	2014	147	58		24.235	42.7	28.6	66.5	0.165	0.032	0.708
Barrow – New Ross	2014	206	30	6.87	60.41	39.5	22.6	75.4	0.293	0.052	1.806
Bunaveela Lough	3/7/2014	11	30	0.37	2.13	47.3	35.7	61.1	-	-	-
Lough Feeagh	9-10/7/2014	47	60	0.78	6.37	41.5	30.6	54.8	0.130	0.045	0.290
L. Furnace tidal	16-17/7/2014	76	60	1.27	12.00	41.6	30.4	78.0	0.140	0.040	1.135
Lwr. L. Furnace tidal	23/7/2014	47	20	2.35	5.05	45.0	21.9	78.0	0.183	0.015	0.810

Table 6-4: Catch details of the yellow eel survey in the national EMP survey 2014.

Location	Total Eels	No. Females	No. Males	No. Immature	% Female	% Male	% Immature	% Prevalence A. crassus	Mean Intensity A. crassus	Preferential Diet from Stomach Contents
Lough Ramor 2014	99	88	10	1	88.90	10.10	1.00	83.84	9.66	Chironomid larvae
<b>Ramor 2011</b>	89	86	1	2	97	1	2	78.7	4.76	Chironomid & Asellus spp

 Table 6-5: Biological data from yellow eel surveys on L. Ramor, 2011 & 2014.

# 6.4 Water Framework Directive

### 6.4.1 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.

## 6.4.2 WFD Sampling Programme Methods

#### 6.4.2.1 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.

#### 6.4.2.2 **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.

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. Three fishings were carried out in a contained area. In small shallow channels (<0.5 - 0.7 m in depth), a portable (bank based) landing net (anode) connected to a control box and portable generator (bank-based) or electric fishing backpack was used to sample in an upstream direction. In larger deeper channels (>0.5 - 1.5 m), fishing was carried out from flat-bottomed boat(s) in a downstream direction using a generator, control box and a pair of electrodes. All habitats, in wadeable and deeper sections, were sampled (i.e. riffle, glide, pool).

#### 6.4.2.3 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.



Figure 6-16: Location of WFD survey sites, 2013.

#### 6.4.3 Results 2013

Locations for WFD sampling sites for 2013 surveys are shown for lakes, rivers and transitional waters (Fig. 6.16). Summary tables detailing the surveys carried out by the WFD team are provided in Appendix 5. A total of 24 lakes (spanning 16 catchments), 75 river sites (31 catchments) and 10 transitional waters (from 5 catchments) were sampled by the WFD team in 2013. Eels were present in all 20 sampled lakes (100% of sites), 54 river sites (72% or 74%) and 8 transitional waters (80%) sampled.

The WFD river sites have a 72% eel presence rate, 35% of sites have  $\leq$ 5 eels, 9% of sites caught between 5 and 10 eels and 28% had  $\geq$ 10 eels.

A total of 422 eels were caught during lake surveys (with 407 eels processed for length and weight). They ranged in length from 29.7 to 84.2 cm. The river surveys caught a total of 653 eels, ranging from 6.9 to 67.0 cm. The transitional water surveys caught a total of 428 eels. However, the catch was not processed at several sites. Therefore, the length frequency data was limited to 171 eels (ranging from 22 to 78 cm). Length frequencies for the lakes, rivers and transitional waters from 2013 sampling are shown in Figures 17, 18 and 19 respectively.

Another benefit of the national survey undertaken by the WFD team is the identification of the spread of the eel swimbladder parasite, *Anguillicola crassus* around the country. While no eels were retained for dissection during the 2013 WFD sampling schedule, previous years of dissection data were included with those from EMP monitoring in order to elucidate a national distribution, prevalence and intensity of the parasite. The results of this study were later published in the Journal of Fish Biology (Becerra-Jurado *et al.* 2014). The distribution of infection has shown to be uneven across the country with several areas appearing to be in early stages and advanced stages of *Anguillicola* invasion, while others are parasite free (Becerra-Jurado *et al.* 2014).



Figure 6-17: Length Frequency of eels caught during WFD Lake Surveys, 2013.



Figure 6-18: Length Frequency of eels caught during WFD River Surveys, 2013.



Figure 6-19: Length Frequency of eels caught during WFD Transitional Water Surveys, 2013.

# 6.5 Otolith Ageing and Growth: Preliminary analysis

## 6.5.1 Introduction

Otoliths were extracted during all dissections of sacrificed eels collected during surveys by the Eel Monitoring Programme. To date, all otoliths from 2009, 2010 and 2011 surveys have been prepared, aged and subjected to quality control checks in-house. These QC checks were devised after the Otolith Workshop with Russell Poole in the Marine Institute (Newport) in early 2010. The QC methodology developed at the workshop was applied to a subset of the total specimens. This comprises over 80% of the otoliths extracted during dissections by the EMP from 2009 to the present time. Work on otolith burning and ageing to date has seen a total of 2,490 specimens processed. This includes 1,462 yellow eels from lake, canal and transitional water sites and a further 1,028 silver eels representing up to nine sites in four catchments.

A number of the monitoring objectives of the Eel Management plan require information on the growth and age of the eel population in Ireland. The objectives to assess the impact of the fishery closure, to set up a baseline data and to assess the quality of the eel stocks all require this type of information.

## 6.5.2 Methodology

#### 6.5.2.1 Extraction

Otoliths are extracted from eels during dissection by opening the brain case with a scalpel and removing otoliths with a forceps from both sides of the exposed brain cavity (Figure 6.20). The otoliths were rinsed, cleaned and allowed to dry before being stored in carefully labelled scale envelopes. The dried otoliths were later prepared and slide mounted for ageing.



Figure 6-20: a) Opening the brain case and b) extracting otoliths from the brain cavities (Photos: R. Cruikshanks).

### 6.5.2.2 Cut and Burn

The Cut and Burn method (Graynoth, 1999 & Annex 5: ICES Workshop Manual on Age Reading for European and American Eel, Version 2, April 2011) involves cutting the otolith along the short axis (along its frontal plane) through the nucleus, while it is lying flat on its convex side (i.e. concave side facing up), (Figure 6.21a.). Each half of the otolith is then individually placed on a scalpel blade and held in a flame of a Bunsen burner until the otolith itself has turned an ashen grey colour (Figure 6.21b). The burned otolith can then be

placed (reading surface facing down) onto a clear resin bead upon a microscope slide. The final placement is carried out under light microscopy to ensure clear positioning of the otolith for ageing purposes (Figure 6.21c) When each slide of otoliths is completed, the specimens are sealed by a final layer of clear resin.



Figure 6-21: Cutting an otolith, b) burning over the Bunsen flame and c) mounting a burned half of an otolith in resin.

### 6.5.3 Ageing and Growth Analysis

The otoliths are aged using the ImagePro<sup>TM</sup> Plus imagery analysis computer package (Media Cybernetics). Individual otoliths are aged and the growth increments per year are marked and measured in order to calculate and observed length at age (which can later be compared to the predicted length at age data generated by von Bertalanffy calculations). In the case of predicted growth calculations, a linear growth model is assumed for eels (Poole & Reynolds, 1996). An average growth rate (cm/year) is also generated for any meta-population of eels examined. Eels are aged in accordance with a calendar which takes into account the potential future growth of the eel until the end of the year. As such, eels caught from January 1<sup>st</sup> to September 30<sup>th</sup> *do not* have the edge of the otolith included in growth and the age is denoted with a + mark. Eels caught between October 1<sup>st</sup> and December 31<sup>st</sup> *will* have the edge of the otolith marked and included in growth calculations (i.e. an eel caught during the Summer of 2010 may be 12+ years of age, while the same eel if caught after October 1<sup>st</sup> that year, would be a 13 year old eel, see Figures 6.22 & 6.23). When ageing silver eels, the edge is *always* marked.



Figure 6-22: Ageing otoliths in ImagePro<sup>™</sup> Plus. An 11+ year old yellow eel (UPERNE/YE/038), from Upper Lough Erne, sampled during summer 2010.



Figure 6-23: Ageing otoliths in ImagePro<sup>™</sup> Plus. An 18 year old silver eel (SIL/CORR/114), from the Corrib catchment, sampled at Moycullen (Lower Lough Corrib) during autumn 2010.

## 6.6 **Preliminary Results**

Early results suggest that transitional water sites (with higher productivity in comparison to inland waters) present the highest mean (and fastest) growth rates (Table 6.6). On average, the eels aged from 2009 to present demonstrate a growth rate of 2.65 cm/year. Yellow eels average at 2.75 cm/year, while silvers demonstrated lower growth in later years which led to an average growth rate of 2.52 cm/year. The growth rates and descriptive statistics for growth for all eels currently aged are presented in Table 6.6.

When considering yellow eels, the average growth rate was 2.75 cm/year (n=1,462). The fastest growth rate recorded was for the eels captured from the Waterford Barrow Estuary (4.07 cm/year, n=65). The Barrow Estuary also had the lowest mean age of 9 years ( $\pm$ 2 years). In contrast, the slowest yellow eel growth rate was noted at Lough Ballynahinch (1.57

cm/year, n=81), where the highest mean age for yellow eels to date was also recorded (mean 21+ years,  $\pm$  6 years). This site also presented some of the oldest yellow eels so far (45+ yrs). The low growth rate here may be linked to the acid-sensitive nature of the catchment (Table 6.6 & Figure 6.24).

Silver eel growth rates were more uniform. Lower growth rates in later years, led to an overall lower average among silvers as opposed to yellows. The average growth rate was 2.52 cm/year (n=1,028). The highest growth rates were recorded for eels captured at sites on the Erne catchment (L. Oughter: 3.50 cm/year, n=21 and Lower Lough Erne (Portora): 3.39 cm/year, n=20). The lowest mean age was also found among Erne silver eels (L. Oughter: 15 years, ±3 years). The lowest growth rate was recorded among the Fane silvers sampled in the autumn of 2011, which presented an average growth rate of 1.95 cm/year (n=140). The highest mean age for silvers of 30 years (± 5 years) was noted at Lough Mask (Cong), (Table 6.6 & Figure 6.25).

