ACTIVITY REPORT

OF THE

STANDING SCIENTIFIC COMMITTEE FOR EEL

2013

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

June 2014

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 _{post})	Estimate of anthropogenic mortality after management actions are implemented				
Anthropogenic mortality before management (A _{pre})	Estimate of anthropogenic mortality before management actions are implemented				
Spawner escapement biomass after management (B _{post})	Estimate of spawner escapement biomass after management actions are implemented				
Spawner escapement biomass before management (B _{pre})	Estimate of spawner escapement biomass before management actions are implemented				
Best achievable biomass (B _{best})	Spawning biomass corresponding to recent natural recruitment that would have survived if there was only natural mortality and no stocking				
Pristine biomass (B ₀)	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.				

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 in 2009. Under the EC Regulation, Ireland is required to monitor the eel stock, evaluate current silver eel escapement and post-evaluate implemented management actions aimed at reducing eel mortality and increasing silver eel escapement. Each Member State is required to report to the Commission, initially every third year until 2018, and subsequently every six years.

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

The 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 - 2014

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 Working Group on Eel.

ICES considered the updated time-series of relevant stock status indices and issued advice for 2014:

"The status of eel remains critical and urgent action is needed. ICES advises that all anthropogenic mortality (e.g. recreational and commercial fishing, hydropower, pollution) affecting production and escapement of silver eels should be reduced to as close to zero as possible, until there is clear evidence of sustained increase in both recruitment and the adult stock."

The annual recruitment of glass eel to European waters has increased over the last two years, from less than 1% to 1.5% of the 1960–1979 reference level in the 'North Sea' series, and from 5% to 10% in the 'Elsewhere' series.

ICES also advised: Restocking under the eel management plans is not expected to have contributed to increased silver eel escapement yet because of the generational lag time. The efficacy of restocking for recovering the stock remains uncertain while evidence of net benefit is lacking.

ICES Workshop on Technical Evaluation of 2012 Reports to the EU (WKEPEMP)

In December 2012 the EU DGMARE sent ICES a special request for 'Technical evaluation of the progress reports submitted by the EU Member States to the European Commission in line with Article 9 of the Eel Regulation (1100/2007)'.

In May 2013 the Workshop on Evaluation Progress Eel Management Plan (WKEPEMP) met at ICES Headquarters, Copenhagen, Denmark. And in June 2013 ICES issued advice to the EU.

The EU Regulation requires the Commission to report to the parliament and the Council not later than 31st December 2013, incorporating the technical and statistical evaluation of the EMPs and appropriate measures to ensure with high probability the recovery of the eel stock. This report has not been issued to date.

Advice Summary from ICES WKEPEMP

'In most Eel Management Units (EMUs), depending on EMU conditions, progress has been made in implementing eel-specific management measures for commercial and recreational fisheries, hydropower, pumping stations and obstacles, restocking, management measures on habitat, and in a few cases predator control.

Management measures related to fisheries have most often been fully implemented while other management measures have often been postponed or only partially implemented. Most increases in silver eel escapement since the implementation of management plans have been achieved by management measures addressing the commercial and recreational fisheries on silver eel.

Where management measures have not been fully implemented or where stock indicators show that management targets have not been reached, additional protection could be achieved by i) completing the implementation of the actions already planned, ii) implementing immediately the actions that were postponed or delayed, and iii) taking additional actions directed at the main anthropogenic mortalities. Extending actions that have proven successful, rather than pursuing untried actions or those difficult to implement, will reduce the risk of continued underachievement.'

The workshop compared local stock indicators provided in the 81 Eel Management Plan progress reports or from a subsequent data call. To date the WKEPEMP reported that 17 EMU's have achieved their target of 40% pristine silver eel escapement, 42 are not achieving the target and 22 did not report stock indicators. Of the 17 EMU's that reached their target, 11 are predicted to be in a downward trend. Of the 42 EMU's below target 20 are in an upward trend and will achieve the target in the future. A total of 756 management actions were proposed in the 81 EMPs. Few progress reports included data that directly demonstrated the effects of individual management measures on silver eel escapement. Most management measures were directed at commercial and recreational fisheries; the remaining measures concerned hydropower, pumping stations and obstacles and finally habitat, restocking and predator control.

National Advice

Glass Eel Imports:

The SSCE recommends against any introductions of live fish to the island of Ireland from abroad, especially from the continent, and recommends a risk analysis be undertaken before carrying out any introductions.

The SSCE recommends that in the event of importations taking place, all batches be screened on receipt for pathogens and also for non-native aquatic species. The screening for non-native species is not a veterinary function and should be carried out by specialists and this should include the transport medium (e.g. ice, water, slime).

Index Silver Eel Sites:

The SSCE expressed concern over the state of two of the key index sites (Galway and Killaloe) identified in the Irish Eel Management Plan as vital to evaluating the annual production and escapement of silver eels from Irish waters. The Galway Fishery has been closed due to structural defects and the Killaloe Fishery requires considerable maintenance.

The SSCE recommends that both these fisheries should be maintained as index scientific sites for eel assessment.

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 not available to the SSCE making it difficult to determine the level of illegal catch.

Irish EMP Management Actions

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 2013 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 four regions which led to some seizures of gear, the most significant activity being in the Shannon IRBD. No dealers transport trucks were seized in 2013 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. 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.

The total quantity released from the three catchments was 62.70t. The level of fishing mortalities was reported to be low.

A total of 22.560t was trapped and transported on the Shannon, including 12.808t at Killaloe. This represented 28.2% of silver eel production. The three year rolling average for the 2011 (38.4%), 2012 (35.9%) and 2013 (28.2%) seasons was 33.8%. Therefore the target of 30% over a three year rolling average was attained.

On the Erne, a total catch of 39.32t of silver eel were trapped and transported to the estuary. The target (50% of production) was, therefore, met in 2012 (53.62%).

The R. Lee was fished at two locations (Inniscarra Reservoir and Lough Allua) and a total of 0.824t was captured and transported downstream as viable silver eel migrants. The combined catches for 2012 and 2013 (234 kg and 824 kg) totalled 1,058 kg. Thus a shortfall in 2012 catches, relative to the EMP 500 kg target, was compensated for by the increased catches in 2013.

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.* 2013).

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 2013, it was estimated that 24.27% used the bypass old river channel.

For the *Erne*, the picture in 2013 was complex. During the experimental period (20 Dec 2013 to 20 Feb 2014), Cliff HPS had no turbines operating with spillage at volumes equivalent to generation at the downstream Cathaleen's Fall HPS. 100% hydropower passage success occurred during this period. Outside of the experimental period, spillage occurred at Cliff HPS with turbines in operation, following the generation protocols from previous seasons (2009 – 2011). Therefore, the combined mortality (7.9%, 8/101) from these years was used in escapement calculations. When turbines were operating without spillage, the mortality estimate from the 2012 season (26.7%, 8/30) was used in calculations.

Initial analysis of discharge patterns at Cathaleen's Fall identified two basic generation protocols during period when telemetry studies were undertaken:

- 1. Two turbines operational with no spillage
- 2. Two turbines operational with spillage

The mortality rate at Cathaleen's Fall HPS during generation protocol 1 was calculated to be 27.3% (3/11). During generation protocol 2, the mortality rate was calculated to be 15.4% (4/26). For the remainder of the silver eel season, outside of the experimental period, a third generation protocol was also in operation. This was one turbine plus spillage. During the previous three migration seasons this was the generation protocol in operation. Therefore, the average mortality (7.7%, N=91) from this period (2010 – 2012) was used in the calculation of hydropower passage mortality on dates in which this generation protocol was being implemented. These estimates of mortality (3 generation protocols) were incorporated into the escapement calculations for the 2013 season

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 continues 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, SERBD and ShIRBD. Substantial mapping and assessment has also taken place on the R. Shannon with 218 potential obstructions being assessed.

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 were transported upstream from the fixed elver traps. Surplus recruits were not identified in 2013 to facilitate a stocking programme between catchments.

4. Improve Water Quality, fish health and biosecurity

No new information on water quality.

There was no new information on fish kills or on eel contamination. *Anguillicoloides 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. 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.

Corrib

Due to health and safety issues over the structure of the Galway weir, it was not possible to undertake an estimate of escapement in 2012.

Shannon

The Killaloe catch in 2013 was 12.808t. Fishing was also undertaken by ESB contracted crews upstream of Killaloe and their catches (9.753t) were also transported downstream.

Following adoption of new analytical protocols for estimation of Shannon silver eel production by MacNamara and McCarthy (2013), as in 2012, the 2013 production/escapement results were presented by NUIG as part of the new time series. The production and escapement estimates obtained following the new protocols were 79.970t and 70.775t (with 21.15% turbine mortality and 24.27% bypass in the old river channel).

Burrishoole

Silver eel trapping was continued in Burrishoole in 2013. The main run occurred in October (68%). The total run amounted to a count of 3633 eels or a production/escapement of 572kg. The run had a mean weight of 0.157kg and was composed of 45.7% male eels

Erne

In the 2013 season the River Erne conservation fishery and the trap & transport programme were monitored by NUIG. This was undertaken in conjunction with studies on silver eel production and escapement. The scientific protocols used in the 2013 season were those described in previous reports and publications (e.g. McCarthy et al 2014).

The trap and transport total (39.319t) represented 53.6% of silver eel production and exceeded the target (50%) by 2.654t.

The silver eel production was estimated as 73.33t and escapement was estimated to be 64.285t (87.7% of production). The combined Cliff HPS and Cathaleen's Fall hydropower mortalities were estimated provisionally as 8.809t (12% of production). A relatively high proportion of male silver eels, also noted in 2011-2013 in upper catchment sites as well as at Roscor Bridge, was observed in 2013.

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 in 2011 and 2012. The site was at the location of a previous commercial fishery until 2008. For the 2013 season, the fishing commenced in October following low water levels in August and September.

A total catch of 1.151t was caught for the 2013 season compared with 0.448t in 2012. The estimated pristine production of silver eels from the Fane catchment is 2.679t with an estimated current production (2009-2011) of 1.264t.

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 if a this is used to determine the efficiency of the fishing site then a production of 5.755t is estimated.

The length of eels caught during the season had an average length of 49.2 cm and a sex ratio of 32% female.

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.

2013 Fyke net Survey

In 2013 intensive sampling of yellow eels took place at five lake locations (Lough Derg (Meelick Bay), Burrishoole (2 lakes), Lough Key, Lough Muckno and Upper Lough Erne, along with several site locations on the River Barrow. Additional sampling in conjunction with the Water Framework Directive was on L. Gill. 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 2013 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, Lough Muckno had the highest CPUE (28.7) with relatively high CPUEs in L. Derg (13.6) and L. Key (10.7) and relatively low CPUEs were recorded in the western lakes, Bunaveela and Feeagh.

Eels were present in all 30 lakes and both estuaries surveyed under the Waterframework Directive.

Transitional waters (Barrow, Burrishoole (Furnace, Furnace lwr)) were also surveyed in 2013 and the CPUEs were 4.11, 2.4 and 2.7 eels per net per night respectively.

Ageing of eels is progressing well with all otoliths from 2009-2011 prepared and read. Over 80% of otoliths extracted have now been processed.

Transboundary

The Upper Erne Survey was carried out in October 2013. A total weight of 3kgs and 8 eels were caught in a 9 fyke nets. The WFD in cooperation with AFBI surveyed Upper and Lower MacNean in 2013. This data will be reported in the 2015 report.

Recruitment

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 ICES for stock assessment. This information is also required to assess and model changes in the future Irish eel stocks.

In 2012, 10 sites were monitored by the Electricity Supply Board and Inland Fisheries Ireland. High water levels in spring made monitoring difficult at some locations. Monitoring of glass eel (elver) migrating at Ardnacrusha (Shannon) and Cathaleens Fall (Erne) showed that while recruitment increased in 2013, levels remained relatively low. This was supported by information from the other sites and from N. Ireland.

Monitoring of young yellow eel migrating at Parteen Weir (Shannon) takes place using a fixed brush trap. The catch in 2013 was the second lowest on record.

Contents

Exec	utive	Summ	ary	5					
1	Introduction14								
	1.1	1 EU Regulation							
	1.2	Standi	ng Scientific Committee on Eel	14					
		1.2.1	Terms of Reference	15					
	1.3	Meetin	ng Activities	16					
2	Inter	nation	al Advice from ICES	17					
	2.1	Introd	uction to ICES Advice	17					
	2.2	ICES A	Advice on Eel 2013	17					
	9.4.7	Euroj <i>2013</i>)	pean Eel (reproduced from the <i>ICES Advice 2013, Book 9) (No</i>	ovember 17					
3	Natio	onal Ac	lvice	21					
	3.1	Glass I	Eel Imports	21					
	3.2	EU Re	port and ICESWKEPEMP	21					
	3.3	Irish I	r silver Fel Sites	22					
	3.4	Eel Tra	aceability	23					
4	Mana	agemei	nt Actions – a scientific assessment	24					
	4.1	Introd	uction	24					
	4.2	Manag	gement Action No. 1 Reduction of fishery to achieve EU target	24					
		4.2.1	Introduction	24					
		4.2.2	Action 1a: Report closure of fishery	24					
		4.2.3	Reports of illegal fishing activity	25					
		4.2.4	Action 1b: Recreational Fishery	25					
		4.2.5	Action 1c: Diversification of the Fishery	25					
	4.3	Manag	gement Action No. 2. Mitigation of hydropower	27					
		4.3.1	Action 2a: Trap and Transport	27					
		4.3.2	Action 2b: Quantify Turbine Mortality	31					
		4.3.3	Action 2c: Engineered Solution	31					
	4.4	Manag	gement Actions No. 3. Ensure upstream migration at barriers	32					
		4.4.1	Action 3a: Existing barriers (inc. small weirs etc.)	32					
		4.4.2	Action 3b: New potential barriers	36					
		4.4.3	Action 3c: Assisted migration and stocking	36					
	4.5	Manag	gement Action No. 4 Improve water quality	36					
		4.5.1	Water Quality	36					
		4.5.2	WFD monitoring – fish	37					
		4.5.3	Fish Kills	37					
		4.5.4	Eel Contaminants	37					
		4.5.5	Prevalence of Anguillicoloides crassus	37					
5	Silve	r Eel E	scapement, 2013	39					

	5.1	5.1 Introduction						
		5.1.1 Shannon	41					
		5.1.2 Burrishoole	47					
		5.1.3 Erne Transboundary	51					
		5.1.4 Fane						
6	Yell	ow Eel Stock Assessment	65					
	6.1	Yellow Eel Survey 2013	65					
		6.1.1 Meelick Bay, Lough Derg	69					
		6.1.2 Lough Key	71					
		6.1.3 Lough Muckno	74					
		6.1.4 Burrishoole	77					
		6.1.5 Barrow Transitional Waters	78					
	6.2	Transboundary Yellow Eel	80					
	6.3	Water Framework Directive	80					
		6.3.1 Introduction	80					
		6.3.2 WFD Sampling Programme 2012	81					
		6.3.3 Results	81					
	6.4	Otolith Ageing and Growth: Preliminary analysis	84					
		6.4.1 Introduction	84					
		6.4.2 Methodology	84					
		6.4.3 Ageing and Growth Analysis	85					
	6.5	Preliminary Results	87					
	6.6	Progress						
7	Rec	ruitment	91					
	7.1	Introduction	91					
	7.2	Glass Eel						
		7.2.1 Introduction	92					
		7.2.2 0+ Recruitment	92					
	7.3	Young Yellow Eel Recruitment						
8	Ref	erences						
•	1		100					
An	nex 1	: Members of the Standing Scientific Lei Committee 2013						
An	nex 2:	Conservation of Eel Fishing Bye-law No. C.S. 312, 2012	101					
An	nex 3: fron	Reports on Fisheries closures, illegal fishing and other manage n the IFI RBD's and Loughs Agency	ement actions					
Annex 4: Silver Eel Trap and Transport Tables: Erne, Shannon and Lee								
Annex 5: National Survey123								
An	nex 6	: Water Framework Directive	126					

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 30th 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. Although the scientists are drawn from these agencies, the advice from the SEG is independent of the parent agencies.

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.

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
 - 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 five times in 2012/2013 to report internally on the 2013 survey years;

2012 - 2015 reporting period

3rd October 2012	Swords
3rd December 2012	Ballyshannon
7th March 2013	Oranmore
25 th September 2013	Galway
December	by correspondence
17 th February 2014	Swords

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 Working Group on Eel (WGEEL).

2.2 ICES Advice on Eel 2013

9.4.7 European Eel (reproduced from the ICES Advice 2013, Book 9) (November 2013)

Advice for 2014

The status of eel remains critical and urgent action is needed. ICES advises that all anthropogenic mortality (e.g. recreational and commercial fishing, hydropower, pollution) affecting production and escapement of silver eels should be reduced to as close to zero as possible, until there is clear evidence of sustained increase in both recruitment and the adult stock.

Restocking under the eel management plans is not expected to have contributed to increased silver eel escapement yet because of the generational lag time. The efficacy of restocking for recovering the stock remains uncertain while evidence of net benefit is lacking.

Stock status

The annual recruitment of glass eel to European waters has increased over the last two years, from less than 1% to 1.5% of the 1960–1979 reference level in the 'North Sea' series, and from 5% to 10% in the 'Elsewhere' series.

Management plans

A management framework for eel within the EU was established in 2007 through an EC Regulation (EC 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, Member States have developed eel management plans for their river basin districts, designed to permit with high probability the escapement to the sea of at least 40% of the silver eel biomass relative to the best

estimate of escapement that would have existed if no anthropogenic influences had impacted the stock. ICES has evaluated the conformity of the national management plans with EC Regulation No. 1100/2007 (ICES, 2009a, 2010a) and progress in implementing the Environmental Management Plan (EMP) actions (ICES, 2013a).

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 (see http://www.cites.org/eng/disc/how.php). Eel was listed in September 2008 as critically endangered in the IUCN Red List. 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 freshwater. 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. Silver eels then migrate to the Sargasso Sea where they are believed to spawn and die.

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 unknown 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, 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 managed 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. In the 2012 EMP Progress Reports, 43 EMPs reported mortality rates for both fishing and non-fishing pressures: the rate due to fishing

(F) exceeded that due to non-fishing pressures (H) in 24 eel management units (EMUs), H exceeded F in 15 EMUs, and the rates of F and H were equal in the last four EMUs.

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.

Many EU Member States have not completely reported stock indicators (22 of 81 EMPs did not report all biomass indicators and 38 did not report all mortality indicators in 2012), and there are inconsistencies in the approaches used to calculate reported stock indicators. The distribution area of the 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.

Scientific basis

The assessment is based on data from fisheries and scientific surveys, and on national stock indicators. Monitoring trends in recruitment has been the main tool in the recent past for assessing the overall status of the eel stock. Methods based on national stock indicators of biomass and mortality, have been recently developed and have been applied this year.

Assessment type Input data	Trend analysis; comparison of indicators with management reference points. Glass eel and yellow eel recruitment indices; national stock indicators of biomass and mortality.
Discards and bycatch	Not included.
Indicators	See above.
Other information	Landing statistics incomplete and reporting inconsistent. Stock indicators incomplete from eel management units/countries in the EU. Stock indicators and other data missing from non-EU states. There is no international legislative requirement to collect and provide data for the whole stock area.
Working group report	Joint EIFAAC/ICES WGEEL (ICES, 2013b).



Figure 9.4.7.1. WGEEL recruitment index: mean of estimated (GLM) glass eel recruitment for the North Sea and elsewhere in Europe updated to 2013. The GLM (recruit=area:year+site) was fitted on 34 series glass eel series comprising either pure glass eel or a mixture of glass eels and yellow eels and scaled to the 1960–1979 average. No series for glass eel are available in the Baltic area. Note the logarithmic scale on the y-axis.



Figure 9.4.7.2 Mean of estimated (GLM) yellow eel recruitment and smoothed trends for Europe updated to 2013. The GLM (recruit= year+site) was fitted to ten yellow eel series and scaled to the 1960–1979 average. Note the <u>logarithmic scale on the y-axis</u>. The grey band shows the 95% point-wise confidence interval of the smoothed trend.

3 National Advice

3.1 Glass Eel Imports

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: 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.

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.

The SSCE recommends against any such introductions of live fish, especially from the continent, and recommends a risk analysis be undertaken before carrying out any introductions.

The SSCE recommends that in the event of importations taking place, all batches be screened on receipt for pathogens and also for non-native species. The screening for non-native species is not a veterinary function and should be carried out by specialists.

3.2 EU Report and ICESWKEPEMP

In June 2012 Ireland submitted a review of the National Management Plan to the EU. In December 2012 the EU DGMARE sent ICES a special request for 'Technical evaluation of the progress reports submitted by the EU Member States to the European Commission in line with Article 9 of the Eel Regulation (1100/2007)'.

In May 2013 the Workshop on Evaluation Progress Eel Management Plan (WKEPEMP) met at ICES Headquarters, Copenhagen, Denmark. There were 17 participants, 7 eel scientists, 7 observers, a representative from DGMARE and 2 representatives of ICES Advisory committee (ACOM). In June 2013 ICES issued advice to the EU based on the report from the Workshop (ICES Advice 9.3.3.3).

The EU Regulation requires the Commission to report to the parliament and the Council not later than 31st December 2013, incorporating the technical and statistical evaluation of the EMPs and appropriate measures to ensure with high probability the recovery of the eel stock. This report has not been issued to date.

Advice Summary from ICES WKEPEMP

'In most Eel Management Units (EMUs), depending on EMU conditions, progress has been made in implementing eel-specific management measures for commercial and recreational fisheries, hydropower, pumping stations and obstacles, restocking, management measures on habitat, and in a few cases predator control.

According to the information provided in the EMP progress reports, management measures related to fisheries have most often been fully implemented while other management measures have often been postponed or only partially implemented. Most increases in silver eel escapement since the implementation of management plans have been achieved by management measures addressing the commercial and recreational fisheries on silver eel.

Where management measures have not been fully implemented or where stock indicators show that management targets have not been reached, additional protection could be achieved by i) completing the implementation of the actions already planned, ii) implementing immediately the actions that were postponed or delayed, and iii) taking additional actions directed at the main anthropogenic mortalities. Extending actions that have proven successful, rather than pursuing untried actions or those difficult to implement, will reduce the risk of continued underachievement.'

The workshop compared local stock indicators provided in the 81 Eel Management Plan progress reports or from a subsequent data call. To date the WKEPEMP reported that 17 EMU's have achieved their target of 40% pristine silver eel escapement, 42 are not achieving the target and 22 did not report stock indicators. Of the 17 EMU's that reached their target, 11 are predicted to be in a downward trend. Of the 42 EMU's below target 20 are in an upward trend and will achieve the target in the future. A total of 756 management actions were proposed in the 81 EMPs however few progress reports include data that directly demonstrates the effects of individual management measures on silver eel escapement. Most management measures were directed at commercial and recreational fisheries; the remaining measures concerned hydropower, pumping stations and obstacles and finally habitat, restocking and predator control.

3.3 Irish Index Silver Eel Sites

The SSCE expresses concern over the state of two of the key index sites (Galway and Killaloe) indentified in the Irish Eel Management Plan as vital to evaluating the annual production and escapement of silver eels from Irish waters.

The Galway Fishery index silver eel site in the Corrib system was closed in 2010 and remains closed due to issues with the infrastructure at the site. There is a large volume of historical information available from this site. It was proposed to use this as an index site in the management plan and to determine the current escapement of silver eels from the Corrib catchment. The Corrib is unaffected by major hydropower installations and would facilitate the evaluation of the impact of closing the eel fishery in the catchment on the silver eel escapement.

The Killaloe site in the lower Shannon system is undergoing maintenance in order to ensure the safety of staff working at this site. This site is important as an index site for determining the silver eel production and escapement from the Shannon catchment. The Shannon is the largest catchment in Ireland and is under the impact of major hydropower facilities below Killaloe.

The location of these two sites in the lower reaches of two of Ireland's key eel catchments means that a significant proportion (~47%) of silver eels emigrating out of the freshwater systems have to pass these sites. This makes them important locations for estimating silver eel production and evaluating the impact of applied management measures on silver eel escapement.

The SSCE recommends that the Galway Fishery and Killaloe Fishery are maintained as index scientific sites for eel assessment.

3.4 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 not available to the SSCE making it difficult to determine the level of illegal catch.

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 2009-2012 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 7th 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 2013 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 2013.

The eel fishery, with the exception of the strictly managed L. Neagh, also remained closed in N. Ireland in 2013.

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).

Four regions have reported some level of illegal fishing which led to gear and equipment seizures (ERBD, ShIRBD, WRDB, NWRBD). Some old lost nets were also located in the WRBD. The most significant activity appeared to be in the Shannon IRBD with 1100m of fyke net (approx 70 nets) and 800m of longline seized.

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 eel sales have occurred in the Shannon IRBD given the level of seizures of gear mentioned previously.

No export data is currently available to the SSCE which is making 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. It is hoped to include this in the 2015 report to the EU.

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 2013.

Some 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	No	No
Illegal trading related to T&T	No	No	No	No	No	No	No
Estimated level of illegal fishing	Low	Low	Low	Medium	None	Unknown	None
Number of gear seizures	0	0	4	6	0	0	2
Gear types seized	-	-	Fykes, coghills	~ 70 Fykes, 800m longline	-	-	Fykes (lost net)
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, 2013

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)

2013 Trap and Transport Results

The total amounts of silver eel trapped and transported in each of the three rivers in 2013 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 22.56 tonnes represented 28.2% of silver eel production. The three year rolling average for the 2011 (38.4%), 2012 (35.9%) and 2013 (28.2%) seasons was 33.8%. Therefore the target of 30% over a three year rolling average has been attained.

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 of 39.32 tonnes represented 53.62% of silver eel production and exceeded the target (50%) by 2,654 kg.

In the River Lee, following protocols successfully used in 2011 and 2012, a contract fishing crew was authorized to fish on behalf of ESB in the two Lee reservoirs and in Lough Allua. However, they confined their fishing this season to Lough Allua and Inniscarra reservoir in 2013 and used only fyke-nets. Their catches were mostly obtained in the Inniscarra reservoir. Analysis of their fishing reports, ESB collection weight records and direct observations on selected catches indicated that 824 kg were trapped and transported. Eels were all released to the River Lee downstream of the Inniscarra dam. NUIG researchers monitored the fishing activities and examined representative Inniscarra catches on 24/7/2013 and 12/8/2013. Size frequency distributions of eel samples obtained from Inniscarra reservoir in 2013 are illustrated in Figure 4-1. The combined catches for 2012 and 2013 (234 kg and 824 kg) totalled 1,058 kg. Thus a shortfall in 2012 catches, relative to the EMP 500 kg target, was compensated for by the increased catches in 2013.

Examination of samples by NUIG, using 5 silver status criteria adopted for the 2011 and 2012 SSCE reports, indicated that 89.6% of the Inniscarra reservoir eels could be regarded as potential natural migrants. Using just observations on two criteria (body colouration and cloacal aperture) suggested that 90.3% of the eels could be designated as having at least one clear indication of their potential silver eel status. It was calculated that, taking account of the fact that most of eels not meeting the silver criteria were small, and presumed male eels, that over

the two seasons a total of 1,000.3 kg of potential spawners had been transported and released below the river section affected by the hydroelectricity production dams (Figure 4-2).

A decline in fyke-net CPUE, reported by fishing reports from the crew in 2012, was not confirmed by 2013 analyses of catch records. The poor eel catch in 2012 may have reflected environmental conditions affecting crew performance rather than being indicative of eel population decline.

Catchment	Year	Target	Amount Transported (t)	Relation to target	Status
R. Shannon	2013	30% of run	22.56	28.2%	Achieved
R. Erne	2013	50% of run	39.32	53.62%	Achieved
R. Lee	2013	0.5t	0.824	165%	Achieved*
Total	2013		62.70		

Table 4-2: Total amounts (t) of silver eel trapped and transported in the Shannon, Erne and Lee, 2013, and the success relative to the targets set in the EMPs.

* Amount estimated as viable silver eel migrants; 1,000kgs over the 2 years (2012 and 2013).





Figure 4-1: Size frequency distributions of eels caught in Inniscarra reservoir in the 2013 season.





Figure 4-2: (A) Inniscarra dam; (B) Carrigadrohid dam.