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Location	Year	Life stage	No. Of Eels	Growth Rate (cm/yr)	Mean Age (Years)	Standard Deviation
Waterford Estuary	2009	Yellow	65	4.07	8.74	2.15
Lough Cullen	2009	Yellow	81	3.37	11.26	2.61
Lough Conn	2009	Yellow	95	2.88	13.54	4.19
Lough Corrib Lower	2009	Yellow	1	3.06	13.00	-
Lough Corrib Upper	2010	Yellow	83	2.39	17.33	5.49
Lough Ree *	2010	Yellow	82	2.92	12.62	3.02
Lough Erne Upper	2010	Yellow	76	3.08	13.27	2.83
Lough Derg °	2009 & 2010	Yellow	139	2.25	16.16	4.61
Barrow Canal	2010	Yellow	39	2.01	15.95	4.58
Grand Canal	2011	Yellow	32	2.41	16.03	5.65
Lough Inchiquin	2011	Yellow	89	2.59	17.73	5.93
Lough Ramor	2011	Yellow	80	2.61	14.94	3.93
Lough Ballynahinch	2011	Yellow	81	1.57	21.04	6.28
Lough Oughter	2011	Yellow	99	3.65	12.37	3.79
Lough Muckno	2012	Yellow	91	2.23	17.71	3.96
Lough Ramor	2014	Yellow	92	2.74	16.13	3.90
Corrib (Galway Weir)	2009	Silver	91	2.45	16.48	6.19
Corrib (Moycullen) ∞	2010 & 2011	Silver	127	2.50	18.67	5.70
Mask (Cong)	2010	Silver	92	2.02	30.60	5.33
Killaloe •	2009 & 2010	Silver	114	2.20	17.87	5.52
Athlone	2010	Silver	87	2.24	24.12	7.52
Erne (Lower L. Erne/Ferny Gap)×	2009 & 2010	Silver	140	2.50	17.59	5.68
ERNE LLE (Portora)	2010	Silver	20	3.39	15.70	2.90
ERNE (L. Oughter Seized Eels)	2010	Silver	21	3.50	14.62	3.11
Fane (L. Muckno)	2011	Silver	140	1.95	18.29	4.42

Table 6-6: Growth rates for sacrificed eels, 2009-present (n = 2,490 eels).

\* Upper and Lower Lough Ree were sampled in two separate surveys in summer 2010 and are pooled above.

° Lower and Upper Lough Derg were surveyed in summers of 2009 and 2010 respectively, and are pooled above.

 $\infty$  Corrib silvers sampled at Moycullen (Lower Lough Corrib) using fyke nets in the autumn of 2010 & 2011 are pooled.

• Killaloe silver eels fished at the weir in autumn 2009 and 2010 are pooled above.

**\*** Erne silver eels sampled at Lower Lough Erne (Ferny Gap) in autumn 2009 and 2010 are pooled above.



Figure 6-24: Observed growth rates (length at age) for yellow eels surveyed from 2009-present (n=1,462).



Figure 6-25: Observed growth rates (length at age) for silver eels surveyed from 2009present (n=1,028).

# 6.7 Progress

Currently, the otoliths from selected sites from the 2009 to 2014 surveys have been prepared, aged and subjected to quality control checks in-house (n = 2,490). This comprises over 80% of the otoliths extracted during dissections by the EMP from 2009 to the present day.

Work continues on the cutting, burning and ageing of otoliths from the more recent surveys. Table 6.7 shows the progress to date in terms of completed work and the sites still to be processed for ageing.

Year	Location	Life stage	Completed (√/≭)
2009	Lough Conn	Yellow	$\checkmark$
2009	Lough Cullin	Yellow	✓
2009	Waterford Estuary	Yellow	✓
2009	Lough Corrib Lower	Yellow	✓
2009	Lough Derg Lower	Yellow	$\checkmark$
2009	Erne (Ballyshannon)	Silver	✓
2009	Corrib (Galway Weir)	Silver	✓
2009	Killaloe	Silver	✓
2010	Lough Ree Lower	Yellow	$\checkmark$
2010	Lough Ree Upper	Yellow	$\checkmark$
2010	Lough Derg Upper	Yellow	$\checkmark$
2010	Lough Erne Upper	Yellow	$\checkmark$
2010	Lough Corrib Upper	Yellow	$\checkmark$
2010	Barrow Canal	Yellow	$\checkmark$
2010	Erne (Ferny Gap)	Silver	$\checkmark$
2010	Erne (Portora)	Silver	✓
2010	Erne (L. Oughter)	Silver	✓
2010	Lough Mask	Silver	✓
2010	Corrib (Moycullen)	Silver	✓
2010	Killaloe	Silver	✓
2010	Athlone	Silver	✓
2011	Lough Inchiquin	Yellow	✓
2011	Lough Ramor	Yellow	✓
2011	Lough Ballynahinch	Yellow	✓
2011	Lough Oughter	Yellow	✓
2011	Grand Canal	Yellow	✓
2011	Fane (Muckno)	Silver	✓
2011	Corrib (Moycullen)	Silver	✓
2012	Lough Muckno	Yellow	✓
2012	Fane (Muckno)	Silver	*
2013	Lough Key	Yellow	*
2013	Lough Muckno	Yellow	*
2013	Fane (Muckno)	Silver	*
2014	Lough Ramor	Yellow	$\checkmark$
2014	River Barrow	Silver	*

# Table 6-7: Progress with otolith work to date.

## 7 Recruitment

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

## 7.1 Introduction

Recruitment of glass eel / elver to Ireland will depend on European wide management action and will not provide a resource to post-evaluate Irish management actions specifically. However, monitoring of recruitment is critical to evaluating the overall success of the eel regulation and is required by the joint EIFAAC/ICES/GFCM WGEEL for stock assessment. This information is also required to project forward in modelling the recovery in Irish eel stocks.

Long-term recruitment monitoring by ESB of 0+ age glass eel (elvers) has taken place on the Shannon at Ardnacrusha and the Erne at Cathleens Fall, the Lee at Iniscarra station (since August 2008) and of >0+ age recruits at Parteen on the Shannon. Improvements were carried out at Cathaleens Fall with straw ropes added to the ramps in 2013 and bristle mats in 2014 (See Section 7.4).

Elver monitoring has been taking place on the Feale and the Maigue Rivers since 1994 and in the Inagh River since 1996. The programme was set up in conjunction with ESB through two studies by Trinity College Dublin and National University of Ireland Galway (Reynolds *et al* 1994 and O'Connor 2003). Subsequently the traps were maintained by the Shannon Regional Fishery Board staff and now by IFI-Limerick. Fixed ramp style traps are used at these locations (Figure 7-1).

The recruitment index data collected is used in Irelands monitoring report to the EU and is also provided to the EIFAAC/ ICES Eel Working Group where it is analysed and modelled to determine the eel production for Europe. Due to the uncertainty surrounding the glass eel fishery in Europe the Working Group has expressed concerns over this European dataset as there is a risk that a large number of the fishery sites used will be discontinued or the effort will be reduced due to quotas on glass eel catch. The Working Group have highlighted the importance of fishery independent monitoring programmes and have recommended that Member States protect the long term series and set up additional programmes. The elver monitoring programme has been expanded to include locations on the Ballysadare, Corrib and Liffey Rivers as it has proved to be successful in the Shannon RBD. Monitoring of elvers was ceased at two locations due to lack of suitable monitoring sites, (Barrow and Slaney Rivers).



Figure 7-1: Elver ramp trap on the River Maigue.

# 7.2 Glass Eel

## 7.2.1 Introduction

Prior to the current Eel Management Plans and Legislation, there was no authorised commercial or recreational catch of juvenile eel in Ireland as fishing in Ireland for juvenile eel was prohibited by law (1959 Fisheries Act, Sec. 173). Fishing, possession and sale of juvenile eel is also prohibited under the current conservation by laws.

# 7.2.2 0+ Recruitment

Monitoring of elver migrating at Ardnacrusha (Shannon) and Cathaleen's Fall (Erne) is undertaken by the ESB (Fig. 7.2). Indications are that recruitment remains low.

Compared to the average for 1980-'95, the Erne recruitment increased by 10.8% in 2013 and by 33% in 2014. The Shannon Ardnacrusha data show little change. The Ardnacrusha trap was in operation from the 4<sup>th</sup> April. Maintenance was carried out between 1pm and 3pm on Friday 2<sup>nd</sup> May (low tide). This two hour period is the only time the trap was not in service between the 4<sup>th</sup> May and when closed down at end of season (1 Sept 2014). Even though the trap was operational in April and visited daily, no elvers were captured. Elvers first appeared at Ardnacrusha in week 28<sup>th</sup> April to 2<sup>nd</sup> May.

64% of the Erne catch was made in April 2014, with 25% on the first night on the 22<sup>nd</sup> April. A mortality of 112kg occurred in the elver trap on the Erne in April 2014. These were included in the recruitment data but should be considered as a mortality in the catchment and not included in any production modelling.

There was an increase in elver catch in both the Erne and the Shannon in 2012 and 2013 and in the Erne in 2014. The 2014 Shannon catch was similar to 2013.

Long-term monitoring of elver migrating 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).

All catches reported in Tables 7.1-7.2 were transported upstream within the catchment and restocked. Additional elver monitoring is shown in Table 7.3.

Due to the unseasonal high rainfall during the summer of 2012, the Inagh and the Maigue sites in the Shannon River Basin District were unable to be monitored. The Feale site started catching elvers on the 09<sup>th</sup> April 2012 and fished up to the 2<sup>nd</sup> June when flood conditions resulted in the trap being unable to fish (Table 7.2). Despite not fishing for most of June and July the catch of elvers has increased compared with 2011.

There are two monitoring traps on the Liffey; a second trap was installed on the weir in 2012 due to the low levels of catches in 2010 and in 2011. However in 2012 both traps caught more elvers than in the previous two years. The two traps were monitored in 2013 and 2014 but catches remained low.

Pipe traps were used for monitoring elvers in the Corrib for the last 4 years. Catches in the pipe traps were variable and seemed to be influenced by changes in water flow. A ramp trap was introduced along with the pipe traps in 2013 and the ramp was continued in 2014.