4.3.2 Action 2b: Quantify Turbine Mortality

4.3.2.1 Shannon

In the 2013 silver eel migration season there was high spillage at the Parteen Regulating Weir. It has been estimated (Figure 5-6) by NUIG that 24.27% 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 (75.73%) 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. During the 2013 season one turbine was removed for refurbishment and an equivalent amount of water was discharged via the Ardnacrusha spillway. However, it was not possible to estimate the extent to which this may have reduced turbine passage mortality because of loss of telemetry receivers downstream of the dam during extreme winter flood events.

4.3.2.2 Erne

During the experimental period (20 Dec 2013 - 20 Feb 2014) in the 2013 season, Cliff HPS had no turbines operating with spillage at volumes equivalent to generation at the downstream Cathaleen's Fall HPS. 100% hydropower passage success occurred during this period. Outside of the experimental period, spillage occurred at Cliff HPS with turbines in operation, following the generation protocols from previous seasons (2009 – 2011). Therefore, the combined mortality (7.9%, 8/101) from these years was used in escapement calculations. When turbines were operating without spillage, the mortality estimate from the 2012 season (26.7%, 8/30) was used in calculations.

The hydrometric situation at the Cathaleen's Fall HPS was relatively complex during the experimental period in 2013. Initial analysis of discharge patterns at Cathaleen's Fall identified two basic generation protocols during period when telemetry studies were undertaken:

- 1. Two turbines operational with no spillage.
- 2. Two turbines operational with spillage.

The mortality rate at Cathaleen's Fall HPS during generation protocol 1 was calculated to be 27.3% (3/11). During generation protocol 2, the mortality rate was calculated to be 15.4% (22/26). For the remainder of the silver eel season, outside of the experimental period, a third generation protocol was also in operation. This was one turbine plus spillage. During the previous three migration seasons this was the generation protocol in operation. Therefore, the average mortality (7.7%, N=91) from this period (2010 – 2012) was used in the calculation of hydropower passage mortality on dates in which this generation protocol was being implemented.

These estimates of mortality (3 generation protocols) were incorporated into the escapement calculations for the 2013 season (Figure 5-16).

4.3.3 Action 2c: Engineered Solution

No deflection technology experiments were undertaken in the 2013 season on either the River Erne or the River Shannon. However, a new telemetric study of route selection by silver eels approaching Parteen weir was initiated and, in addition to providing a more robust regression model for escapement studies, it is hoped that when completed this will facilitate evaluation of options for management of silver eel movements at Parteen. Likewise, a series of DIDSON surveys were undertaken at Clonlara on the Ardnacrusha headrace canal and the analyses of these results may also provide a better understanding of the responses of silver eels to the regulated discharge in the vicinity of hydropower stations.

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 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 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.)

Mitigation measures at barriers are being taken including the creation of rubble mats (e.g. Feale tributary at Shanowen), removal of sections of weirs (e.g. Mulkear River) along with remedial works to improve existing fish passes (e.g. Galey River). Recently, the River Tolka has had a significant number of manmade weirs modified to open up the river to fish migration. As a result in September 2013 Atlantic salmon have begun to reproduce in the River after beingabsent for at least a century. The work was carried out by Inland Fisheries Ireland, The Office of Public Works and Dublin, Meath and Fingal County Councils. A programme to ease fish passage in the River Dodder is at the planning stage and should be implemented over the coming years in conjunction with Dublin City Councils as part of their flood relief scheme.

Staff in the SouthEastern River Basin District (SERBD) have been assessing barriers in the Suir and Barrow catchments with the Suir Main channel, the Multeen and Duag Rivers assessed. A rock ramp fish pass is being designed to facilitate migration past a number of weirs on the Burrin tributary of the River Barrow. Since 2009 in the SERBD fish passage has been improved at a total of 20 bridges, 10 fish passes have been installed and 4 weirs have been removed. The weirs have been removed from the River Urrin (Figure 4-3), Blackwater and River Drish tributaries of the River Suir and the Glenshalane tributary of the River Blackwater (Figure 4-4).



Figure 4-3: Weir on River Urrin, Slaney catchment, side view of weir (top) and upstream view of removal (bottom)



Figure 4-4: Weir on Glenshalane Trib of River Blackwater

4.4.1.1 Shannon Barriers Project

The Shannon Barriers Project was funded by the Salmon Conservation Fund with the aim to identify potential barriers to fish migration in the Shannon River Basin District (ShIRBD). This project has mapped and assessed potential barriers throughout the RBD over the last 2 years. In total, 218 barriers have been assessed, resulting in a large database of potential barriers to fish migration. This data will inform management approaches to dealing with barriers on the Shannon, including the assessment of impacts on migratory fish, cataloguing the types of barriers throughout the catchment and prioritising the remedial works or removal of barriers. Layered with other GIS information, assessments can be made of real or potential impacts to fish migrations. The layers can be used by flood authorities linking with CFRAMS data.

The project also piloted the new IFI Barriers Field Assessment Form and liaised with the IFI barriers group in developing this form. Some of the assessed barriers will be used for comparisons with Northern Ireland SNIFFER methodology. This will help improve techniques for assessing potential fish barriers and ecological impacts of these barriers.

The Shannon has been extensively surveyed from Leitrim village (including the canal network) to south of Lough Derg. The sub-catchments assessed in 2012 were the River Brosna, Little Brosna, Camcor, Inny, Suck, Camlin, River Shannon (Lough Allen outfall to Mount Talbot), Shannon navigation and the Boyle River. In 2013 all of the Lough Ree and Lough Derg sub-catchments have been completed and the assessments have started in the River Fergus, Maigue, and Mulkear catchments. It is proposed to continue the project in 2014 by completing the Fergus, Mulkear, Maigue and Feale catchments. All sites surveyed have been geo-referenced with photographic links enabling the creation of a map of barriers in GIS for the Shannon River Basin District (Figure 4-5).



Figure 4-5: Locations where barrier assessments were undertaken in the Shannon RBD.

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 will be published shortly.

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 2013. 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.

Surplus recruits were not identified in 2013 to facilitate a stocking programme between catchments.

4.5 Management Action No. 4 Improve water quality

Management Action No. 4: Improve water quality Action 4a: Ensure compliance 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 eel quality monitoring (EUFP7 EELIAD)

4.5.1 Water Quality

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.

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). This has previously been reported in the 2012 SSCE annual update, and there are no new updates to date.

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 RBD's are transboundary, in that there are portions of them in Northern Ireland. Only a very small portion of the Shannon RBD is in Northern Ireland, while the Neagh Bann RBD is not included in the Irish Eel Management reports. Therefore, the implementation of the WFD in the Northern Irish part of the North Western RBD is also of
interest in this report, as it is the major international RBD which is considered in this eel 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). More detail in this area is presented in the SSCE report (2012).

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 assessment of the second cycle of WFD reporting in 2015, summary reports are available (www.wfdfish.ie) (Table 4-3). The most relevant of these summary reports is the report for 2013 (Kelly et al. 2013). 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. Eel are fairly ubiquitous across all sites, and were found in 83.3% of lakes surveyed and 69.8% of rivers.

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. 2013).

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

4.5.3 Fish Kills

There were 52 reported fish kills in 2013 (IFI 2013). This was up from 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

No new data available in 2013. Additional information will be available within the EU EELIAD project.

4.5.5 Prevalence of Anguillicoloides crassus

A comprehensive review on the distribution, prevalence and intensity of *A. crassus* in Ireland has recently been published in the *Journal of Fish Biology (Beccera-Jurado et al. 2014)*. The abstract is included below:

"This study is the first comprehensive documentation of the geographical range of *Anguillicoloides crassus* in its host, the European eel *Anguilla anguilla* in the Republic of Ireland. The prevalence and intensity of infections across 234 sites and 93 river basins in Ireland comprising rivers, lakes and transitional waters (estuaries) were analyzed. While only 32% of the river basins were affected by this nematode, they correspond to 74% of the total wetted area. Significant differences in infection levels among water body types were found with lakes and transitional waters yielding the highest values, which can be attributed to the proportions of juvenile (LT < 300 mm) *A. anguilla* caught. There were no significant differences in infection levels between water body types for adult *A. anguilla* or between sexes for any water body type. Prevalence was significantly lower in juvenile compared to adult *A. anguilla* captured in rivers and a positive correlation between infection levels and host size-classes was found. Future efforts should focus on monitoring the spread of *A. crassus* infections and assessing the swimbladder health of *A. anguilla* in Ireland."

5 Silver Eel Escapement, 2013

(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 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 Erne, Shannon, Burrishoole and Fane catchments (Table 5.1). Problems emerged with the Corrib station in 2010 (see below). 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 2013.

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 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.

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

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



Figure 5-1: Silver eel monitoring 2013.

5.1.1 Shannon

The silver eel populations of the River Shannon are among the better researched in Europe, due to the availability of long-term fishery records and on-going studies (e.g. MacNamara and McCarthy, 2013). In the 2013 season the conservation fishery and the trap & transport programme were monitored by NUIG. This was undertaken in conjunction with studies on silver eel production and escapement.

5.1.1.1 Catch

The 2013 fishing season for eels on the Shannon extended from 1st September to 7th December for the conservation sites in the upper Shannon (Figure 5-2). In the case of the Killaloe eel weir, fishing began on 23rd October. A total of 84 nights were fished and the last fishing took place on 27th February 2013. A total of 22,561 kg was captured, 9,753 kg in the upper catchment sites and a further 12,808 kg at Killaloe. The relative catch contribution from the conservation fishing sites to the ESB silver eel trap and transport programme in 2013 is summarised in Figure 5-3.

The pattern of downstream migration at Killaloe (Figure 5-4) was reflected in the daily catches recorded at the eel fishing weir. These data are graphically presented, in relation to variation in discharge and to the lunar cycle (Figure 5.5). It can be seen from Figure 5-5 that as in previous years, increases in discharge can override the typical lunar periodicity of silver migrations at Killaloe. Between the full moon on 17th December and the new moon on 1st January a total of 7,475 kg was captured, representing 58.4% of the total seasonal catch. The dramatic increase in catches occurred when discharge increased from 157 m³s⁻¹ to >400 m³s⁻¹ over a period of 4 days. By the following full moon on 16th January a further 2,861 kg was captured giving a total of 10,336 kg for the lunar cycle or 80.7% of the total seasonal catch.



Figure 5-2: Map of River Shannon catchment with conservation fishing sites and release point highlighted.



Figure 5-3: Proportions of the River Shannon silver eel trap and transport catch obtained by different fishing crews in 2013/2014.



Figure 5-4: Refurbishment work at Killaloe Bridge.



Figure 5-5: Variation in daily catches at the Killaloe eel weir in relation to lunar cycle and discharge.

5.1.1.2 Escapement

The 2013 season results are presented in Figure 5-6 flow diagram. The protocols used for calculation of silver eel production and escapement, for the River Shannon 2013, in the basic model have been outlined in previous reports. The silver eel production was estimated by NUIG as 79,970 kg, using Killaloe catch data and results of mark-recapture experiments. The capture efficiency at Killaloe eel weir was very variable during the 2013 silver eel season, from the start of fishing (23rd October) until 2nd January 2014 the weir was using the standard number of nets as in previous years. During this period no eels were tagged, therefore the average weir efficiency from the previous three years was used in production calculations (22.47%). After that date a series of technical problem reduced the number of nets fishing. Between the 3rd January and 8th January the manual wattle nets were no longer fishable due to high flow conditions. During this period a total of 300 eels, in two batches, were FLOY tagged giving a capture efficiency of 18% (54/300). From the 8th January until the close of the fishing season a number of the hydraulically operated nets were also unfishable due to a technical fault. A total of 299 eels were tagged and released during this period giving a capture efficiency of 12.4% (37/299). Had the weir been operating at its previous average capture efficiency for the entire silver eel season it is estimated that the total catch at Killaloe would have been 15,780 kg, which would have been 2,970 kg more than what was actually caught. Further refurbishment of the weir at Killaloe due to take place in 2014 may improve efficiency.

Escapement was estimated to be 70,775 kg (86% of production) and mortalities at Ardnacrusha were estimated to be 9,195 kg (11.5% of production). The trap and transport total (22,561 kg) represented 28.2% of silver eel production. The three year rolling average for the 2011 (38.4%), 2012 (35.9%) and 2013 (28.2%) seasons was 33.8%. Therefore the target of 30% over a three year rolling average has been attained in the 2011-'13 period.

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 silver eel season, size frequency data recorded in 2013 is not considered to be fully representative of the seasonal variation. However, the seasonal

variation in sex ratio data described in the 2012 report was up-dated with 2013 data and this allowed for production to be estimated. The analytical protocols are referred to as the New Model (2008 – 2013). The results were similar to those presented above: 79,160 kg production and 70,100 kg escapement. This increases slightly the percentage of production in the T&T programme to 28.5%.



Figure 5-6: A summary of the analysis of silver eel production and escapement in the River Shannon during the 2013 eel migration season.

5.1.1.3 Length

Size frequency distributions for samples examined at the conservation fishing sites in the 2013 season are illustrated in Figure 5-7 size frequencies. Variations in eel size and sex ratios along the river system, in 2013, 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 (Figure 5-7), a trend consistent with previous years.









Figure 5-7: Length frequencies of eels captured at River Shannon conservation fishing sites.

5.1.2 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.

5.1.2.1 Catch

Silver eel trapping was continued in 2013. The main run (68%) occurred in October (Table 5.2). Figure 5.9 shows the daily counts of silver eels.

The total run amounted to 3633 eels. As in other years, the highest proportion of the total catch (74.7%) was made in the Salmon Leap trap.

	Salmon Leap	Mill Race	Total	%
June	1	1	2	0.1
July	18	7	25	0.7
August	119	61	180	5.0
September	219	99	318	8.8
October	1771	681	2452	67.5
November	308	35	343	9.4
December	218	29	247	6.8
Jan. 2013	47	6	53	1.5
February	5	0	5	0.1
March	2	0	2	0.1
April	1	0	1	0.0
May	4	1	5	0.1
Total	2713	920	3633	

 Table 5-2: Timing and numbers of the 2013 silver eel run in the Burrishoole.



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

5.1.2.2 Length, weight & sex

Sampling of individual eels (n = 1332) gave an average length of 42.7cm (range: 26.8 - 99.4cm) and an average weight of 157.3g. The length frequency distribution is presented in Figure 5-10 along with those for 2011 and 2012 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 (Figure 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 (Figure 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%.