The data for Ballysadare is 0.842kg in 2014, just below the 0.924kg in 2013. The fish pass was closed in early June '14 compared to 2013 when it was July due to low water levels. 84% of the catch came the 24<sup>th</sup> April 2014 – similar April run as observed in the Erne.

Recruitment for the 2013 and 2014 seasons indicated that there was a general increase in the recruitment levels to Ireland in 2013. The picture was less clear in 2014 with four sites showing decreases, three sites showing increases and two sites with little change.

A mortality of 5kg of elver occurred on the Erne in 2013 and 112kg in 2014. A further 38kg from the same day in 2014 were released downstream. These data have been included in the total upstream recruitment data but have been excluded as mortality in the determination of Erne/NWIRBD silver eel production and mortality rates.

A mortality of 7kg plus a moribund weight of 3.3kg was recorded in the trap on the Maigue in 2014. This mortality (10.3kg total) has been included in the total upstream recruitment data but excluded as mortality in the determination of Shannon IRBD production and mortality rates.



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

		Shannon			Shannon
Year	Erne (kg)	(kg)	Year	Erne (kg)	(kg)
1952			1984	1121	500
1953			1985	463	1093
1954			1986	898	948
1955			1987	2367	1610
1956			1988	3033	145
1957			1989	1781	27
1958			1990	2409	467
1959	244		1991	546	90
1960	1229		1992	1371	32
1961	625		1993	1785	24
1962	2469		1994	4463	287
1963	426		1995	2400	398
1964	208		1996	1000	332
1965	932		1997	1065	2120
1966	1394		1998	782	275
1967	345		1999	1500	18
1968	1512		2000	1100	39
1969	600		2001	699	27
1970	60		2002	113	178
1971	540		2003	576	378
1972			2004	269	58
1973			2005	838	41
1974	794		2006	118	42
1975	392		2007	189	45
1976	394		2008	39	7
1977	138	1000	2009	88	8
1978	320	1300	2010	97	50
1979	488	6700	2011	74	7
1980	1434	4500	2012	146	23
1981	2892	2100	2013	215	47
1982	4550	3100	2014	659	45
1983	728	600			

Table 7-1: Annual elver catches (kg) in the traps at Ardnacrusha (Shannon) and Cathaleen's Fall (Erne).

						Sh. Estuarv	R. Liffev	R. Liffev
	Erne	Mov	R	R	Inagh	Glass	MI	IFI
Year	Estuary	Estuary	Feale	Maigue	R	Eels		
1985	-	-	503	U				
1986								
1987								
1988								
1989								
1990								
1991								
1992								
1993								
1994			70	14				
1995			0	194				
1996			0	34	140			
1997			407	467	188	616		
1998	46		81	8	11	484		
1999	441		135	0	0	416		
2000	188		174	0	120	43		
2001		13	58	2	18	1		
2002		21	116	5		37		
2003		36	36	72	111	147		
2004		0	0	0	24	1		
2005		14	0	1	0	41		
2006		0	1	0	4	3		
2007		0	0	0	39	12		
2008		0	0	0	82.5	2		
2009		1	42					
2010		7	20	3	1.3	3		
2011		0	5	5	8			
2012		0	55		*		0.5	0.2
2013			68	14	43		1.1	2.7
2014			5	29**	40		0.3	0.3

Table 7-2: Recruitment catches (kg), 1985 to 2014 (blanks = not fished). These are often of mixed glass eel and young yellow eel.

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

Location	Year	Total Wt. Elvers (kg)	Est. No. Elvers	Av Wt. Elver (g)	Total Wt. Yellow Eels (kg)	Est. Nos Yellow Eels	Av. Wt. Yellow Eel (g)
Ballysadare	2013	0.924	2,640	0.35	4.612	1,005	4.59
5	2014	0.842	2,148	0.35	0.873	203	4.51
	2010	29.696	95,254	0.33	7.401	728	9.83
Corrib pipe	2011	4.189	11,970	0.35	24.493	3,244	7.55
tiap	2012	2.383	5,168	0.34	7.487	1,143	8.55
Corrib Ramp and pipe	2013	14.260	42,064	0.34	12.520	2,149	5.41
Corrib Ramp	2013*	10.168	29,994	0.34	0	0	-
цар	2014	2.891	8,998	0.32	374	55	2.46
	2010	20.361	42,161	0.48			
	2011	1.099	3,139	0.35	6.298	834	7.55
Feale	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
	2010	1.417	2,931	0.5			
	2011	8.168	23,338	0.35	7.134	945	7.55
Inagh	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
	2012	0.213	608	0.35	-	-	-
Liffey	2013	2.742	7,849	0.35	-	-	-
	2014	0.285	746				
	2012	0.454	1,298	0.35	-	-	-
Liffey MI	2013	1.144	3,359	0.36			
	2014	0.311	1,402			4	
	2010	2.772	5,650	0.42	-	-	-
	2011	5.061	13,678	0.37	0.054	7	7.55
Maigue	2012	*	*	*	*	*	*
	2013	14.032	39,665	0.35	0.019	3	6.4
	2014	29.020	78,042	0.37	-	-	-
	2010	0.094	159	0.59	-	-	-
	2011	0.084	195	0.43	-	-	-
Burrishoole	2012	0.050	126	0.42	-	-	-
	2013	0.393	1062	0.37	-	-	-
	2014	2.000	3846	0.52	-	-	-

Table 7-3: Recruitment data from IFI & MI traps. Glass eel/elver and yellow eels are separated.

# 7.3 Young Yellow Eel Recruitment

There is no authorised commercial or recreational catch of juvenile eel in Ireland as glass eel and elver fishing in Ireland is prohibited by law (1959 Fisheries Act, Sec. 173). Fishing for juvenile eel is also prohibited under the conservation bye-laws.

Monitoring of juvenile yellow eel migrating at Parteen Dam (Shannon) and Inniscarra on the R. Lee takes place using a fixed brush trap. The Parteen trap captures bootlace (young yellow) eels only due to its location 15kms upstream of Limerick

The data for Parteen is presented in Figure 7.3 and Table 7.4. 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 Parteen trap continued to decline in 2011, 2012 and 2013.

The Parteen trap was in operation from the 11<sup>th</sup> April. Maintenance was carried out on Saturday 4<sup>th</sup> May, when new supports were fitted to the slope. This was the only time the trap was not in service between the 11<sup>th</sup> April and when closed down at end of season on 24<sup>th</sup> September. Even though the trap was operational in April and visited daily, no eels were captured during that month. Young yellow eels first appeared at Parteen in week 11<sup>th</sup> May to 17<sup>th</sup> May, with the bulk captured from 18<sup>th</sup> May to 31<sup>st</sup> May . Low catches were recorded in August and September. The total catch in 2014 was 365kg.

A new trap was installed in 2012 on the Shannon at Parteen, on the opposite bank. The catch was 6.6kg and 6.8kg in 2013 and 7.8kg in 2014.

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.



Figure 7-3: Juvenile yellow eel catches (kg) at Parteen Weir, 1985 to 2014. From 2012, a second trap was installed on the opposite bank and this is included in the above figure.

	Shannon	Shannon	Lee
		Parteen	Inniscarra
	Parteen	New	
Year	hatchery	trap	
1985	984		
1986	1555		
1987	984		
1988	1265		
1989	581		
1990	970		
1991	372		
1992	464		
1993	602		
1994	125		
1995	799		
1996	95		
1997	906		
1998	255		
1999	701		
2000	389		
2001	3		
2002	677		
2003	873		
2004	320		
2005	612		
2006	467		
2007	757		
2008	1303		
2009	153		
2010	160		1
2011	105		48
2012	24	7	23.8
2013	20	7	5
2014	365	8	1

Table 7-4: Juvenile yellow eel catches (kg), 1985 to 2014.

# 7.4 Erne Elver Traps Upgrade

ESB have had many decades of experience of elver trapping upon the Shannon and Erne systems and these traps which are located at various locations have gradually been upgraded as needed over the years. In January / February 2015, ESB station staff at the R. Erne Cathaleen's Fall station further upgraded the two existing elver traps. The upgrades to these traps involved new bristle matt elver climbing substrate for the 'Left bank' trap, a new stainless steel inclined ramp (including covers to prevent bird predation) and an improved water aeration system to the elver box itself (Fig. 7.4).



Figure 7-4: The 'left bank' box and associated ramp.

The 'G5' trap had already been partially upgraded in 2014 when the new bristle matt type of substrate was added and a new inclined stainless steel ramp added. The additions for 2015 included stainless steel covers for the ramp and improvements to the water aeration system (Fig. 7.5).



Figure 7-5: The G5 elver trap, showing the elver box and aeration system, the new ramp and substrate.

A new trap was added on the northern shoreline of Cathaleen's Fall. At this location a new elver box, inclined stainless steel ramp with covers and new bristle mat type of elver climbing substrate was added (Fig. 7.6). Similar to the other elver boxes the new box has a spray bar for better water aeration.



Figure 7-6: The new elver box and ramp located on the Northern shoreline at Cathaleen's Fall station. Note the covered ramp with the inspection panel open being inspected by IFI and DCAL, NI staff.

All boxes have lever type valves and new lock boxes are fitted on each valve to avoid any unintended alteration/adjustment to the flow rates at each point (Fig. 7.7).

In addition to the new infrastructure, it has been agreed by ESB, Inland Fisheries Ireland and Department of Arts, Culture and Leisure, Northern Ireland that the elver traps will be all fully operational by March 17<sup>th</sup> each year. Traps will also be checked with greater frequency and emptied at earlier stages.



Figure 7-7: The new elver box and ramp located on the Northern shoreline at Cathaleen's Fall station. Note the red lock box which is in place to prevent the lever valve which adjusts the water supply being inadvertently interfered with.

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# Annex 1: Members of the Standing Scientific Eel Committee 2014

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. Robert Rosell	Agri-Food & Bioscience Institute, N. Ireland
	(for issues relating to the transboundary plans)
Invited Contributors – 2014	

Dr. Derek Evans	Agri-Food & Bioscience Institute, N. Ireland
Dr. Kieran McCarthy	NUI Galway
Dr. Karen Gaynor	National Parks & Wildlife

# Annex 2: Conservation of Eel Fishing Bye-law No. C.S. 312, 2012

# DEPARTMENT OF COMMUNICATIONS, ENERGY AND NATURAL RESOURCES

## FISHERIES ACTS 1959 TO 2010

#### CONSERVATION OF EEL FISHING BYE-LAW NO. C.S. 312, 2012

I, Fergus O' Dowd, 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) (No. 2) Order 2011 (S.I. No. 631 of 2011), at the request of Inland Fisheries Ireland, and having complied with Regulations 27 and 42 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), 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<sup>1</sup>, hereby make the following bye-law:

(1) This Bye-law may be cited as the Conservation of Eel Fishing Bye-law No.
 C.S. 312, 2012.

(2) This Bye-law comes into operation on the day of its making and ceases to have effect on 30 June 2015.

<sup>&</sup>lt;sup>1</sup>OJ No. L248, 22.09.2007, p.17.

 (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

(b) to be in possession of or sell or offer for sale eel caught 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. 303, 2009 is revoked.

GIVEN under my hand, 7 December 2012. Fergues & Duthdy Fergus O'Dowd

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 fishing for eel, or possessing or selling eel caught in a river 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.
Annex 3: 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 / Neagh Bann (International) River Basin District

IE\_East

Date: Jan-Dec 2014

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 and Neagh Bann RBD remained closed throughout 2014.

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 Dublin (covering both Eastern / Neagh Bann (International) River Basin Districts) during 2014.

Estimated level of illegal fishing:

The level of illegal activity was low for 2014 in the East. Illegal activity targeting eels was not recorded during any of the traditional eel fishing seasons during the year. Patrols concentrated on lakes throughout the Region. IFI Dublin received no reports of possible illegal activity.

Main catchments where illegal activity occurred:

Number of gear seizures: Gear targeting eels was not recorded

Gear types seized: None

Number of Eel Dealer Interceptions: None

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: No 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 2014)

#### Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?: River Liffey Elver Trap (IFI Research monitoring station) - There are 2 traps operating at the Islandbridge weir - one operated by IFI and one by the Marine Institute. The Marine Institute trap was installed in 2010 and a second trap was installed on the weir face in order to investigate the low numbers being caught in 2010 and 2011. The 2 traps have been operating for the last 3 years. The catch from the 2 traps has increased significantly compared with 2010 and 2011, with 2013 showing particularly high numbers which was mirrored in other locations around Ireland. The catch for 2014 was higher than 2012 but was less than the 2013 peak event. The recruitment for both traps shows a similar pattern. The Islandbridge traps are relatively new and need to be operated over a number of years in order to draw conclusions about any changes in recruitment on an annual basis. All elvers caught were immediately returned back to the river upstream of Islandbridge weir.

Location	Year	Total Wt. Elvers (g)	Est. No. Elvers	Av Wt. Elver (g)
Liffey	2012	213	608	0.35
	2013	2,742	7,849	0.35
	2014	285	746	

What was the total catch transported (kg)?: No silver eel T&T

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

In November 2012 Inland Fisheries Ireland published the "Wicklow Bridges Project, Assessment of the risk of barriers to migration of fish species in County Wicklow" Report to the Wicklow Heritage Forum. The broader project was coordinated by Wicklow County Council, through the Wicklow Heritage Forum and was part funded by the Heritage Council of Ireland. The County Wicklow Heritage Plan 2009-2014 forms the background to the project. Heritage Plan Action: 3.8 was to "Undertake a survey of Bridges and relevant culverts in County Wicklow to identify fauna usage and assess whether any impediments to passage exist, particularly in light of on-going changes in climate and rainfall patterns etc. Use this information to carry out retrofitting of features such as nest boxes, fish baffles and mammal ledges wherever possible". Project Partners included the Inland Fisheries Ireland, National Parks and Wildlife Service (NPWS) and Birdwatch Ireland. Of the 103 structures assessed in the Wicklow Bridges Project 58 of these structures were deemed to represent a high risk to the upstream migration of Atlantic salmon and Brown trout while 68 of the structures were deemed to represent a high risk to the upstream migration of lamprey and eel.

Since the publication of the Wicklow Bridges Project Report, with the assistance of Wicklow County Council, the National Roads Authority, the Heritage Council and private citizens, works have been carried out at a number of sites which were identified as significant barriers to the migration of eels. Fish passage has now been facilitated at these four sites, with Salmon and/or sea trout recorded upstream of the new fish pass structures and with salmon and/or sea trout spawning recorded upstream of two of the fish-passes in the Winter 2014-2015. We hope eventually to facilitate the free passage of fish at all of the identified barriers, the combined effect of which will be a very significant increase in the habitat for a number of threatened fish species.

Management Action 4. Improve Water Quality

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

Many thanks for taking the time to respond to this.

### 2. IE\_NorW

River District Basin: NWIRBD River Basin District

IE\_NorW

Date: Jan-Dec 2014

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 NWIRBD remained closed throughout 2014.

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 head office of the NWRBD during 2014.

Estimated level of illegal fishing:

Three confirmed incidents.

Main catchments where illegal activity occurred:

7 August 2014- Ashfield Lake on the Dromore River catchment - 8 fyke nets seized 14 October 2014- Derrykerrib Lough on Lough Erne (Belturbet) - 7 fyke nets seized 15 October 2014- Quivvy Lough on Lough Erne (Belturbet)- 5 fyke nets seized Number of gear seizures:

3

Gear types seized:

20 sets of fyke nets in total

Number of Eel Dealer Interceptions: None.

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: Low level of illegal activity detected or suspected.

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD? Yes

Jan – Mar 2014 5,741 Kg

Aug - Dec 2014 46,431 Kg

Total = 52,172 Kg

NB. - The total catch of 52,172 Kg includes silver eel trapped both in N. Ireland and RoI portions of the Erne catchment during 2014 and released to sea from the Erne catchment.

Trapping sites on the R. Erne were located at:-

Rosscor bridge, Ferny Gap, Portora Lock, Lisnaskea, Urney bridge, Killashandra and L Gowna.

All catches were transported to Ballyshannon and released below Cathaleen's Fall hydro station to sea.

What was the total catch transported (kg)? 52,172 Kg

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

General impression of the programme:

The programme worked very well. There was good co-operation between authorised fishermen, ESB staff and IFI personnel to ensure that silver eel catches were appropriately handled and released to sea in good condition.

Management Action 3. Ensure Upstream Migration at Barriers

There was continuing liaison with Local Authorities and contractors where in stream works are proposed to ensure provision for safe eel passage.

**Management Action 4. Improve Water Quality** 

IFI conduct routine monitoring of planning, forestry, infrastructure developments and investigation and detection of water pollution which have contributed to the protection and improvement of water quality within the NWRBD.

Many thanks for taking the time to respond to this.

## 3. IE\_Shan

River District Basin: ShRBD River Basin District

Date: Jan-Dec 2014

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 ShRBD remained closed throughout 2014.

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 Limerick office of the ShRBD during 2014.

Estimated level of illegal fishing:

The level of illegal activity was low for 2014 in the Lower Shannon. There didn't appear to be illegal activity during the historical brown/yellow eel season and this followed through to the silver eel season. Patrols concentrated on Lough Derg and the main East Clare lakes, but it could be the case that those illegal could have moved to other waters. One report that possible activity was taking place below Killaloe bridge, but this area was dragged and there were no nets found.

There was an increased level of illegal activity experienced on Lough Ree.

Main catchments where illegal activity occurred:

Lough Derg and East Clare Lakes, Lough Ree.

Number of gear seizures: 54 Fyke Nets, 2 Long lines measuring 2000m, 11 long lines measuring 10m

Gear types seized: Full Report on Lough Ree illegal Eel activities attached with photos

- 1. 11 longlines measuring approx. 10m (nightlines) on Doon lake during September
- 2. 5 Fyke Nets measuring 50m, 0 fish
- 3. 5 Fyke Nets measuring 50 m, 1 Pike and 3 Perch dead, 17 Eel released.
- 4. 20 Fyke Nets measuring 200m, 0 fish

- 5. 3 Fyke Nets measuring 30m, 73 Tench 1 Pike and 1 Perch dead, 20 eel, 15 roach, 2 Pike and 50 Tench released.
- 6. 6 Fyke Nets measuring 60m, 5 Pike dead, 100 Eel, 22 Perch and 8 Roach released.
- 7. 2 Fyke Nets measuring 20m, 0 fish dead, 20 Eel and 7 Perch released.
- 8. 7 Fyke Nets measuring 70m, 10 Pike Dead, 50 Eel and 22 Perch released.
- 9. 1 Long Line measuring 1000m, 0 fish dead, 28 Eel and 2 Perch released.
- 10. 1 Long Line measuring 1000m, o fish dead, 7 Eel and 1 Roach released.
- 11. 3 Fyke Nets measuring 30m, 3 Pike dead, 18 Eel, 1 Pike and 2 Perch released.
- 12. 3 Fyke Nets measuring 10 m, 0 fish.

Number of Eel Dealer Interceptions: None

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: There was a large increase of illegal activity on Lough Ree in 2014 and protection patrols and surveillance operations were increased in line with the level of activity.

Illegal activity continues and is always present. There also appears to be more anglers targeting eels now than in past years. These eels are probably for personal consumption rather than for sale. There needs to be a publicity effort to reinforce that the fishery is closed as some newer anglers are unaware of this.

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?: Yes

Jan – Feb 2014 5,635 Kg

Aug - Dec 2014 22,230 Kg

Total = 27,835 Kg

What was the total catch transported (kg)?: Yes

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

No

General impression of the programme: The programme ran well this year and works well if eels are moved quickly. The monitoring of the released silver eels by IFI staff draws a lot on local staffing resources. Management Action 3. Ensure Upstream Migration at Barriers

e.g. All applications for infrastructural and other developments etc which could impact on upstream migrations are reviewed and submissions 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

No information

Many thanks for taking the time to respond to this.

# 4. IE\_SouE

River District Basin: SERBD River Basin District

IE\_SouE

Date: Jan-Dec 2014

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 2014.