Figure 5-10: Length frequency of sub-samples of Burrishoole silver eels trapped in the downstream traps, 2011 (n = 1835), 2012 (n=3317) and 2013 (n=1329). Note change of y-axis scale in 2012.



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

5.1.3 Erne Transboundary

In 2009, the analysis of downstream migrating silver eel population dynamics was complicated by: Lack of reliable historical fishery data for the River Erne system; delayed fishery closure in the Northern Ireland part of the system; difficulties in establishing an effective monitoring site in the lower part of the system and development of research protocols. Following establishment in 2010 of an experimental fishing weir, which was scientifically monitored by NUIG, at Roscor Bridge significant progress became possible. Initial estimates of both silver eel production and escapement rates was possible in the 2010, 2011 and 2012 seasons and these have been reported previously (SSCE 2013).

In the 2013 season the River Erne conservation fishery and the trap & transport programme were monitored by NUIG. This was undertaken in conjunction with studies on silver eel production and escapement. The scientific protocols used in the 2013 season were those described in previous reports and publications (e.g. McCarthy et al 2014).

5.1.3.1 Catch

The fishing activities (Figure 5-12) of contract crews (N=7) at the authorized River Erne conservation fishing sites (Figure 5-13) were all monitored by NUIG in 2013, though additional scientific studies were undertaken at Urney and Roscor Bridge. The fishing season on the Erne started on 1st September and finished on 7th December 2014 (with the exceptions of Roscor Bridge and Urney). The percentage contributions to the trap and transport programme in 2013 from each of the fishing sites are indicated in Figure 5-14. Four sites (Urney, Portora, Ferny Gap, Roscor Bridge) cumulatively contributed almost 72% of the total catches for 2013. The variation in Roscor Bridge experimental fishing weir daily catches is illustrated (Figure 5-15) in relation to lunar cycles and variation in discharge. The fishing season at Roscor Bridge extended from 1st October 2013 to 7th March 2014 and a total of 142 nights were fished at that location. Fishing at the other sites ended at the beginning of December, with the exception of Urney where scientific monitoring was continued till mid February 2014.



Figure 5-12: (A) ESB silver eel collection at Urney site; (B) ESB silver eel collection at Roscor Bridge; (C) ESB release at Ballyshannon harbour; (D) ESB release point at Ballyshannon tailrace.



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 2013 season.



Figure 5-15: Variation in daily catches at the Roscor Bridge eel weir in relation to lunar cycle and discharge during the 2013 season. (The threshold discharge of 130 m3•s-1 delineating between use of high flow/low flow models used in population analyses is indicated by a red line).

5.1.3.2 Escapement

The 2013 season River Erne silver eel population study results are summarized in Figure 5-16 flow diagram. The silver eel production was estimated by NUIG as 73,330 kg and escapement was estimated to be 64,285 kg (87.67% of production). The trap and transport total (39,319 kg) represented 53.62% of silver eel production and exceeded the target (50%) by 2,654 kg. The 2013 calculations were based on estimations of production at Roscor Bridge and the threshold discharge of 130 m³•s⁻¹, described in the 2012 report, was used in the analyses. A series of 7 mark-recapture experiments (batches of 100 PIT-tagged eels) were undertaken at Roscor Bridge. Using protocols adopted in previous years, only PIT tags were used and batches (N=100) of marked fish were released at dusk at the established release point upstream. Five batches were released in high flow (>130 m³•s⁻¹) and two in low flow (<130 m³•s⁻¹). The efficiency of the Roscor Bridge index nets was estimated to have been 8% in low flow conditions and 16.6% in high flow conditions during this season. The results were used, together with index net catch and hydrometric data, to calculate the biomass of eels approaching Roscor Bridge. Using catch data for this site and for upstream sites, the silver eel production for the River Erne was calculated (Figure 5-16). In this season the production was estimate to have been 73,330 kg.

5.1.3.3 Length and weight

Information compiled in the 2013 season on size frequency distributions of catches at River Erne conservation fishing sites is summarized in Figure 5-17. A relatively high proportion of male silver eels also noted in 2011-2013, in upper catchment sites as well as at Roscor Bridge was observed in 2013.



Figure 5-16: A summary of the analysis of silver eel production and escapement in the River Erne during the 2013 eel migration season.







Figure 5-17: Length frequencies of eels captured at River Erne conservation fishing sites in the 2013 eel migration season.







Figure 5-18cont.: Length frequencies of eels captured at River Erne conservation fishing sites in the 2013 eel migration season.



Figure 5-19cont.: Length frequencies of eels captured at River Erne conservation fishing sites in the 2013 eel migration season.

5.1.4 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, 2012 and 2013 (Figure 5-18 and 5-19). The site was the location of a commercial fishery until 2008. Due to very low water levels in August and September the silver eel fishery did not commence until October for the 2013 season.

5.1.4.1 Silver Eel Catch

The Fane silver eel fishery is dependent on water levels in the River in order for the nets to be set. As the fishing site is located downstream of Lough Muckno and a water abstraction site there is a delay due to the lake absorbing rainfall before a rise in river water levels is observed in the Clarebane River. Low water levels in August and September prevented the site from fishing (Figure 5-20). Three nights were fished in October with a catch of 28kgs following a rise in the water levels (Table 5-3). A flood event occurred before the November new moon phase so the nets were set and continued to fish through the flood and into the November dark. A catch of 1,123kgs was caught over 16 nights. The nets were not set in December as the River water levels dropped to below that required to float the nets. The water levels for the Clarebane River were very variable for the silver eel season (Figure 5-20). The increase in silver eels caught in 2013 was almost 2 and half times that caught in 2012 season.



Figure 5-20: Location of Silver eel fishery on the Clarebane River.



Figure 5-21: 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
	October	9	253
2012	November	4	44
	December	1	7
	Total	22	448
	October	3	28
2013	November	16	1123
	Total	19	1151

Table 5-3: Fane Silver eel fishery catch data 2011 - 2013



Figure 5-22: Water level and moon phase for the 2013 silver eel season

5.1.4.2 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 not caught at the fishing site.

In 2013 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, approx. 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 a net to the gap. This measure was taken as a result of the low mark recapture rate for 2012 season (8%) and the potential of eels to bypass the nets by using the free gap/ Queens pass.

For the 2013 season it was decided to concentrate efforts on 1 release location. Two mark recapture sessions were undertaken in the November dark. A total of 302 eels were tagged and released with 60 eels recaptured giving a 20% efficiency rate for the fishery for 2013 (Table 5-4). This study will be repeated in 2014.

A preliminary escapement of 5,755kg can be calculated from the 20% recapture rate.

Session	Nos Tagged	Nos Recaptured	%
1	139	29	21
2	163	31	19
Total	302	60	20

Table 5-4: Mark Recapture Data 2013

5.1.4.3 Eel Biology

Morphometric measurements were taken on 1,165 eels. The average length was 49.2 cm (range 30.8 – 96.6 cm), the average weight was 0.289 kg (range from 0.03kg to 1.952 kg; Table 5-5)). The population structure for 2013 is in line with what was caught in 2012 and 2013 (Figure 5-21).

A total of 152 eels were retained for further analysis in the laboratory. Sixty eight percent of the eels retained were male, with 32% female (Table 5-6). In 2012 the sex ratio was 56% female. A parasite prevalence rate of 53% with a mean intensity of 3.94 was recorded for 2013. The parasite prevalence has increased for 2013 from 28% in 2012 to 53% for 2013.

Year	No. eels	Av Length (cm)	Min Length (cm)	Max Length (cm)	Av weight (kgs)	Min Weight (kgs)	Max Weight (kgs)
2013	1165	49.2	30.8	96.6	0.289	0.03	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

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

Year	Total eels	No. females	No. males	% female	% male	% prevalence <i>A. crassus</i>	Mean Intensity A. <i>crassus</i>	Count A. crassus
2013	152	48	104	32	68	53	3.94	319
9019	919	110	0.4	50	4.4	27	3.66	271
2012	212	118	94	20	44	(n=273)	(n=273)	(n=273)
2011	158	47	110	30	70	28	3.7	167



Figure 5-23: Length Frequency of silver eels for 3 years in the Fane catchment

5.1.4.4 Fane Summary

For the last three years the silver eel fishery on the Clarebane River is dominated by a peak migration in the October/November period depending on the environmental conditions. A total catch of 1,151kgs was caught in 2013. The efficiency rate of 20% recorded for the 2013 season tallies with the rate calculated for the 2011 season of 23%. The 2012 rate of 8% is affected by a number of environmental conditions such as the location might have been too near the fishing site and the eels were not well mixed in the water column.

Due to the large number of eels delaying migration after being moved into the lake and into River above the lake it was decided to concentrate on one release site for 2013 into the Clarebane River. A result of 20% for the first year of this release site is promising and this study will be repeated 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 2013

In 2013 intensive sampling of yellow eels took place at five lake locations (Lough Derg (Meelick Bay), Burrishoole (3 lakes), Lough Key, Lough Muckno and Upper Lough Erne, along with several site locations on the River Barrow (Figure 6-1).

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 INDICANG style 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.

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	8	2012	2013	2014
Meelick Bay, L. Derg	Lake	Yellow	*	*	*		*	*	*	*	EMP	EMP	
Erne	Lake & River	Yellow	*	*	*	*	*	*	*	*	EMP	AFBI	AFBI
Barrow R.	River	Yellow	*	*	*	*	*	*	*	*	EMP	EMP	EMP
Blackwater	River	Yellow	*		*		*	*		*			
Nore R.	River	Yellow	*		*		*	*		*			
L. Ramor	Lake	Yellow	*		*			*		*			EMP
L. Ree	Lake	Yellow	*	*	*	*	*	*		*		WFD	
L. Feeagh	Lake	Yellow	*	*			*	*		*	MI	MI	MI
Bunaveela L.	Lake	Yellow	*	*			*	*		*	MI	MI	MI
L. Gill	Lake	Yellow	*		*	*	*	*		*			WFD
L. Inchiquin	Lake	Yellow	*				*	*		*			
L. Key	Lake	Yellow	*	*	*		*	*		*		EMP	
Dromore L. (Fergus)	Lake	Yellow	*		*	*	*	*		*			
L. Bunny	Lake	Yellow	*		*	*	*	*		*	WFD		
L. Arrow	Lake	Yellow	*		*	*	*	*		*	WFD		
South Sloblands	Lagoon	Yellow	*		*		*	*		*			EMP
Lady's Island	Lagoon	Yellow	*		*		*	*		*	х	X	Х
Lough Furnace	Lagoon	Yellow	*	*			*	*		*	MI	MI	MI
Blackwater Estuary	T. water	Yellow	*				*	*		*			
Fane	River & Lake	Yellow	*	*	*			*	*	*	EMP	EMP	EMP

Table 6-1: Monitoring Programme 2012-2014.



Figure 6-1: Locations of yellow eel survey work 2013.

6.1.1 Meelick Bay, Lough Derg

Meelick Bay, on Lough Derg, is located in the Shannon catchment near Mountshannon in Co. Clare. The lake has a surface area of 11,857.37ha and a maximum depth of 36m. Meelick Bay was sampled for 6 nights during the summer of 2013 (Figure 6-2). The survey was repeated from earlier sampling in 2011 and 2012 which attempted to replicate, compare and contrast previous eel population studies in this bay (Moriarty, 1983 & 1996). To this end, fyke nets were laid in chains of ten to replicate the previous work. In total, 409 eels were caught with a catch per unit effort (CPUE) of 13.63 (Appendix 5 Table 0-1). The eels ranged in length from 25.3cm to 63.8cm and in weight from 0.024kgs to 0.497kgs, with a total weight of 55.4kgs caught over the 6 nights (Appendix 5 Table 0-1 and Figure 6-3). No sacrificed eels were retained for this survey.

6.1.1.1 Mark Recapture Study

From 2011 to 2013 a mark recapture study was carried out in Meelick Bay. The aim of the study was to tag eels for the maturation study in the Shannon catchment, where tagged yellow eels are detected as silver eels migrating downstream. The second aim of the study was to carry out a comparision with the historical data available from the Fisheries Research Centre. A total of 8,093 eels were collected in fyke net survey of Meelick bay from 1981 to 1994.

Over the three years of sampling a total of 1,934 eels were tagged with passive integrated transponders (PIT). To date 36 yellow eels were recaptured resulting in a recovery rate of 1.85% (Table 6-2). Moriarty (1986) reported on the eels of Meelick Bay from 1981 – 1984. A Mark Recapture study was undertaken using floy tags. A total of 3,602 eels were tagged over the four seasons and 44 were recaptured giving a recovery rate of 1.2%. Twenty eels were recaptured within 14 days of being tagged. Twenty four eels were recaptured at a greater time interval ranging from 14 days to 1,074 days. The low recapture rate from the FRC and EMP data is mirrored in other IFI Mark Recapture studies in the Waterford Transitional waters and Lough Feeagh. Moriarty (1986) reported that the population of Meelick Bay was not resident and that the population underwent changes throughout the warmer months of the year.

	2011	2012	2013	Total	FRC
No. Eels Tagged	842	722	382	1,946	3,602
Total Recapture	16	19	1	36	44
Years	3	2	1	3	4
% Recapture				1.85%	1.22%
Recaptured 2011	8				
Recaptured 2012	4	15			
Recaptured 2013	4	4	1		
Silver 2011	6				
Silver 2012	2	1			
Silver 2013	5	1	5		

Table 6-2: Summary data from Mark Recapture Study in Meelick Bay 2011 – 2013 and the Fisheries Research Centre (FRC) data from 1981 – 1984.



Figure 6-2: Locations of fyke nets sampled on Meelick Bay, L. Derg, 2013.



Figure 6-3: Length frequency of yellow eels captured at Meelick Bay, L. Derg, 2013.