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 Clonmel office of the SERBD during 2014.

Estimated level of illegal fishing:

None known / reported

Main catchments where illegal activity occurred:

Number of gear seizures: None

Gear types seized:

Number of Eel Dealer Interceptions: None

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: None noted or reported

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?: No

What was the total catch transported (kg)?:

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

No

General impression of the programme: n/a

Management Action 3. Ensure Upstream Migration at Barriers

Consideration is given to eel and all fish migration when making submissions on projects impacting migration. A number of projects in the SERBD are also addressing existing barrier problems and eel migration as part of design changes.

**Management Action 4. Improve Water Quality** 

Many thanks for taking the time to respond to this.

## 5. IE\_SouW

River District Basin: South West River Basin District

IE\_SouW

Date: Jan-Dec 2014

#### 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 2014.

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 Dublin (covering SWRBD districts) during 2014.

Estimated level of illegal fishing:

The level of illegal activity was low to nil.

Main catchments where illegal activity occurred:

Number of gear seizures: Gear targeting eels was not recorded

Gear types seized:

Number of Eel Dealer Interceptions: None

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: No levels of illegal activity recorded. Any eels recorded were a by-catch of when coarse fish were found in illegal nets. (However very few eels found in any nets in 2014).

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?: Yes

Year	Kg		
2013	824		
2014	670		

What was the total catch transported (kg)?:

See above

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

General impression of the programme:

Management Action 3. Ensure Upstream Migration at Barriers

**Management Action 4. Improve Water Quality** 

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

Many thanks for taking the time to respond to this.

### 6. IE\_West

River District Basin: Western River Basin District

IE\_West

Date: Jan-Dec 2014

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 2014.

Confirm no licences issued in 2009 Licences) Bye-law No. 858, 2009:	under Conservation of Eel Fishing (Prohibition on Issue o
No eel fishing licences were issue RBD during 2014.	ed by either the Ballina or Galway offices of the Wester
Estimated level of illegal fishing Ballinakill or Connemara fishe whatsoever of any illegal eel fish fishery districts Sligo, Ballina fisheries largely based on the m activity in the Ballina or Galway	g: There is no history of eel fishing in the Bangor ry districts and there was, as expected, no evidence ing in any of these districts during 2014. The other three and Galway all previously had well established ee ajor lakes. Again, there was no evidence of any illega fishery districts.
Main catchments where illegal act activity in the Sligo fishery distri- by IFI research personnel went n discovered in October by WRBI some pike anglers lifted the net appears that the net was lost and	ivity occurred: There is a <u>possibility</u> that there was som ict on Lough Gill. An IFI survey fyke net being operate nissing L Gill during the summer survey season and wa D staff who kept the net under surveillance. However when their lines became entangled in it. On balance, i had not been taken for illegal purposes.
Number of gear seizures: 0	Gear types seized: <b>0</b>
1 IFI standard (survey) fyke net w	which had been lost on L Gill was recovered
Number of Eel Dealer Interception	ns: 0
Estimated tonnage on board: N	Declared origin(s) of cargos: N/
Describe Action taken: N/A	

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?: No

N/A

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

Note: All applications for infrastructural and other developments etc which could impact on upstream migrations are reviewed and submissions made to ensure that the free passage of fish is maintained. Natural barriers to upstream migration arising from floods etc were removed. Staff also monitored elver movements on the lower Ballisodare, Moy and Corrib Rivers.

Management Action 4. Improve Water Quality

The WRBD is represented on the WFD WRBD management group which works towards ensuring compliance with the requirements of the WFD. Furthermore, routine monitoring of planning, forestry, infrastructure developments and investigation and detection of water pollution contributed to the protection and improvement of water quality within the WRBD.

Many thanks for taking the time to respond to this.

# **IE\_East Carlingford**

River District Basin: Neagh Bann River Basin District – Loughs Agency Carlingford Area

Date: Jan-Dec 2014

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 NBRBD remained closed throughout 2014.

(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 NBRBD during 2014.

Estimated level of illegal fishing:

2 seizures for illegal fishing

Main catchments where illegal activity occurred:

Newry Canal

Number of gear seizures:

2

Gear types seized:

2 fishing rods

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?:

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:

General impression of the programme:

Management Action 3. Ensure Upstream Migration at Barriers

All applications for infrastructural and other developments etc which could impact on upstream migrations are reviewed and submissions 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

Many thanks for taking the time to respond to this.

Wk No.	Week Ending	Jolly Mariner, Athlone	Yacht club, Athlone	Rooskey	Finea	Kilaloe Eel Weir	Total for Week
Cate per	ch Quota Location	5.5 Tonnes	2 Tonnes	2 Tonnes	1.5 Tonnes	No Quota	
1	30/08/14	0	0	0	725	N/F	725
2	06/09/14	0	0	0	183	N/F	183
3	13/09/14	0	0	0	0	N/F	0
4	20/09/14	319	0	166	310	N/F	795
5	27/09/14	0	0	0	0	N/F	0
6	04/10/14	0	0	0	0	N/F	0
7	11/10/14	146	0	0	0	N/F	146
8	18/10/14	0	0	0	0	0	0
9	25/10/14	975	362	638	0	0	1975
10	01/11/14	386	184	602	461	0	1633
11	08/11/14	329	169	412	N/F	0	910
12	15/11/14	0	0	0	N/F	402	402
13	22/11/14	2703	1150	195	N/F	7051	11099
14	29/11/14	348	0	N/F	N/F	2261	2609
15	06/12/14	0	0	0	0	325	325
16	13/12/14	383	184	0	0	0	567
17	20/12/14	N/F	N/F	N/F	N/F	254	254
18	27/12/14	N/F	N/F	N/F	N/F	572	572
19	03/01/15	N/F	N/F	N/F	N/F	1433	1433
20	10/01/15	N/F	N/F	N/F	N/F	534	534
21	17/01/15	N/F	N/F	N/F	N/F	1739	1739
22	24/01/15	N/F	N/F	N/F	N/F	517	517
23	31/01/15	N/F	N/F	N/F	N/F	20	20
24	07/02/15						0
	Total	5589	2049	2013	1679	15108	26438

**River Shannon Silver Eel Weekly Collection Sheet 2014/15** 

Week No.	Week Ending	Lisnas kea	Ferny Gap	Portora Gates	Killasha ndra	Urney Bridge	Roscor	Lough Gowna	Total for Week
1	23/08/2014	0	0	0	0	0	0	0	0
2	30/08/2014	178	327	413	0	0	0	0	918
3	06/09/2014	0	0	971	0	0	0	0	971
4	13/09/2014	338	178	0	0	169	0	0	685
5	20/09/2014	0	0	0	0	0	0	0	0
6	27/09/2014	242	258	512	0	0	0	0	1012
7	04/10/2014	310	957	0	0	0	0	0	1267
8	11/10/2014	0	0	0	0	0	0	0	0
9	18/10/2014	91	3267	341	0	0	0	0	3699
10	25/10/2014	173	999	2044	0	0	232	0	3448
11	01/11/2014	394	1648	58	0	441	104	0	2645
12	08/11/2014	0	337	522	0	657	0	0	1516
13	15/11/2014	782	3894	1057	3521	2107	2702	148	14211
14	22/11/2014	326	1785	1302	1441	1928	938	712	8432
15	29/11/2014	442	592	208	530	965	404	1811	4952
16	06/12/2014	108	289	122	47	956	147	429	2098
17	13/12/2014	40	0	0	0	0	0	0	40
18	20/12/2014	N/F	N/F	N/F	N/F	N/F	537	N/F	537
19	27/12/2014	N/F	N/F	N/F	N/F	N/F	0	N/F	0
20	03/01/2015	N/F	N/F	N/F	N/F	N/F	1193	N/F	1193
21	10/01/2015	N/F	N/F	N/F	N/F	N/F	166	N/F	166
22	17/01/2015	N/F	N/F	N/F	N/F	N/F	0	N/F	0
23	24/01/2015	N/F	N/F	N/F	N/F	N/F	268	N/F	268
24	31/01/2015	N/F	N/F	N/F	N/F	N/F	0	N/F	0
25	07/02/2015	N/F	N/F	N/F	N/F	N/F	68	N/F	68
26	14/02/2015	N/F	N/F	N/F	N/F	N/F		N/F	0
27	21/02/2015	N/F	N/F	N/F	N/F	N/F		N/F	0
28	28/02/2015	N/F	N/F	N/F	N/F	N/F		N/F	0
29	07/03/2015	N/F	N/F	N/F	N/F	N/F		N/F	0
30	14/03/2015	N/F	N/F	N/F	N/F	N/F		N/F	
Total t	o Date(kgs)	3424	14531	7550	5539	7223	6759	3100	48126

**River Erne Silver Eel Weekly Collection Sheet 2014/15** 

Annex J. Water Framework Differing	Annex 5:	Water	Framework	Directive
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Table 0-1: Summary data from WFD Lake Surveys, 2013. N.r. not recorded, n.a. not applica	ble
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RBD	Catchments	Lake Name	No. Nights	No. Nets	No. Eels	CPUE	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
ERBD	Boyne	Bane, Lough	1	3	5	1.67	66.3	54.5	76.5	0.5232	0.298	0.77	2.616
ERBD	Boyne	Lene, Lough	1	6	5	0.83	70.4	51.5	84.2	0.6996	0.223	1.151	3.498
ERBD	Upper Boyne	Annagh (White ) Lough	1	3	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
NWIRBD	Ballintra	Glen Lough	1	3	15	5	n.r.	n.r.	n.r.	0.0458	0.0349	0.0551	0.6873
NWIRBD	Melvin	Lattone Lough	1	2	15	7.5	48.7	39.8	56.5	0.1871	0.096	0.295	2.807
NWIRBD	Erne	Macnean Lower	1	3	1	0.33	60.6	60.6	60.6	0.399	0.399	0.399	0.399
NWIRBD	Erne	Macnean Upper	1	3	16	5.33	56.5	38	71.9	0.3659	0.084	0.724	5.854
NWIRBD	Erne	Mushlin Lough	1	3	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SHIRBD	Fergus	Atedaun, Lough	1	3	4	1.33	62	46.9	83	0.503	0.185	1.143	2.012
SHIRBD	Inagh	Lickeen	1	2	9	4.5	44.4	38.4	50.2	0.1442	0.091	0.204	1.298
SHIRBD	Shannon	Ree, Lough	1	12	116	9.67	49.3	32.2	68.5	0.2186	0.078	0.732	25.352
SHIRBD	Shannon Up.	Urlaur, Lough	1	3	4	1.33	62.1	50.5	77.5	0.4798	0.178	0.9	1.919
WRBD	Coastal	Ardderry Lough	1	3	1	0.33	39.9	39.9	39.9	0.118	0.118	0.118	0.118
WRBD	Coastal	Aughrusbeg Lough	1	3	28	9.33	38.5	30	46.5	0.1028	0.051	0.184	2.879
WRBD	Newport	Beltra, Lough	1	3	28	9.33	41.1	29.7	83	0.1575	0.042	1.149	4.41
WRBD	Garvogue	Glenade Lough	1	3	1	0.33	62	62	62	0.416	0.416	0.416	0.416
WRBD	Drumcliff	Glencar Lough	1	3	33	11	43.3	31.5	54.2	0.1401	0.055	0.359	4.624
WRBD	Dawros	Kylemore Lough	1	3	12	4	43.4	35.2	51.8	0.1473	0.066	0.29	1.768
WRBD	Corrib	Lettercraffroe Lough	1	3	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
WRBD	Coastal	Nambrackmore Lough	1	3	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
WRBD	Corrib	Maumwee Lough	1	2	3	1.5	49.7	39.5	54.8	0.2197	0.091	0.331	0.659

RBD	Catchments	Lake Name	No. Nights	No. Nets	No. Eels	CPUE	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
WRBD	Kilcolgan	Rea, Lough	1	3	115	38.33	47.8	35.4	73.5	0.1995	0.066	0.674	22.937
WRBD	Corrib	Ross Lake	1	3	4	1.33	46.4	30.1	56.9	0.1683	0.044	0.274	0.673
WRBD	Coastal	Shindilla, Lough	1	3	7	2.33	40.1	32.6	50.8	0.1079	0.058	0.192	0.755

RBD	Catchments	Lake Name	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	Boyne	Bane, Lough	5	0	0	0	0	0	1	2	2	0
ERBD	Boyne	Lough Lene	5	0	0	0	0	0	1	1	2	1
NWIRBD	Ballintra	Glen Lough	15	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
NWIRBD	Melvin	Lattone Lough	15	0	0	0	1	9	5	0	0	0
NWIRBD	Erne	MacNean Lower	1	0	0	0	0	0	0	1	0	0
NWIRBD	Erne	MacNean Upper, Lough	16	0	0	0	1	4	4	5	2	0
SHIRBD	Fergus	Atedaun, Lough	4	0	0	0	0	1	2	0	0	1
SHIRBD	Inagh	Lickeen Lough	9	0	0	0	2	6	1	0	0	0
SHIRBD	Shannon	Ree, Lough	116	0	0	0	12	55	40	9	0	0
SHIRBD	Shannon Up.	Urlaur Lough	4	0	0	0	0	0	2	1	1	0
WRBD	Coastal	Ardderry Lough	1	0	0	0	1	0	0	0	0	0
WRBD	Coastal	Aughrusbeg, Lough	28	0	0	0	17	11	0	0	0	0
WRBD	Newport	Beltra Lough	28	0	0	1	15	9	2	0	0	1
WRBD	Garvogue	Glenade Lough	1	0	0	0	0	0	0	1	0	0
WRBD	Drumcliff	Glencar Lough	33	0	0	0	8	20	5	0	0	0
WRBD	Dawros	Kylemore Lough	12	0	0	0	4	5	3	0	0	0
WRBD	Corrib	Maumwee, Lough	3	0	0	0	1	0	2	0	0	0
WRBD	Kilcolgan	Rea, Lough	115	0	0	0	17	55	38	4	1	0
WRBD	Corrib	Ross, Lough	4	0	0	0	1	2	1	0	0	0
WRBD	Coastal	Shindilla, Lough	7	0	0	0	4	2	1	0	0	0

Table 0-2: Length Frequency data from WFD Lake Surveys, 2013. N.r. not recorded

RBD	Catchments	River Name	River Site	No. Sets	No. Runs	Area (m²)	Density (No./ m <sup>2</sup> )	No. Eels
ERBD	Boyne	Blackwater (Kells), River	Just u/s L. Ramor_A	3	3	391	0.05375	21
ERBD	Liffey	Dodder, River	Bushy Park_A	3	3	385	0.0052	2
ERBD	Liffey	Dodder, River	D/s Piperstown Stream, Bohernabreena_A	3	3	274	0	0
ERBD	Liffey	Dodder, River	Firhouse_A	2	3	238	0.0042	1
ERBD	Liffey	Dodder, River	Footbr. Beaver Row_B	3	3	514	0.11861	61
ERBD	Liffey	Dodder, River	Knocklyon_A	2	3	264	0.00379	1
ERBD	Liffey	Dodder, River	Mount Carmel Hospital_A	3	3	339	0.00885	3
ERBD	Liffey	Dodder, River	Oldbawn_A	3	3	311	0.00322	1
ERBD	Liffey	Liffey, River	500 m d/s Ballyward BrA	2*	3	4228	0	0
ERBD	Liffey	Liffey, River	Kilcullen BrA	4*	1	8688	0.00012	1
ERBD	Ovoca	Avonbeg River	Greenan BrA	3	3	313	0	0
ERBD	Vartry	Vartry River	Annagolan BrA	2	3	231	0	0
ERBD	Vartry	Vartry River	Ashford BrA	3	3	378	0.02383	9
ERBD	Vartry	Vartry River	Newrath BrA	3	3	347	0.03742	13
ERBD	Vartry	Vartry River	Nun's Cross BrA	3	3	369	0.07588	28
NBIRBD	Dee	Dee, River	Br. at Drumcar_A	3	3	500	0.126	63
NBIRBD	Dee	White River (Louth)	Athclare_A	2	3	212	0.00944	2
NBIRBD	Dee	White River (Louth)	Coneyburrow BrB	3	3	294	0.00681	2
NBIRBD	Dee	White River (Louth)	Dunleer_A	2	3	212	0.05189	11
NBIRBD	Dee	White River (Louth)	Gibber's BrA	1	3	123	0.00816	1
NBIRBD	Dee	White River (Louth)	Martinstown BrA	1	3	103	0	0
NBIRBD	Fane	Fane River	Br. d/s of Inniskeen_A	3	2	336	0.04165	14
NWIRBD	Erne	Annalee River	0.2km d/s Cavan R confl_A	4*	3	3300	0.00182	6

Table 0-3: Summary data from WFD River Surveys, 2013. \* indicates number of boats used. All other sites were fished using bankside generator sets.

RBD	Catchments	River Name	River Site	No. Sets	No. Runs	Area (m²)	Density (No./ m²)	No. Eels
NWIRBD	Erne	Cullies River	Br. nr Kilbrackan House_A	2	3	227	0	0
NWIRBD	Erne	Dromore River	Drummuck_A	2	3	252	0	0
NWIRBD	Erne	Erne, River	Bellahillan BrA	2*	3	2921	0.00034	1
NWIRBD	Erne	Erne, River	Kilconny Belturbet (RHS)_A	4*	1	5304	0.00094	5
NWIRBD	Erne	Finn River (Monaghan)	Cumber BrA	2	3	2835	0	0
SERBD	Barrow	Gowran River	Br. N of Goresbridge (S Channel)_A	1	3	171	0.02339	4
SERBD	Barrow	Gowran River	Grange Lower_A	2	3	205	0	0
SERBD	Nore	Ballyroan River	Ballydine BrA	2	3	163	0.00612	1
SERBD	Nore	Ballyroan River	Gloreen BrD	1	3	163	0	0
SERBD	Nore	Glory, River	Br. E of Raheen_A	2	3	320	0.00937	3
SERBD	Nore	Nuenna River	Br. d/s Clomantagh_B	2	3	207	0	0
SERBD	Owenavorragh	Banoge River	Br. u/s Owenavorragh R confl_A	2	3	219	0.07306	16
SERBD	Owenavorragh	Banoge River	d/s of N11 bridge_A	2	3	223	0.01796	4
SERBD	Slaney	Clody, River	Ford (Br.) 3km u/s Bunclody_B	3	3	300	0.00333	1
SERBD	Slaney	Douglas River (Ballon)	Sragh BrB	2	3	177	0	0
SERBD	Slaney	Slaney, River	Waterloo BrA	3	3	477	0.01468	7
SERBD	Suir	Nier, River	Br. ENE of Ballymacarby_A	4	3	662	0.02115	14
SHIRBD	Annagh	Glendine River (Clare)	Knockloskeraun Br. S of M_A	1	1	153	0.01961	3
SHIRBD	Bunratty	Broadford River	Br. u/s Doon Lough_A	2	3	203	0	0
SHIRBD	Bunratty	Broadford River	Broadford (Village)_A	2	3	216	0.00926	2
SHIRBD	Bunratty	Gourna River	Beside railway brA	2	3	233	0.11578	27
SHIRBD	Bunratty	Gourna River	Br. u/s Owenogarney R confl_C	2	3	182	0.03841	7
SHIRBD	Burrishoole	Newport River	Rossaguile BrA	3	3	380	0	0
SHIRBD	Fergus	Fergus, River	Br. near Clonroad House_A	4*	1	5487	0.00346	19