6.1.2 Lough Key

Lough Key is situated in the upper Shannon catchment near Boyle and Carrick-on-Shannon. The lake has a surface area of 890ha, a maximum depth of approximately 22 metres and has several small islands over its surface. Lough Key was sampled over 6 night during the summer of 2013 (Figure 6-4). In total, 375 eels were caught with a catch per unit effort (CPUE) of 10.71 (Appendix 5 Table 0-1). The eels ranged in length from 36.9cm to 80.2cm and in weight from 0.071kgs to 0.907kgs, with a total weight of 108kgs caught over the 6 nights (Appendix 5 Table 0-1 and Figure 6-5). A total of 102 eels were sacrificed during the summer surveys on Lough Key. All of the dissected individuals were female (Figure 6-6). The most common food type noted during stomach content examinations was *Asellus* sp. The swimbladder parasite *Anguillicola crassus* was present in Lough Key with a prevalence of 55% across the sacrificed eels and a mean intensity of infection of 2.64. A total of 102 individual parasites were noted across the dissected eels (Appendix 5 Table 0-2 and Figure 6-7).



Figure 6-4: Locations of fyke nets sampled on Lough Key, 2013


Figure 6-5: Length frequency of yellow eels captured at L. Key, 2013.



Figure 6-6: Sex distribution of sacrificed yellow eels in L. Key, 2013.



Figure 6-7: *Anguillicoloides crassus* infection intensity for sacrificed yellow eels collected from L. Key, 2013.

6.1.3 Lough Muckno

Lough Muckno was sampled for the first time by the National Eel Monitoring Programme during the summer of 2012. The lake is located approximately 25 kms upstream within the Fane catchment. It has a surface area of 325ha and depths up to 20 metres.

Lough Muckno was sampled for 6 nights during the summer of 2013 (Figure 6-8). Fyke nets were set in chains of five. A total catch of 1007 eels were caught with a CPUE of 28.77. Due to the high catches recorded, the full suite of measurements was taken on a proportion of the catch (Appendix 5 Table 0-1). The remaining eels caught during this survey were counted and batch weighed. The measured eels ranged in length from 26.7cm to 82.8cm and in weight from 0.042 to 1.133kgs (Appendix 5 Table 0-1 and Figure 6-9). Of the total, 100 eels were sacrificed for further analysis from Lough Muckno. From these eels, 94% were female (Appendix 5 Table 0-1 and Figure 6-10). There was a 56% prevalence rate for *A. crassus* and a mean infection intensity of 3.41 parasites per eel. In total, 100 individual parasites were noted among the dissected eels. (Appendix 5 Table 0-2 and Figure 6-11).



Figure 6-8: Locations of fyke nets sampled on Lough Muckno, 2013



Figure 6-9: Length frequency of yellow eels captured at L. Muckno, 2013.



Figure 6-10: Sex distribution of sacrificed yellow eels in L. Muckno, 2013.



Figure 6-11: *Anguillicoloides crassus* infection intensity for sacrificed yellow eels collected from L. Muckno, 2013.

6.1.4 Burrishoole

Bunaveela Lough 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 2013 (4 July 2013), with chains of 10 nets fished at three sites (A, B, C). In total 15 eels were caught with a catch per unit of effort of 0.5. The eels average length was 45.8cm and ranged in length from 37.8cm to 57.5cm (Appendix 5 Table 0-1). All eels were PIT tagged.

Lough Feeagh has a surface area of 395ha and an average depth of 14.5m (with several areas >35m in depth). L. Feeagh was fished in the traditional style (sets of 10 nets perpendicular to the shore) in 2013 (10-11 July 2013), with chains of 10 nets fished at six sites (A, C, D, E, F, J) for one night each. In total, 96 eels were caught with a catch per unit effort (CPUE) of 1.6 (Appendix 5 Table 0-1). The eels average length was 40.3cm and ranged in length from 31.3cm to 93.2cm, with a total weight of 13.64kgs caught in the two nights (Appendix 5 Table 0-1). Most of the catch was PIT tagged and two previous recaptures were taken.

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 ('Back of the House'). 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 2013 (17-18 July 2013), with chains of 10 nets fished at six sites (A, B, C, D, E, F) in one night each and one night (25 July 2013) 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 Lough Furnace (tidal), 145 eels were caught with a catch per unit effort (CPUE) of 2.4 (Appendix 5 Table 0-1). The eels average length was 43.1cm and ranged in length from 29.1cm to 73.0cm, with a total weight of 21.82kgs caught for the 2 nights (Appendix 5 Table 0-1).

In the Back of the House, 54 eels were caught with a catch per unit effort (CPUE) of 2.7 (Appendix 5 Table 0-1). The eels average length was 45.3cm and ranged in length from 29.8cm to 77.8cm, with a total weight of 10.46kgs caught.

Figure 6.12 shows the average annual CPUE (numbers) for the four lakes surveyed in Burrishoole. CPUE in Feeagh has not changed but the CPUE has dropped in Bunaveela since 2005 and in Furnace and Furnace Lower (Back of the House) since 2001. Different factors may have contributed to this including falling recruitment and the presence of toxic algal blooms in tidal waters in 2005. In both Furnace and Back of the House, the fall in CPUE has also been accompanied by a drop in mean length and the loss of large eels.



Figure 6-12: Annual mean CPUE (number of eels per net (pair of traps) per night) in the four lakes surveyed in Burrishoole.

6.1.5 Barrow Transitional Waters

This is the second year of sampling at the Saint Mullins stretch of the lower river Barrow, which is a tidal habitat. The catchment area is approximately 14,103ha and is a recognized Special Area of Conservation (SAC) in Ireland.

The river was sampled over 3 nights (Figure 6-13) with fyke nets being set in chains of five. The first session saw sampling carried out at 11 sites (2 nights) just below the high water mark at St. Mullins, with a total of just 17 eels captured. It was concluded that the reduced catches were due to the unusual low temperatures at the time of sampling in May. The second trip to Saint Mullins resulted in a catch of 118 eels in 1 night, with 6 out of the 11 sites re-sampled. Across the two trips, a total of 137 eels were caught, with a CPUE of 4.11 (Appendix 5 Table 0-1). The eels ranged in length from 21.1cm to 67.0cm and in weight from 0.015 to 0.620kgs (Appendix 5 Table 0-1 and Figure 6-14). No eels were sacrificed during the 2013 sampling survey.



Figure 6-13: Locations of fyke nets sampled on R. Barrow, 2013.



Figure 6-14: Length frequency of yellow eels captured on R. Barrow, 2013.

6.2 Transboundary Yellow Eel

The Upper Erne Survey was carried out in October 2013. A total weight of 3kgs and 8 eels were caught in a 9 fyke nets. The WFD in cooperation with AFBI surveyed Upper and Lower MacNean in 2013. This data will be reported in the 2015 report.

6.3 Water Framework Directive

6.3.1 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.

6.3.2 WFD Sampling Programme 2012

6.3.2.1 Methods

<u>Lakes</u>

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 (62.5mm 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 6pm, fished overnight and lifted between 10.00am and 12.00 midday in order to ensure that the activity peaks of each fish species were included.

<u>Rivers</u>

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 normally carried out in a contained area. In small shallow channels (<0.5-0.7m 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 (<0.5-1.5m), 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 wadable and deeper sections, were sampled (i.e. riffle, glide, pool).

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 - 200m) in open water areas adjacent to beach seining locations. Fyke nets were set overnight in selected areas adjacent to beach seining locations.

6.3.3 Results

Locations for WFD sampling sites are shown for lakes, rivers and transitional waters for the 2012 sampling period (Figure 6-15). Summary tables detailing the surveys carried out by the WFD team are provided in Appendix 6 Tables 3-6. A total of 23 lake, 58 river and three transitional water sites were sampled by the WFD team. Eels were present in 22 lakes and 2 transitional waters sampled in 2012 (Appendix 5 Tables 3-5). No eels were recorded in the Erne estuary. Eels were present at 71% of all river sites.

A mean Catch Per Unit Effort value of 1.118 was found across all lake sites. While the highest values were found in Lough Cullin (CPUE=3.722), Lough Anure (CPUE=2.556) and Lough Derg (CPUE=2.083), the lowest values were found in Lough Muckanagh (CPUE=0.111), Lough Carra (CPUE=0.111) and Lough Alewnaghta (CPUE=0.444). The CPUE for the transitional sites were 1.185 and 0.567 in the Boyne and Gweebarra estuaries, respectively.

Length frequency for the lake and river sites from 2012 sampling is shown in Figure 6-16 and Figure 6-17. A peak in the lake length frequency was found for eels $L_T = 40-46$ cm. The WFD river surveys have supplied vital information on the smaller eels (<30cm) rarely encountered by the fyke net surveys. Length frequency across all river sites revealed three distinctive

peaks of differing frequency values. The first peak was found for eels $L_T = 6-10$ cm. A second peak was found for eels $L_T = 15-20$ cm, followed by a smaller third peak for eels $L_T = 29-33$ cm.



Figure 6-15: Locations of WFD survey sites, 2012



Figure 6-16: Length frequency for WFD lake sites, 2012.



Figure 6-17: Length frequency for WFD river sites, 2012.

6.4 Otolith Ageing and Growth: Preliminary analysis

6.4.1 Introduction

The growth rate of eels is influenced by environmental factors such as population density; water temperature; amount of food that is available per unit surface area (Tesch 2003). The available food is influenced by the age structure of the population; the sex ratio and the different diet of different sized eels (Tesch 2003). Within the eel population there is a different growth strategy for male and female eels. Female eels try to maximise their growth whereas male eels undertake a risk averse strategy (migrating at the minimum growth required to undertake a successful migration; Oliveria & McCleave 2002). Moriarty 2003 reported an average growth rate of 2-3 cm per year for eels in Ireland; however this can be as low as 1.38 cm per year for silver males in the Burrishoole system (Poole & Reynolds 1996).

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.

6.4.2 Methodology

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 in early 2010. The QC methodology developed at the workshop was applied to all specimens. This comprises over 80% of the otoliths extracted during dissections by the EMP from 2009 to 2013.

The three years of otolith work have led to 1,874 successfully aged eels. This includes 1,042 yellow eels from lake, canal and transitional water sites and 832 silver eels representing up to eight sites in five catchments.

6.4.2.1 Extraction

Otoliths are extracted from eels during dissection by opening the skull with a scalpel and removing otoliths with a forceps from both sides of the exposed brain cavity (Figure 6-18). 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 6-18: Opening the brain case and b) extracting otoliths from the brain cavities.

6.4.2.2 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 6-19a.). 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 6-19b.). 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 placement of the otolith for ageing purposes (Figure 6-19c.). When each slide of otoliths is completed, the specimens are sealed by a final layer of clear resin.



Figure 6-19: Cutting an otolith, b) burning over the Bunsen flame and c) mounting a burned half of an otolith in resin.

6.4.3 Ageing and Growth Analysis

The otoliths are aged using the ImagePro[™] 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 1st to September 30th do not have the edge of the otolith included in growth and the age is denoted with a + mark. Eels caught between October 1st and December 31st 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 1st that year, would be a 13 year old eel; Figure 6-20 and Figure 6-21).



Figure 6-20: Ageing otoliths in ImagePro[™] Plus. An 11+ yr. old yellow eel (UPERNE/YE/038), from Upper Lough Erne, sampled during summer 2010.



Figure 6-21: Ageing otoliths in ImagePro[™] Plus. An 18 yr. old silver eel (SIL/CORR/114), from the Corrib catchment, sampled at Moycullen (Lower Lough Corrib) during autumn 2010.

6.5 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 6-3). On average, the eels aged from 2009-2011 present a growth rate of 2.29 cm/year. Yellow eels average at 2.42 cm/year, while silvers demonstrated lower growth in later years which led to an average growth rate of 2.09 cm/year. The yellow eels analysed have an average age of 15 years with a minimum of 9 and maximum of 21 years. The silver eels analysed have an average age of 19 years old with a minimum of 15 and a maximum of 30 years old. The growth rates and descriptive statistics for growth for all eels currently aged are presented in Table 6-3.

When considering yellow eels, the average growth rate was 2.42 cm/year (n=1,042). The fastest growth rate recorded was for the eels captured from the Waterford Barrow Estuary (3.78 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 (1.44 cm/year, n=81), where the highest mean age for yellow eels to date was also recorded (mean 21+ years). This site also presented some of the oldest yellow eels so far (45+ years) (Figure 6-22 and Table 6-3).

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 2.09 cm/year (n=832). The highest growth rates were recorded for eels captured at sites on the Erne catchment (Lower Lough Erne (Portora): 3.23 cm/year, n=20; Oughter: 2.90 cm/year, n=21 and Ballyshannon/Ferny Gap: 1.97 cm/year, n=140 eels). The lowest mean age was also found among Erne silver eels (Oughter: 15 years, ± 3 years). The lowest growth rate was recorded among the Fane (Muckno) silvers sampled in the autumn of 2011, which presented an average growth rate of 1.48 cm/year (n=140). The highest mean age for silvers of 30 years (± 5 years) was noted at Lough Mask (Cong), (Figure 6-23 and Table 6-3).

Location	Year	Lifestage	No. Of Eels	Growth Rate (cm/yr)	Mean Age (Years)	Standard Deviation
Waterford Estuary	2009	Yellow	65	3.78	8.74	2.15
Lough Cullen	2009	Yellow	81	3.11	11.26	2.61
Lough Conn	2009	Yellow	95	2.50	13.54	4.19
Lough Corrib Lower	2009	Yellow	1	3.06	13.00	-
Lough Corrib Upper	2010	Yellow	83	2.07	17.33	5.49
Lough Ree *	2010	Yellow	82	2.28	12.62	3.02
Lough Erne Upper	2010	Yellow	76	2.76	13.27	2.83
Lough Derg $^\circ$	2009 & 2010	Yellow	139	1.90	16.16	4.61
Barrow Canal	2010	Yellow	39	1.70	15.95	4.58
Grand Canal	2011	Yellow	32	1.97	16.03	5.65
Lough Inchiquin	2011	Yellow	89	2.11	17.73	5.93
Lough Ramor	2011	Yellow	80	2.25	14.94	3.93
Lough Ballynahinch	2011	Yellow	81	1.44	21.04	6.28
Lough Oughter	2011	Yellow	99	2.98	12.37	3.79
Corrib (Galway Weir)	2009	Silver	91	1.90	16.48	6.19

Table 6-3: Growth rates for sacrificed eels, 2009-2011 (n = 1,874 eels).