RBD	Catchments	River Name	River Site	No. Sets	No. Runs	Area (m²)	Density (No./ m²)	No. Eels
SHIRBD	Fergus	Fergus, River	Poplar BrB	3	3	318	0.06918	22
SHIRBD	Fergus	Moyree River	Br. u/s Fergus River_A	3	3	347	0.00288	1
SHIRBD	Fergus	Spancelhill River	Br. NW, near Spancelhill_A	1	3	115	0.0087	1
SHIRBD	Inny	Mountnugent River	Mountnugent BrA	3	3	309	0	0
SHIRBD	Shannon Lw.	Ballyfinboy River	Ballinderry BrA	2	3	254	0	0
SHIRBD	Shannon Lw.	Ballyfinboy River	Br. just u/s L. Derg_A	2	3	209	0.01439	3
SHIRBD	Shannon Lw.	Bow River	Bow River BrA	2	3	240	0	0
SHIRBD	Shannon Lw.	Glenafelly River	Br. 3km E of Longford_A	1	3	128	0	0
SHIRBD	Shannon Lw.	Graney River	Caher Br. S of L.Graney_A	2	3	228	0	0
SHIRBD	Shannon Up.	Boor River	Br. NW of Kilbillaghan_B	2	3	214	0.01401	3
SHIRBD	Suck	Suck, River	Ballyforan BrA	4*	1	7896	0.00013	1
SHIRBD	Suck	Suck, River	Cloondacarra BrA	2*	3	2195	0.00046	1
SWRBD	Adrigole	Adrigole River	0.5km d/s of Glashduff Adrigole confluence_A	3	3	401	0.06739	27
SWRBD	Bandon	Blackwater (Munster), River	Killavullen BrA	4*	1	10704	0.00159	17
SWRBD	Bandon	Blackwater (Munster), River	Lismore BrA	4*	1	8712	0.00161	14
SWRBD	Bandon	Blackwater (Munster), River	Nohaval BrA	2*	3	2029	0	0
SWRBD	Blackwater	Dalua River	Footbr. SW of Liscongill_A	3	3	456	0.01536	7
SWRBD	Blackwater	Funshion, River	Br. u/s Blackwater R confl_A	2*	1	2537	0.00355	9
SWRBD	Blackwater	Licky River	Br. NE of Glenlicky_A	2	3	267	0.03745	10
SWRBD	Colligan	Araglin River	Elizabeth's BrA	3	3	560	0.03571	20
SWRBD	Cummeragh	Cummeragh River	Footbr. u/s Owengarriff confl_A	2	3	255	0.00785	2
SWRBD	Lee	Lee (Cork), River	Inchinossig BrA	3	3	428	0	0
SWRBD	Lee	Lee (Cork), River	Lee Fields_A	4*	1	10656	0.0045	48
SWRBD	Owvane	Owvane River (Cork)	Lisheen / Piersons Br. (LHS)_A	3	3	614	0.0765	47

RBD	Catchments	River Name	River Site	No. Sets	No. Runs	Area (m²)	Density (No./ m <sup>2</sup> )	No. Eels
WRBD	Corrib	Abbert River	Bridge at Bullaun_A	3	3	351	0.00285	1
WRBD	Kinvarra	Owendalluleegh River	Br. SE Killafeen_A	3	3	387	0.06724	26
WRBD	Owenboliska	Owenboliska River	Caravan Park_A	3	3	441	0.05672	25
WRBD	Screeb	Screeb River	L. Aughawoolia_A	3	3	282	0.04973	14

RBD	Catchments	River Name	River Site	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
ERBD	Boyne	Blackwater (Kells), River	Just u/s L. Ramor_A	23.5	13.3	44.5	0.0247	0.003	0.129	0.518
ERBD	Liffey	Dodder, River	Bushy Park_A	20.3	16.8	23.7	0.0143	0.0085	0.02	0.0285
ERBD	Liffey	Dodder, River	Firhouse_A	23.7	23.7	23.7	0.02	0.02	0.02	0.02
ERBD	Liffey	Dodder, River	Footbr. Beaver Row_B	20.5	11.1	32.4	0.0164	0.002	0.061	0.967
ERBD	Liffey	Dodder, River	Knocklyon_A	33	33	33	0.057	0.057	0.057	0.057
ERBD	Liffey	Dodder, River	Mount Carmel Hospital_A	45.7	37	52	n.r.	n.r.	n.r.	n.r.
ERBD	Liffey	Dodder, River	Oldbawn_A	38	38	38	0.096	0.096	0.096	0.096
ERBD	Liffey	Liffey, River	Kilcullen BrA	44.6	44.6	44.6	0.124	0.124	0.124	0.124
ERBD	Vartry	Vartry River	Ashford BrA	23.3	16.6	34.3	n.r.	n.r.	n.r.	n.r.
ERBD	Vartry	Vartry River	Newrath BrA	21.3	14.8	29	0.0156	0.005	0.038	0.1715
ERBD	Vartry	Vartry River	Nun's Cross BrA	23.7	14.6	37	n.r.	n.r.	n.r.	n.r.
NBIRBD	Dee	Dee, River	Br. at Drumcar_A	11.2	6.9	30.2	0.0032	0.0005	0.0475	0.1985
NBIRBD	Dee	White River (Louth)	Athclare_A	35.9	34.1	37.7	n.r.	n.r.	n.r.	n.r.
NBIRBD	Dee	White River (Louth)	Coneyburrow BrB	27.8	26	29.5	0.031	0.024	0.038	0.062
NBIRBD	Dee	White River (Louth)	Dunleer_A	25.1	15.1	38.9	0.0448	0.006	0.1185	0.179
NBIRBD	Dee	White River (Louth)	Gibber's BrA	19	19	19	n.r.	n.r.	n.r.	n.r.
NBIRBD	Fane	Fane River	Br. d/s of Inniskeen_A	24.9	12.7	35.2	0.0283	0.0065	0.0645	0.3115
NWIRD	Erne	Annalee River	0.2km d/s Cavan R confl_A	36.2	24.6	51	0.0907	0.0215	0.198	0.544
NWIRD	Erne	Erne, River	Bellahillan BrA	65	65	65	0.6	0.6	0.6	0.6
NWIRD	Erne	Erne, River	Kilconny Belturbet	50.4	37	58	0.2345	0.0765	0.366	1.1725

Table 0-4: Summary data from WFD River Surveys, 2013. N.r. not recorded

RBD	Catchments	River Name	River Site	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
			(RHS)_A							
SERBD	Barrow	Gowran River	Br. N of Goresbridge (S Channel)_A	37.6	30.6	51.2	0.0931	0.0365	0.219	0.3725
SERBD	Nore	Ballyroan River	Ballydine BrA	29	29	29	0.0385	0.0385	0.0385	0.0385
SERBD	Nore	Glory, River	Br. E of Raheen_A	22.8	16	31.6	0.0245	0.0065	0.053	0.0735
SERBD	Owenavorragh	Banoge River	Br. u/s Owenavorragh R confl_A	18.7	11.4	33.1	0.0167	0.002	0.07	0.2665
SERBD	Owenavorragh	Banoge River	d/s of N11 bridge_A	23.4	17.7	34	0.0285	0.004	0.0855	0.114
SERBD	Slaney	Clody, River	Ford (Br.) 3km u/s Bunclody_B	17.5	17.5	17.5	0.063	0.063	0.063	0.063
SERBD	Slaney	Slaney, River	Waterloo BrA	30.3	16.7	50.5	0.0604	0.006	0.239	0.8455
SERBD	Suir	Nier, River	Br. ENE of Ballymacarby_A	24.8	16.8	34.3	0.0275	0.006	0.075	0.385
SHIRBD	Annagh	Glendine River (Clare)	Knockloskeraun Br. S of M_A	26.3	17.1	32	0.0384	0.0005	0.396	9.4395
SHIRBD	Bunratty	Broadford River	Broadford (Village)_A	28.3	18	38.5	0.0568	0.0075	0.106	0.1135
SHIRBD	Bunratty	Gourna River	Beside railway brA	21.7	9.1	33.4	0.0233	0.001	0.067	0.605
SHIRBD	Bunratty	Gourna River	Br. u/s Owenogarney R confl_C	17.7	11.8	28.9	0.0148	0.005	0.037	0.074
SHIRBD	Fergus	Fergus, River	Br. near Clonroad House_A	36.7	10.2	67	0.1312	0.001	0.625	2.361
SHIRBD	Fergus	Fergus, River	Poplar BrB	29.6	19	41.1	0.0464	0.01	0.101	0.975
SHIRBD	Fergus	Moyree River	Br. u/s Fergus River_A	35	35	35	0.073	0.073	0.073	0.073
SHIRBD	Fergus	Spancelhill River	Br. NW, near Spancelhill_A	28	19.4	33.3	0.045	0.012	0.096	0.315
SHIRBD	Shannon Lw.	Ballyfinboy River	Br. just u/s L. Derg_A	39	23	53	0.1517	0.024	0.33	0.455
SHIRBD	Shannon Up.	Boor River	Br. NW of Kilbillaghan_B	42	34.5	48	0.1133	0.052	0.172	0.34
SHIRBD	Suck	Suck, River	Ballyforan BrA	41.5	41.5	41.5	0.103	0.103	0.103	0.103

RBD	Catchments	River Name	River Site	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
SHIRBD	Suck	Suck, River	Cloondacarra BrA	57.4	57.4	57.4	0.396	0.396	0.396	0.396
SWRBD	Adrigole	Adrigole River	0.5km d/s of Glashduff Adrigole confluence_A	26.6	14	50.5	0.031	0.004	0.1675	0.5265
SWRBD	Bandon	Blackwater (Munster), River	Killavullen BrA	26.5	12.9	35.5	0.053	0.017	0.0915	0.318
SWRBD	Bandon	Blackwater (Munster), River	Lismore BrA	22.2	7.4	38	0.0294	0.0005	0.0975	0.411
SWRBD	Blackwater	Dalua River	Footbr. SW of Liscongill_A	24	16	34.3	0.0273	0.006	0.0715	0.191
SWRBD	Blackwater	Funshion, River	Br. u/s Blackwater R confl_A	29.7	17.9	49.8	0.0674	0.008	0.2995	0.5395
SWRBD	Blackwater	Licky River	Br. NE of Glenlicky_A	18	9.7	32.7	0.0131	0.001	0.067	0.1305
SWRBD	Colligan	Araglin River	Elizabeth's BrA	23.5	12.1	33.5	0.0254	0.002	0.0675	0.507
SWRBD	Cummeragh	Cummeragh River	Footbr. u/s Owengarriff confl_A	29.5	18.1	40.9	n.r.	n.r.	n.r.	n.r.
SWRBD	Lee	Lee (Cork), River	Lee Fields_A	30.3	7.4	60.6	0.0711	0.009	0.381	3.1295
SWRBD	Owvane	Owvane River (Cork)	Lisheen / Piersons Br. (LHS)_A	30.6	21.6	50.5	0.034	0.0005	0.396	3.74
WRBD	Corrib	Abbert River	Bridge at Bullaun_A	22	22	22	0.019	0.019	0.019	0.019
WRBD	Kinvarra	Owendalluleegh River	Br. SE Killafeen_A	22.4	7	37	0.0257	0.0005	0.093	0.6415
WRBD	Owenboliska	Owenboliska River	Caravan Park_A	24.8	16.8	34.3	0.0275	0.006	0.075	0.385
WRBD	Screeb	Screeb River	L. Aughawoolia_A	12.2	7.4	32.6	0.0061	0.0005	0.056	0.262

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	Boyne	Blackwater (Kells), River	Just u/s L. Ramor_A	21	0	7	11	2	1	0	0	0	0
ERBD	Liffey	Dodder, River	Bushy Park_A	2	0	1	1	0	0	0	0	0	0
ERBD	Liffey	Dodder, River	Firhouse_A	1	0	0	0	1	0	0	0	0	0
ERBD	Liffey	Dodder, River	Footbr. Beaver Row_B	61	0	33	21	7	0	0	0	0	0
ERBD	Liffey	Dodder, River	Knocklyon_A	1	0	0	0	1	0	0	0	0	0
ERBD	Liffey	Dodder, River	Mount Carmel Hospital_A	3	0	0	0	1	1	1	0	0	0
ERBD	Liffey	Dodder, River	Oldbawn_A	1	0	0	0	1	0	0	0	0	0
ERBD	Liffey	Liffey, River	Kilcullen BrA	1	0	0	0	0	1	0	0	0	0
ERBD	Vartry	Vartry River	Ashford BrA	9	0	3	5	1	0	0	0	0	0
ERBD	Vartry	Vartry River	Newrath BrA	13	0	7	6	0	0	0	0	0	0
ERBD	Vartry	Vartry River	Nun's Cross BrA	28	0	9	15	4	0	0	0	0	0
NBIRBD	Dee	Dee, River	Br. at Drumcar_A	63	30	31	1	1	0	0	0	0	0
NBIRBD	Dee	White River (Louth)	Athclare_A	2	0	0	0	2	0	0	0	0	0
NBIRBD	Dee	White River (Louth)	Coneyburrow BrB	2	0	0	2	0	0	0	0	0	0
NBIRBD	Dee	White River (Louth)	Dunleer_A	11	0	3	4	4	0	0	0	0	0
NBIRBD	Dee	White River (Louth)	Gibber's BrA	1	0	1	0	0	0	0	0	0	0
NBIRBD	Fane	Fane River	Br. d/s of Inniskeen_A	14	0	2	8	4	0	0	0	0	0
NWIRBD	Erne	Annalee River	0.2km d/s Cavan R confl_A	6	0	0	3	0	2	1	0	0	0
NWIRBD	Erne	Erne, River	Bellahillan BrA	1	0	0	0	0	0	0	1	0	0
NWIRBD	Erne	Erne, River	Kilconny Belturbet (RHS)_A	5	0	0	0	1	1	3	0	0	0
SERBD	Barrow	Gowran River	Br. N of Goresbridge (S Channel)_A	4	0	0	0	3	0	1	0	0	0

 Table 0-5: Length Frequency data from WFD River Surveys, 2013.

RBD	Catchments	<b>River</b> 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	Nore	Ballyroan River	Ballydine BrA	1	0	0	1	0	0	0	0	0	0
SERBD	Nore	Glory, River	Br. E of Raheen_A	3	0	1	1	1	0	0	0	0	0
SERBD	Owenavorragh	Banoge River	Br. u/s Owenavorragh R confl_A	16	0	10	5	1	0	0	0	0	0
SERBD	Owenavorragh	Banoge River	d/s of N11 bridge_A	4	0	1	2	1	0	0	0	0	0
SERBD	Slaney	Clody, River	Ford (Br.) 3km u/s Bunclody_B	1	0	1	0	0	0	0	0	0	0
SERBD	Slaney	Slaney, River	Waterloo BrA	7	0	1	2	4	0	0	0	0	0
SERBD	Suir	Nier, River	Br. ENE of Ballymacarby_A	14	0	5	6	3	0	0	0	0	0
SHIRBD	Annagh	Glendine River (Clare)	Knockloskeraun Br. S of M_A	3	0	1	1	1	0	0	0	0	0
SHIRBD	Bunratty	Broadford River	Broadford (Village)_A	2	0	1	0	1	0	0	0	0	0
SHIRBD	Bunratty	Gourna River	Beside railway brA	27	2	9	10	6	0	0	0	0	0
SHIRBD	Bunratty	Gourna River	Br. u/s Owenogarney R confl_C	7	0	5	2	0	0	0	0	0	0
SHIRBD	Fergus	Fergus, River	Br. near Clonroad House_A	19	0	1	3	11	1	1	2	0	0
SHIRBD	Fergus	Fergus, River	Poplar BrB	22	0	1	9	10	2	0	0	0	0
SHIRBD	Fergus	Moyree River	Br. u/s Fergus River_A	1	0	0	0	1	0	0	0	0	0
SHIRBD	Fergus	Spancelhill River	Br. NW, near Spancelhill_A	1	0	0	0	0	1	0	0	0	0
SHIRBD	Shannon Lw.	Ballyfinboy River	Br. just u/s L. Derg_A	3	0	0	1	0	1	1	0	0	0
SHIRBD	Shannon Up.	Boor River	Br. NW of Kilbillaghan_B	3	0	0	0	1	2	0	0	0	0
SHIRBD	Suck	Suck, River	Ballyforan BrA	1	0	0	0	0	1	0	0	0	0
SHIRBD	Suck	Suck, River	Cloondacarra BrA	1	0	0	0	0	0	1	0	0	0
SWRBD	Adrigole	Adrigole River	0.5km d/s of Glashduff Adrigole confluence_A	27	0	5	18	2	0	2	0	0	0
SWRBD	Bandon	Blackwater (Munster), River	Killavullen BrA	17	0	3	7	7	0	0	0	0	0
SWRBD	Bandon	Blackwater (Munster), River	Lismore BrA	14	1	6	3	4	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
SWRBD	Blackwater	Dalua River	Footbr. SW of Liscongill_A	7	0	3	2	2	0	0	0	0	0
SWRBD	Blackwater	Funshion, River	Br. u/s Blackwater R confl_A	9	0	1	4	3	1	0	0	0	0
SWRBD	Blackwater	Licky River	Br. NE of Glenlicky_A	10	1	5	3	1	0	0	0	0	0
SWRBD	Colligan	Araglin River	Elizabeth's BrA	20	0	7	10	3	0	0	0	0	0
SWRBD	Cummeragh	Cummeragh River	Footbr. u/s Owengarriff confl_A	2	0	1	0	0	1	0	0	0	0
SWRBD	Lee	Lee (Cork), River	Lee Fields_A	48	1	1	23	19	1	2	1	0	0
SWRBD	Owvane	Owvane River (Cork)	Lisheen / Piersons Br. (LHS)_A	47	26	15	5	1	0	0	0	0	0
WRBD	Corrib	Abbert River	Bridge at Bullaun_A	1	0	0	1	0	0	0	0	0	0
WRBD	Kinvarra	Owendalluleegh River	Br. SE Killafeen_A	26	0	0	13	12	0	1	0	0	0
WRBD	Owenboliska	Owenboliska River	Caravan Park_A	25	4	6	9	6	0	0	0	0	0
WRBD	Screeb	Screeb River	L. Aughawoolia_A	14	0	3	3	7	0	1	0	0	0

RBD	Catchments	Transitional Water	No. Nights	No. Nets	No. Eels	CPUE	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
SERBD	Barrow	Barrow Est., Up.	1	6	36	6	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
SERBD	Barrow	Barrow Nore Est., Up.	1	2	59	29.5	37.1	24.6	74.4	0.1331	0.028	0.994	7.852
SERBD	Barrow	Barrow Suir Nore Est.	1	4	0	0	-	-	-	-	-	-	-
SERBD	Barrow	New Ross Port	1	4	21	5.25	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
SERBD	Nore	Nore Estuary	1	4	73	18.25	38.5	23.2	61.8	0.1211	0.022	0.398	8.838
SERBD	Suir	Suir Estuary, Lower	1	4	62	15.5	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
SERBD	Suir	Suir Estuary, Middle	1	6	141	23.5	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
SERBD	Suir	Suir Estuary, Upper	1	2	0	0	-	-	-	-	-	-	-
SWRBD	Coastal	Drongawn Lough	1	6	33	5.5	33	30	78	n.r.	n.r.	n.r.	n.r.
SWRBD	Coastal	Gill, Lough	1	6	3	0.5	27.8	24	30.4	n.r.	n.r.	n.r.	n.r.

Table 0-6: Summary data from WFD Transitional Water Surveys, 2013. (n.r. not recorded)

RBD	Catchments	Transitional Water	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	Barrow	Barrow Est., Up.	36	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
SERBD	Barrow	Barrow Nore Est., Up.	59	0	0	8	34	11	3	2	1	0
SERBD	Barrow	Barrow Suir Nore Est.	0	-	-	-	-	-	-	-	-	-
SERBD	Barrow	New Ross Port	21	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
SERBD	Nore	Nore Estuary	73	0	0	8	41	15	8	1	0	0
SERBD	Suir	Suir Estuary, Lower	62	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
SERBD	Suir	Suir Estuary, Middle	141	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
SERBD	Suir	Suir Estuary, Upper	0	-	-	-	-	-	-	-	-	-
SWRBD	Coastal	Drongawn Lough	33	0	0	0	9	12	9	2	1	0
SWRBD	Coastal	Gill, Lough	3	0	0	2	1	0	0	0	0	0

Table 0-7: Length Frequency data from WFD Transitional Water Surveys, 2013. n.r. not recorded