Corrib (Moycullen) 8	2010 & 2011	Silver	127	1.87	18.67	5.70
Mask (Cong)	2010	Silver	92	1.79	30.60	5.33
Killaloe •	2009 & 2010	Silver	114	1.89	17.87	5.52
Athlone	2010	Silver	87	1.79	24.12	7.52
Erne (Ballyshannon/Ferny Gap)≭	2009 & 2010	Silver	140	1.97	17.59	5.68
Erne LLE (Portora)	2010	Silver	20	3.23	15.70	2.90
Erne (Oughter Seized Eels)	2010	Silver	21	2.90	14.62	3.11
Fane (Muckno)	2011	Silver	140	1.48	18.29	4.42

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

 $^{\circ}$ Lower and Upper Lough Derg were surveyed in summers of 2009 and 2010 respectively, and are pooled above.

8 Corrib silvers sampled at Moycullen (Lower Lough Corrib) using fyke nets in the autumn of 2010 and 2011 are pooled above.

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

★ Erne silver eels sampled at Ballyshannon (Ferny Gap) in autumn 2009 and 2010 are pooled above.



Figure 6-22: Observed growth rates (length at age) for yellow eels surveyed from 2009-2011.



Figure 6-23: Observed growth rates (length at age) for silver eels surveyed from 2009-2011.

6.6 Progress

Currently, all otoliths from 2009 to 2011 surveys have been prepared, aged and subjected to quality control checks in-house (n=1,874). This comprises over 80% of the otoliths extracted during dissections by the EMP from 2009 to 2013.

Work has begun on the cutting and burning of otoliths from the 2012 surveys. Table 6-4 shows the progress to date in terms of completed work and the sites still to be processed for ageing.

Year	Location	Lifestage	Completed (√/×)
2009	Lough Conn	Yellow	\checkmark
2009	Lough Cullin	Yellow	\checkmark
2009	Waterford Estuary	Yellow	\checkmark
2009	Lough Corrib Lower	Yellow	\checkmark
2009	Lough Derg Lower	Yellow	\checkmark
2009	Erne (Ballyshannon)	Silver	\checkmark
2009	Corrib (Galway Weir)	Silver	\checkmark
2009	Killaloe	Silver	\checkmark
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	\checkmark
2010	Erne (L. Oughter)	Silver	\checkmark
2010	Lough Mask	Silver	\checkmark
2010	Corrib (Moycullen)	Silver	\checkmark
2010	Killaloe	Silver	\checkmark
2010	Athlone	Silver	\checkmark
2011	Lough Inchiquin	Yellow	\checkmark
2011	Lough Ramor	Yellow	\checkmark
2011	Lough Ballynahinch	Yellow	\checkmark
2011	Lough Oughter	Yellow	\checkmark
2011	Grand Canal	Yellow	\checkmark
2011	Fane (Muckno)	Silver	\checkmark
2011	Corrib (Moycullen)	Silver	\checkmark
2012	Lough Muckno	Yellow	×
2012	Fane (Muckno)	Silver	×
2013	Lough Key	Yellow	×
2013	Lough Muckno	Yellow	×
2013	Fane (Muckno)	Silver	×

Table 6-4: 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 WGEEL for stock assessment. This information is also required to project 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.

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 2 studies by Trinity College Dublin and National University of Ireland Galway (Reynolds *et al* 1994 and O'Connor 2003). Subsequently the traps have been maintained by the Shannon Regional Fishery Boards and now by Inland Fisheries Ireland 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

Previously 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 for juvenile eel is also covered under the current conservation bye-laws.

7.2.2 0+ Recruitment

Monitoring of elver migrating at Ardnacrusha (Shannon) and Cathaleen's Fall (Erne) is undertaken by the ESB (Figure 7-2). Indications are that recruitment remains low. Catches in 2004 for both Erne and Shannon were the second lowest recorded. Numbers in 2005 were more unpredictable, with good catches of elvers recorded in the Erne (45% of the 1979-84 mean) and a poor catch in Ardnacrusha (1.4% of the 1979-'84 mean). Recruitment remained low in 2010.

Monitoring of elver migrating takes place at Ardnacrusha (Shannon), Cathaleen's Fall (Erne), the Feale, Inagh and Maigue Rivers and fishing is also undertaken by IFI in the Shannon Estuary for glass eels (Tables 7.1-7.3). Catches in 2004 for both Erne and Shannon were the second lowest recorded and while there is no effort data available, the total catch for all stations in 2004 was the lowest yet recorded. Elver catches in 2005 were much more unpredictable, with good catches of elvers recorded in the Erne (45% of the 1979-84 mean) and a poor catch in Ardnacrusha (1.4% of the 1979-'84 mean). Elver numbers reported for 2008 to 2010 were poor and there was little or no improvement in 2011.

There was an increase in elver catch in both the Erne and the Shannon in 2012 and 2013.

All catches reported in Tables 7.1-7.3 were transported upstream within the catchment and restocked.



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.

Veen	Erne	Shannon	Voor	Erne	Shannon
Iear	(kg)	(kg)	Tear	(kg)	(kg)
1952			1983	728	600
1953			1984	1121	500
1954			1985	463	1093
1955			1986	898	948
1956			1987	2367	1610
1957			1988	3033	145
1958			1989	1781	27
1959	244		1990	2409	467
1960	1229		1991	546	90
1961	625		1992	1371	32
1962	2469		1993	1785	24
1963	426		1994	4463	287
1964	208		1995	2400	398
1965	932		1996	1000	332
1966	1394		1997	1065	2120
1967	345		1998	782	275
1968	1512		1999	1500	18
1969	600		2000	1100	39
1970	60		2001	699	27
1971	540		2002	113	178
1972			2003	576	378
1973			2004	269	58.1
1974	794		2005	838	41.36
1975	392		2006	118	42
1976	394		2007	189	45
1977	138	1000	2008	38.7	7
1978	320	1300	2009	88.3	7.75
1979	488	6700	2010	96.6	49.73
1980	1434	4500	2011	74.34	7.239
1981	2892	2100	2012	145.71	22.53
1982	4550	3100	2013	219.7	45.99

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

The pipe traps have been used in the Corrib catchment since 2010 in order to investigate the behaviour of elvers at the Galway weir. In 2013 a fixed ramp trap was installed into the elver pass and was used in conjunction with the pipe traps for the season. A total of 24 kg of elvers and 12kgs of yellow eels were trapped from 31st May to the 14th August (Table 7.3).

In Ballysadare a total of 924g of elvers and 4.6kgs of young yellow eels were trapped from 29th April to the 7th July. Due to the low water levels in the Ballysadare River the fish pass ladder was closed on the 7th July. During some years it is possible to see the elvers in the ladder as they congregate below the closed sluice gate however this was not visible for the 2013 season indicating the run was potentially over by this time. One of the questions outstanding for this site is the influence of the fish pass water levels on the migration of elvers later in the season. The Ballysadare River has a natural falls acting as a potential impediment to elver migration with elvers utilising the fish pass to ascend upstream, it is not known what proportion ascend the falls directly.

The Islandbrige site on the River Liffey saw a marked increase in catches for the 2013 season up from 213g to 2.7kgs for the IFI trap and an increase from 454g to 1.1kgs for the Marine Institute trap. The IFI trap was operated from 6th May to the 29th July and the Marine Institute trap was operated from the 16th April to the 20th August.

The Maigue River has 2 traps at Adare Manor one on each river bank. The traps were operating from 5th May until the 8th July. The total catch for the Maigue River was 14kgs with only 3 yellow eels recorded. This was a large increase from the 2011 catch of 5kgs; however the traps did not operate in the 2012 season due to flood water levels in the river for a large part of the season.

The elver site located at Listowel on the River Feale was operated from 1st May until the 16th July. A total catch of 44kgs of elvers and 23kgs of yellow eels were recorded. This was an increase from 35kgs in 2012.

The Inagh River trap was operational from the 6th May until the 30th July. A total catch of 31kgs of elvers and 12.5kgs of yellow eels were recorded.

						Sh.	R.	R.
	Erne	Moy	R	R	Inagh	Estuary	Liffey	Liffey
Year	Estuary	Estuary	Feale	Maigue	R	Glass Eel	MI	IFI
1985			503					
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

Table 7-2: Recruitment catches (kg), 1985 to 2013 (blanks = not fished). These are often of mixed glass eel and young yellow eel.

Location	Year	Total Wt. Elvers (g)	Est. No. Elvers	Av Wt. Elver (g)	Total Wt. Yellow Eels (g)	Est. Nos Yellow Eels	Av. Wt. Yellow Eel (g)
Ballysadar e	2013	924	2,640	0.35	4,612	1,005	4.59
	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
trap	2012	2,383	5,168	0.34	7,487	1,143	8.55
	2013	14,260	42,064	0.34	12,520	2,149	5.41
Corrib Ramp trap	2013	10,168	29,994	0.34	0	0	-
	2010	20,361	42,161	0.48			
Faala	2011	1,099	3,139	0.35	6,298	834	7.55
reale	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
	2010	1,417	2,931	0.5			
Inagh	2011	8,168	23,338	0.35	7,134	945	7.55
magn	2012	*	*	*	*	*	*
	2013	31,069	88,641	0.35	12,581	4,089	3.07
T * 00	2012	213	608	0.35	-	-	-
Liney	2013	2,742	7,849	0.35	-	-	-
Liffey	2012	454	1,298	0.35	-	-	-
Marine Institute	2013	1,144					
	2010	2,772	5,650	0.42	-	-	-
Moigers	2011	5,061	13,678	0.37	54	7	7.55
wiaigue	2012	*	*	*	*	*	*
	2013	14,032	39,665	0.35	19	3	6.4

 Table 7-3: Elver data from IFI & MI traps. Elver and yellow eels are separated.

7.3 Young Yellow Eel Recruitment

Monitoring of juvenile yellow eel migrating at Parteen Dam (Shannon) and Inniscarra on the R. Lee takes place using a fixed brush trap.

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.

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.

In 2010, less than one kg was recorded in the Inniscarra trap on the River Lee and in 2011, 48kg were recorded this dropped to 23kg in 2012. There was no trapping on the Lee in 2013.



Figure 7-3: Juvenile yellow eel catches (kg) at Parteen Weir, 1985 to 2013. From 2012, a second trap was installed on the opposite bank and this is included in the 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	159.5		1
2011	104.5		48
2012	23.9	6.6	23.8
2013	19.5	6.8	

Table 7-4: Juvenile yellow eel catches (kg), 1985 to 2013.

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Annex 1: Members of the Standing Scientific Eel Committee 2013

The SSCE is comprised of the following representatives:

Dr. Russell Poole (Chair) correspondence	Marine Institute Jan-April '13; Oct '13-April '14 by
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/Interi	m chair) Inland Fisheries Ireland
Dr. Robert Rosell	Agri-Food & Bioscience Institute, N. Ireland
	(for issues relating to the transboundary plans)

Invited Contributors - 2013

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 2007¹, hereby make the following byelaw:

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

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

OJ No. 1248, 22.09.2007, p.17.

- (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. Feegue & Dubbdy 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.

River District Basin: ERBD	
Date: Jan-Dec 2013	
Management Action 1. Reduction of Fishery to acl	hieve EU target
Confirm fishery ceased under Conservation of Eel	Fishing Bye-law No. C.S. 312, 2012:
The eel fishery in the ERBD was closed throughout	ut 2013.
Confirm no licences issued in 2009 under Conserva Licences) Bye-law No. 858, 2009:	tion of Eel Fishing (Prohibition on Issue of
No eel fishing licences were issued by the ERBD of	during 2013.
Estimated level of illegal fishing:	
Low	
Main catchments where illegal activity occurred: L.	Muckno
Number of gear seizures:	Gear types seized:
0	
Number of Eel Dealer Interceptions: 0	
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:
The level of illegal eel fishing in the ERBD organized. Any illegal eel fishing activity is consumption.	is low and doesn't appear to be well likely for the purposes of personal

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:
No
General impression of the programme:
N/a

Management Action 3. Ensure Upstream Migration at Barriers

Note: The SEG is currently developing a pilot project for 2011, in conjunction with the national survey programme, to identify the major obstacles to upstream migration. The programme will be instigated by the Eel survey team in conjunction with the RBD staff. It is intended to focus on the main eel producing waters in the initial phase.

Management Action 4. Improve Water Quality

It is intended to achieve this objective through compliance with the Water Framework Directive. Eel is included in the fish monitoring programme under the Directive and the survey data will also be used in the eel stock assessments.

Many thanks for taking the time to respond to this.

River District Bas	in: SERBD

Date: Jan-Dec 2013

Management Action 1. Reduction of Fishery to achieve EU target Confirm fishery ceased under Conservation of Eel Fishing Bye-law No. C.S. 303, 2009: The eel fishery in the SERBD was closed throughout 2013. Confirm no licences issued in 2009 under Conservation of Eel Fishing (Prohibition on Issue of Licences) Bye-law No. 858, 2009: No eel fishing licences were issued by the SERBD during 2013. Estimated level of illegal fishing: None Main catchments where illegal activity occurred: Number of gear seizures: 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:

None known

Management Action 2. Trap & Transport
Was trap & transport undertaken in your RBD?:
No
What was the total catch transported (kg)?: 0
Was there any evidence of illegal trading of eel in conjunction with the T&T programme:
Νο
General impression of the programme:
n/a

Management Action 3. Ensure Upstream Migration at Barriers

Note: The SEG is currently developing a pilot project for 2011, in conjunction with the national survey programme, to identify the major obstacles to upstream migration. The programme will be instigated by the Eel survey team in conjunction with the RBD staff. It is intended to focus on the main eel producing waters in the initial phase.

Management Action 4. Improve Water Quality

It is intended to achieve this objective through compliance with the Water Framework Directive. Eel is included in the fish monitoring programme under the Directive and the survey data will also be used in the eel stock assessments.

Many thanks for taking the time to respond to this.

	River	District	Basin:	SWRBD
--	-------	----------	--------	--------------

Date: Jan-Dec 2013

Management Action 1. Reduction of Fishery to achieve EU target					
Confirm fishery ceased under Conservation of Eel Fishing Bye-law No. C.S. 303, 2009:					
Yes					
Confirm no licences issued in 2009 under Conservation of Eel Fishing (Prohibition on Issue of Licences) Bye-law No. 858, 2009:					
Yes					
Estimated level of illegal fishing: Not identified					
Main catchments where illegal activity occurred: N/a					
Number of gear seizures: 0 Gear types seized: N/a					
Number of Eel Dealer Interceptions: Nil					
Estimated tonnage on board: N/a Declared origin(s) of cargos: N/a					
Describe Action taken: N/a					
General impression of levels of illegal activity since the cessation of the commercial fishery:					
The level of illegal eel fishing in the SWRBD is low and doesn't appear to be well organized. Any illegal eel fishing activity is likely for personal consumption.					
Management Action 2. Trap & Transport Was trap & transport undertaken in your RBD?: No

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

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: The SEG is currently developing a pilot project for 2011, in conjunction with the national survey programme, to identify the major obstacles to upstream migration. The programme will be instigated by the Eel survey team in conjunction with the RBD staff. It is intended to focus on the main eel producing waters in the initial phase.

Management Action 4. Improve Water Quality

It is intended to achieve this objective through compliance with the Water Framework Directive. Eel is included in the fish monitoring programme under the Directive and the survey data will also be used in the eel stock assessments.

River District Basin: Shannon RBD

Date: Jan-Dec 2013

Management Action 1. Reduction of Fishery to achieve EU target

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

The eel fishery in the Shannon RBD was closed throughout 2013.

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

No eel fishing licences were issued by the Shannon RBD during 2013.

Estimated level of illegal fishing:

Medium in general throughout the Shannon RBD. The upper and Lower Shannon had lower seizures than in previous years. However Lough Ree had a marked increase in seizures this year. While there were only 4 reports received of possible illegal eel fishing this is normal as most eel seizures are not received from direct reports. Nets are usually seized during targeted eel patrols where it is necessary to drag an area to find a sunken net if unmarked. This is very time consuming.

Main catchments where illegal activity occurred:

Lough Derravarragh, Lough Ree Lough Derg, Owengarney, Graney

Number of gear seizures:

6

Gear types seized:

Fyke nets and longlines

Month	Type of gear	Length	Waters
April	Fyke nets	200	Derravarragh
May	Fyke nets	100	Lough Ree
June	Fyke nets	100	Lough Ree
October	Fyke nets	300	Lough Ree
November	Fyke nets	400	Lough Ree
December	Longline	800	Lough Ree
	•		

Number of Eel Dealer Interceptions: None	
Estimated tonnage on board: n/a	Declared origin(s) of cargos:
Describe Action taken:	
General impression of levels of illegal activity	since the cessation of the commercial fishery:
Illegal activity continued and while some 111ctiveties other areas increase year on year illegal activity taking place. There is an opin these eels that are being caught as some of could have a lot of eels moving at any one time	e areas have a notable reduction in illegal r, but there is always an underlying amount of nion among staff that there is still a market for the seizures are quite large which potentially me.

Management Action 2. Trap & Transport

Was trap & transport undertaken in your RBD?:

Yes

What was the total catch transported (kg)?:

(Total to 31 Dec 2013) 23,879 Kg

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

There was no evidence, but nets seized on Lough Ree in October, November and December were all very close to the location of trap and truck operations, but could not be proven to be linked to it.

General impression of the programme:

Working well if eels are moved quickly. The monitoring of the released silver eels by IFI staff requires significant local staffing resources.

Management Action 3. Ensure Upstream Migration at Barriers

Note: The SEG is currently developing a pilot project for 2011, in conjunction with the national survey programme, to identify the major obstacles to upstream migration. The programme will be instigated by the Eel survey team in conjunction with the RBD staff. It is intended to focus on the main eel producing waters in the initial phase.

Management Action 4. Improve Water Quality

It is intended to achieve this objective through compliance with the Water Framework Directive. Eel is included in the fish monitoring programme under the Directive and the survey data will also be used in the eel stock assessments.

River District Basin: Western River Basin District

Date: Jan-Dec 2013

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 Ballina and Galway operational areas of the WRBD remained closed throughout 2013.

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 Ballina or Galway offices of the WRBD during 2013.

Estimated level of illegal fishing:

Staff reported no evidence of illegal eel fishing activity in any district of the WRBD during 2013

Main catchments where illegal activity occurred:

N/A

Number of gear seizures:

Gear types seized:

1 2 fyke nets from L Corrib (there for very long time – most likely lost).

Number of Eel Dealer Interceptions:

Nil

Estimated tonnage on board:

N/A

Declared origin(s) of cargos:

Describe Action taken:

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

There has been no illegal eel fishing reported or observed in the WRBD since the closure of the eel fishery.

a

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: 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.

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.

Date: Jan-Dec 2013

Management Action 1. Reduction of Fishery to achieve EU target

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

The eel fishery in the NWRBD was closed throughout 2013.

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 NWRBD during 2013.

Estimated level of illegal fishing:

Low- 4 reports received from upper reaches of the Erne.

Main catchments where illegal activity occurred: L. Oughter (Carratraw Br.), River Erne (Puttighan), River Erne (Belturbet), L. Erne (Quivvy)

Number of gear seizures:

Four

Gear types seized:

10 set fyke nets at Quivvy

1 coghill net at Carratraw 1 coghill net at New Br. Belturbet 2 sets fyke nets on R. Erne near

Putiaghan

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 levels of activity. Illegal activity ceased upon detection of nets in all of the above instances of illegal netting detected.

Was trap & transport undertaken in your RBD?

Yes. At 3 sites. Urney Br. on River Erne/Annalee, Rann on L. Oughter and Sallaghan at L. Gowna.

What was the total catch transported (kg)?

Total to 31 Dec 2013 was 37,645 kg

Was there any evidence of illegal trading of eel in conjunction with the T&T programme: **None**

Generalimpressionoftheprogramme:The programme again worked very well with excellent co-operation between fishermen,ESB, DCAL and IFI on this cross-border fishery. The silver eels captured, transported andreleased to the Erne estuary were in excellent condition.

Management Action 3. Ensure Upstream Migration at Barriers

Note: The SEG is currently developing a pilot project for 2011, in conjunction with the national survey programme, to identify the major obstacles to upstream migration. The programme will be instigated by the Eel survey team in conjunction with the RBD staff. It is intended to focus on the main eel producing waters in the initial phase.

Management Action 4. Improve Water Quality

It is intended to achieve this objective through compliance with the Water Framework Directive. Eel is included in the fish monitoring programme under the Directive and the survey data will also be used in the eel stock assessments.

River District Basin: Neagh Bann RBD – Carlingford Area

Date: Jan-Dec 2013

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 Neagh Bann RBD Carlingford was closed throughout 2013.

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 Nagh Bann RBD Carlingford area during 2013.

Estimated level of illegal fishing:

. low no reports received

Main catchments where illegal activity occurred:

Number of gear seizures:

Gear types seized:

0

Number of Eel Dealer Interceptions:

0

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.
[
Management Action 2. Trap & Transport
Was trap & transport undertaken in your RBD?:
ΝΟ
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:

Management Action 3. Ensure Upstream Migration at Barriers

Note: The SEG is currently developing a pilot project for 2011, in conjunction with the national survey programme, to identify the major obstacles to upstream migration. The programme will be instigated by the Eel survey team in conjunction with the RBD staff. It is intended to focus on the main eel producing waters in the initial phase.

Management Action 4. Improve Water Quality

It is intended to achieve this objective through compliance with the Water Framework Directive. Eel is included in the fish monitoring programme under the Directive and the survey data will also be used in the eel stock assessments.

River District Basin: NWRBD – Foyle Area

Date: Jan-Dec 2013

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 NW RBD Foyle was closed throughout 2013.

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 NW RBD Foyle during 2013.

Estimated level of illegal fishing:

High/Medium/low- e.g. 3 reports received etc. low no reports received

Main catchments where illegal activity occurred:

Number of gear seizures:

Gear types seized:

0

Number of Eel Dealer Interceptions:

0

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.

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:

n/a

General impression of the programme:

Management Action 3. Ensure Upstream Migration at Barriers

Note: The SEG is currently developing a pilot project for 2011, in conjunction with the national survey programme, to identify the major obstacles to upstream migration. The programme will be instigated by the Eel survey team in conjunction with the RBD staff. It is intended to focus on the main eel producing waters in the initial phase.

Management Action 4. Improve Water Quality

It is intended to achieve this objective through compliance with the Water Framework Directive. Eel is included in the fish monitoring programme under the Directive and the survey data will also be used in the eel stock assessments.

XX/1-	11/l-	Jolly	V- det desk	V		V.I.I.	Others	Total
WK No.	week Ending	Mariner, Athlone	Yacht club, Athlone	Rooskev	Finea	Kilaloe Eel Weir	(see comment)	for Week
Cat	ch Quota				2.5	No		
per	Location	6.5 Tonnes	2 Tonnes	3 Tonnes	Tonnes	Quota		
1	07/09/13	0	0	0	275	0	0	275
2	14/09/13	0	0	0	160	0	0	160
3	21/09/13	0	0	0	0	0	0	0
4	28/09/13	0	0	0	0	0	0	0
5	05/10/13	108	0	338	1039	0	0	1485
6	12/10/13	0	0	502	0	0	0	502
7	19/10/13	133	0	0	0	0	0	133
8	26/10/13	0	0	567	394	0	0	961
9	02/11/13	0	0	1360	529	0	0	1889
10	09/11/13	2953	497	0	0	341	0	3791
11	16/11/13	0	0	0	0	73	0	73
12	23/11/13	0	0	0	0	0	0	0
13	30/11/13	177	136	0	0	0	0	313
14	07/12/13	253	114	127	87	0	0	581
15	14/12/13	N/F	N/F	N/F	N/F	0	0	0
16	21/12/13	N/F	N/F	N/F	N/F	817	0	817
17	28/12/13	N/F	N/F	N/F	N/F	5495	0	5495
18	04/01/14	N/F	N/F	N/F	N/F	1996	0	1996
19	11/01/14	N/F	N/F	N/F	N/F	1292	0	1292
20	18/01/14	N/F	N/F	N/F	N/F	614	0	614
21	25/01/14	N/F	N/F	N/F	N/F	395	0	395
22	01/02/14	N/F	N/F	N/F	N/F	418	0	418
23	08/02/14	N/F	N/F	N/F	N/F	580	0	580
24	15/02/14	N/F	N/F	N/F	N/F	290	0	290
25	22/02/14	N/F	N/F	N/F	N/F	0	0	0
26	01/03/14	N/F	N/F	N/F	N/F	50	0	50
27	08/03/14							0
28	15/03/14							0
29	22/03/14							0
30	29/03/14							0
T	otal to	0004	747	9004	9494	10001	<u> </u>	00110
Da	ate(kgs)	3624 1 Iolly	747 2 Yacht	2894	Z484	12361	U Others	ZZIIU Total
Wk No.	Week Ending	Mariner, Athlone	club, Athlone	Rooskey	Finea	Kilaloe Eel Weir	(see comment)	for Week

River Shannon Silver Eel Weekly Collection Sheet 2013/14

Week No.	Week Ending	Lisnas kea	Ferny Gap	Portora Gates	Killashan dra	Urney Bridge	Roscor	Lough Gowna	Total for Week
1	07/09/2013	133	301	400	0	0	0	0	834
2	14/09/2013	0	358	262	0	0	0	0	620
3	21/09/2013	213	274	207	0	0	0	0	694
4	28/09/2013	0	0	0	0	0	0	0	0
5	05/10/2013	1139	0	0	0	125	0	0	1264
6	12/10/2013	614	0	1653	0	635	0	0	2902
7	19/10/2013	0	0	0	0	0	0	0	0
8	26/10/2013	172	346	371	0	647	64	0	1600
9	02/11/2013	1110	2342	1269	2651	1901	0	1030	10303
10	09/11/2013	572	1224	1093	1241	1150	663	1120	7063
11	16/11/2013	0	1085	0	0	887	0	0	1972
12	23/11/2013	0	0	0	0	556	0	0	556
13	30/11/2013	0	539	0	0	0	0	430	969
14	07/12/2013	0	623	0	0	0	169	620	1412
15	14/12/2013	82	1997	1	0	0	755	27	2862
16	21/12/2013	N/F	N/F	N/F	N/F	337	190	N/F	527
17	28/12/2013	N/F	N/F	N/F	N/F	0	0	N/F	0
18	04/01/2014	N/F	N/F	N/F	N/F	0	2221	N/F	2221
19	11/01/2014	N/F	N/F	N/F	N/F	1098	421	N/F	1519
20	18/01/2014	N/F	N/F	N/F	N/F	231	322	N/F	553
21	25/01/2014	N/F	N/F	N/F	N/F	0	0	N/F	0
22	01/02/2014	N/F	N/F	N/F	N/F	0	0	N/F	0
23	08/02/2014	N/F	N/F	N/F	N/F	184	429	N/F	613
24	15/02/2014	N/F	N/F	N/F	N/F	0	0	N/F	0
25	22/02/2014	N/F	N/F	N/F	N/F	180	400	N/F	580
26	01/03/2014	N/F	N/F	N/F	N/F	N/F	0	N/F	0
27	08/03/2014	N/F	N/F	N/F	N/F	N/F	255	N/F	255
28	15/03/2014								0
29	22/03/2014								0
30	29/03/2014								0
Total t	o Date(kgs)	4035	9089	5256	3892	7931	5889	3227	39319
Week No.	Week Ending	Lisnas kea	Ferny Gap	Portora Gates	Killashan dra	Urney Bridge	Roscor	Lough Gowna	Total for Week

River Erne Silver Eel Weekly Collection Sheet 2013/14

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Annex 5: National Survey

Table 0-1 Catch details of the yellow eel survey in the national EMP Survey, 2013.

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)
	05/06/2013	40	30	1.33	6.494	44.2	29.1	59.5	0.162	0.040	0.399
	06/06/2013	72	30	2.40	9.971	41.5	25.9	63.8	0.138	0.042	0.497
	07/06/2013	86	30	2.87	12.476	42.7	27.0	62.5	0.145	0.034	0.436
Meelick Bay, Lough Derg	27/08/2013	48	30	1.60	5.971	41.1	30.7	61.2	0.124	0.048	0.300
	28/08/2013	56	30	1.87	7.295	41.5	30.1	59.2	0.130	0.043	0.376
	29/08/2013	107	30	3.57	13.182	41.3	25.3	61.5	0.123	0.024	0.379
	2013	409	180	13.63	55.3 89	41.9	25.3	63.8	0.135	0.024	0.497
	18/06/2013	78	35	2.23	22.001	54.1	37.5	77.4	0.282	0.089	0.689
	19/06/2013	105	35	3.00	32.724	55.1	37.0	73.2	0.312	0.071	0.673
	20/06/2013	39	35	1.11	10.398	53.2	41.5	75.6	0.267	0.115	0.820
Lough Koy	20/08/2013	52	35	1.49	14.761	53.7	39.7	80.2	0.284	0.089	0.907
Lough Key	21/08/2013	47	35	1.34	13.902	55.1	43.6	72.8	0.296	0.124	0.591
	22/08/2013	54	35	1.54	14.348	52.9	36.9	78.6	0.266	0.075	0.758
	18/06/2013	78	35	2.23	22.001	54.1	37.5	77.4	0.282	0.089	0.689
	2013	375	210	10.71	108.134	54.2	36.9	80.2	0.288	0.071	0.907

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)
	11/06/2013	388	35	11.09	51.018	50.4	32.4	73.6	0.244	0.053	0.902
	12/06/2013	238	35	6.83	50.511	48.3	31.0	82.8	0.212	0.047	1.078
	13/06/2013	157**	35	4.49	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lough Muckno	13/08/2013	86	35	2.46	21.274	50.1	33.5	71.0	0.247	0.058	0.728
	14/08/2013	68	35	1.94	14.147	46.4	32.3	79.0	0.208	0.053	1.133
	15/08/2013	67	35	1.97	13.375	47.3	26.7	70.4	0.200	0.042	0.710
	2013	1007	210	28.7	150.325	48.9	26.7	82.8	0.225	0.042	1.133
	14/05/2013	12	35	0.34	0.651	30.8	21.1	35.4	0.054	0.015	0.076
Divor Barrow	15/05/2013	5	35	0.14	0.283	31.9	28.2	35.4	0.057	0.044	0.084
Kiver Dailow	16/07/2013	120	30	4.00	13.225	37.1	23.4	67.0	0.110	0.019	0.620
	2013	137	100	4.11	14.159	36.3	21.1	67.0	0.103	0.015	0.620
Bunaveela L.	04/07/2013	15	30	0.50	3.0	45.8	37.8	57.5			
Lough Feeagh	10/07/2013	96	60	1.60	13.64	40.3	31.3	93.2	0.142	0.050	2.270
L. Furnace tidal	17/7/2013	145	60	2.40	21.82	43.1	29.1	73.0	0.151	0.040	0.695
Lwr Furnace tidal	25/7/2012	54	20	2.70	10.46	45.3	29.8	77.8	0.194	0.040	0.940

Location	Total Eels	No. Females	No. Males	% Female	% Male	% Prevalence <i>A. crassus</i>	Mean Intensity <i>A.</i> <i>crassus</i>	Preferential Diet from Stomach Contents
Lough Key	102	102	0	100	0	55	2.64	Asellus sp.
Lough Muckno	100	94	6	94	6	56	3.41	Fish Remains

Table 0-2 Biological data from the yellow eel surveys, 2013.

Annex 6: Water Framework Directive

Table 0-3 WFD Lake Summary Data 2012

RBD	Catchment	Lake	No Eels	No. Nights	No. Nets	CPUE	Mean length (cm)	Min. length (cm)	Max. length (cm)	Mean weight (Kg)	Min. weight (Kg)	Max. weight (Kg)	Total weight (kg)
ERBD	Ovoca	Dan, Lough	8	1	9	0.889	52.2	40.3	60.2	0.213	0.101	0.376	1.7
ERBD	Ovoca	Tay, Lough	0	1	9	0.000	n/a						
NBIRBD	Fane	Muckno, Lough	6	1	9	0.667	50.5	40.5	69.8	0.312	0.120	0.928	1.872
NWIRBD	Coastal	Dunglow Lough	5	1	9	0.556	43.1	33.0	60.0	0.165	0.059	0.398	0.825
NWIRBD	Coastal	Kindrum Lough	16	1	9	1.778	40.0	30.5	54.3	0.126	0.050	0.258	2.023
NWIRBD	Coastal	Sessaigh, Lough	8	1	6	1.333	42.5	32.4	53.5	0.130	0.052	0.263	1.04
NWIRBD	Erne	White, Lough (Ballybay)	9	1	9	1.000	52.5	41.0	59.2	0.264	0.093	0.392	2.377
NWIRBD	Gweedore	Anure, Lough	23	1	9	2.556	45.3	30.9	70.3	0.201	0.049	0.767	4.627
NWIRBD	Owenamarve	Nasnahida, Lough	5	1	6	0.833	41.6	28.5	51.6	0.139	0.039	0.244	0.697
SHIRBD	Fergus	Cullaun, Lough	7	1	9	0.778	48.9	35.5	58.1	0.220	0.083	0.363	1.539
SHIRBD	Fergus	Dromore Lough	16	1	9	1.778	50.1	42.0	58.1	0.217	0.102	0.323	3.468
SHIRBD	Fergus	Muckanagh Lough	1	1	9	0.111	58.7	58.7	58.7	0.339	0.339	0.339	0.339

RBD	Catchment	Lake	No Eels	No. Nights	No. Nets	CPUE	Mean length (cm)	Min. length (cm)	Max. length (cm)	Mean weight (Kg)	Min. weight (Kg)	Max. weight (Kg)	Total weight (kg)
SHIRBD	Owencashla	Caum, Lough	3	1	6	0.500	38.9	32.6	43.0	0.099	0.064	0.117	0.296
SHIRBD	Shannon	Alewnaghta, Lough	4	1	9	0.444	46.5	33.6	54.8	0.190	0.062	0.297	0.758
SHIRBD	Shannon	Derg, Lough	75	1	36	2.083	47.4	32.3	100.3	0.233	0.052	2.720	17.467
SHIRBD	Shannon	Gur, Lough	5	1	9	0.556	63.9	57.0	79.4	0.548	0.317	1.059	2.742
SHIRBD	Shannon	Inchicronan Lough	10	1	9	1.111	56.7	47.0	73.0	0.333	0.177	0.733	3.334
WRBD	Ballysadare	Arrow, Lough	22	1	9	2.444	50.2	34.5	65.8	0.239	0.047	0.506	5.261
WRBD	Bundorragha	Lough, Doo	5	1	6	0.833	44.0	37.5	49.5	0.148	0.089	0.218	0.739
WRBD	Corrib	Carra, Lough	10	1	9	1.111	57.4	45.2	73.4	0.374	0.111	0.741	3.74
WRBD	Corrib	Mask, Lough	14	1	27	0.519	56.7	44.1	63.6	0.342	0.147	0.507	4.781
WRBD	Fergus	Bunny, Lough	1	1	9	0.111	44.8	44.8	44.8	0.158	0.158	0.158	0.158
WRBD	Moy	Cullin, Lough	67	1	18	3.722	39.7	30.4	58.4	0.123	0.046	0.329	7.998

Catchment	River	Site	No. Sets	No. Runs	Area (m2)	Density (no./m2)	No. Eels captured
Boyne	Athboy River	Br. nr Clonleasan Ho_A	2	3	212	0.0000	0
Boyne	Athboy River	Br. nr Clonleasan Ho_B	2	3	249	0.0040	1
Liffey	Liffey, River	500 m d/s Ballyward BrA	2	1	4228	0.0000	0
Dargle	Dargle River	Bahana_A	2	3	311	0.0000	0
Avoca	Glenealo River	Br. d/s Upper Lake_B	2	3	276	0.0254	7
Nanny	Nanny (Meath), River	Br. at Julianstown_A	3	3	456	0.0526	24
Dargle	Glencree River	Br. u/s Dargle R confl_A	3	3	401	0.0025	1
Avoca	Glenealo River	Br. d/s Upper Lake_A	3	2	242	0.0000	0
Castletown	Big River (Louth)	Ballygoly BrA	2	3	209	0.0192	4
Dee	White River (Louth)	Coneyburrow BrB	3	3	358	0.0028	1
Clady	Clady River (Donegal)	Bryan's BrA	3	3	380	0.0079	3
Eany water	Eany Water	Just d/s Eany Beg/More confl_A	2	1	7849	0.0004	3
Nore	Dinin River	Dinin BrA	3	3	667	0.0030	2
Burren	Lerr River	Prumplestown BrA	2	3	225	0.0000	0
Burren	Greese, River	Br. NE of Belan House_A	3	3	307	0.0033	1
Burren	Greese, River	Br. NE of Belan House_B	3	3	258	0.0039	1
Barrow	Burren River	Ullard BrA	2	3	159	0.0126	2
Barrow	Burren River	Ullard BrB	2	3	216	0.0000	0
Barrow	Tully Stream	Soomeragh BrA	1	3	163	0.0000	0
	CatchmentBoyneBoyneBoyneLiffeyDargleAvocaNannyDargleAvocaCladyEany waterNoreBurrenBurrenBarrowBarrowBarrowBarrow	CatchmentRiverBoyneAthboy RiverBoyneAthboy RiverBoyneAthboy RiverLiffeyLiffey, RiverDargleDargle RiverAvocaGlenealo RiverNannyNanny (Meath), RiverDargleGlencree RiverDargleGlenealo RiverAvocaGlenealo RiverDargleGlenealo RiverDargleGlenealo RiverDargleBig River (Louth)CladyClady River (Donegal)Chany waterEany WaterNoreDinin RiverBurrenGreese, RiverBurrenGreese, RiverBarrowBurren RiverBarrowFurren RiverBarrowFurren RiverBarrowSurren RiverBarrowSurren RiverBarrowFurly Stream	CatchmentRiverSiteBoyneAthboy RiverBr. nr Clonleasan Ho_ABoyneAthboy RiverBr. nr Clonleasan Ho_BLiffeyLiffey, River500 m d's Ballyward Br_ADargleDargle RiverBahana_AAvocaGlenealo RiverBr. d's Upper Lake_BNannyNanny (Meath), RiverBr. d's Upper Lake_ADargleGlencree RiverBr. u's Dargle R confl_AAvocaGlenealo RiverBr. d's Upper Lake_ADargleGlencree RiverBr. d's Upper Lake_AAvocaGlenealo RiverBr. d's Upper Lake_ACastletownBig River (Louth)Ballygoly Br_ADeeWhite River (Louth)Bryan's Br_ACladyClady River (Donegal)Bryan's Br_ANoreDinin RiverDinin Br_ABurrenLer RiverPrumplestown Br_ABurrenGreese, RiverBr. NE of Belan House_ABurrenBurren RiverUllard Br_ABarrowBurren RiverUllard Br_ABarrowTully StreamSoomeragh Br_A	CatchmentRiverSiteNo SetsBoyneAthboy RiverBr. nr Clonleasan Ho_A2BoyneAthboy RiverBr. nr Clonleasan Ho_B2LiffeyLiffey, River500 m d/s Ballyward Br_A2DargleDargle RiverBahana_A2AvocaGlenealo RiverBr. d/s Upper Lake_B2NannyNanny (Meath), RiverBr. u/s Dargle R confl_A3DargleGlencee RiverBr. u/s Dargle R confl_A3AvocaGlenealo RiverBr. d/s Upper Lake_A3AvocaGlenealo RiverBr. d/s Upper Lake_A3AvocaGlenealo RiverBr. d/s Upper Lake_A3AvocaGlenealo RiverBr. d/s Upper Lake_A3CastletownBig River (Louth)Ballygoly Br_A3CastletownBig River (Louth)Bullygoly Br_A3CadyClady River (Donegal)Just d/s Eany Beg/More confl_A3Fany waterEany WaterJust d/s Eany Beg/More confl_A3BurrenLerr RiverPrumplestown Br_A3BurrenGreese, RiverBr. NE of Belan House_A3BurrenGreese, RiverBr. NE of Belan House_A3BarrowBurren RiverUllard Br_A2BarrowBurren RiverUllard Br_A2BarrowBurren RiverUllard Br_A2BarrowFurger RiverSoomeragh Br_A1	CatchmentRiverSiteNo.No.BoyneAthboy RiverBr. nr Clonleasan Ho_A23BoyneAthboy RiverBr. nr Clonleasan Ho_A23LiffeyLiffey, River500 nd /s Ballyward BrA23DargleDargle RiverBahana_A23AvocaGlenealo RiverBr. d/s Upper Lake_B23DargleClenere RiverBr. d/s Upper Lake_B33AvocaGlenealo RiverBr. d/s Upper Lake_A33AvocaGlenealo RiverBr. d/s Upper Lake_A33AvocaGlenealo RiverBr. d/s Upper Lake_A33AvocaGlenealo RiverBallygoly BrA33DargleOlder River Louth)Coneyburrow BrB33CadstetownBig River (Louth)Bryan's Br.,A33CadyClady River DonegalBryan's Br.,A33Fany waterEany WaterDinin Rr_A33BurrenLerr RiverDinin Br_A33BurrenGreese, RiverBr. NE of Belan House_A33BurrenGreese, RiverBr. NE of Belan House_A33BarrowBurren RiverUllard BrA23BarrowBurren RiverUllard BrA33BarrowBurren RiverBurren Si33BarrowFurger RiverBurren Si33BarrowBurren River<	CatchmentRiverSiteNo.AreaBoyneAthboy RiverBr. nr Clonleasan Ho_A23212BoyneAthboy RiverBr. nr Clonleasan Ho_B23249LiffeyLiffey, River500 m d's Ballyward Br. A2312DargleDargle RiverBahana_A23311AvocaGlenealo RiverBr. d's Upper Lake_B23276NannyNanny (Meath), RiverBr. at Julianstown_A33456DargleGlenere RiverBr. d's Upper Lake_B2242242AvocaGlenealo RiverBr. d's Upper Lake_A33401AvocaGlenealo RiverBr. d's Upper Lake_A3209242DargleGlenealo RiverBr. d's Upper Lake_A3201242DargleGlenealo RiverBr. d's Upper Lake_A33401AvocaGlenealo RiverBr. d's Upper Lake_A3201242CastletownBig River (Louth)Coneyburrow BrBA33380CladyClady River (Donegal)Buryn's BrA33361Fany waterEany WaterJust d's Eany Beg/More confl_A33225BurrenLerr RiverPrumplestown BrA33258BurrenGreese, RiverBr. NE of Belan House_A33258BarrowBurren RiverUllard BrA23351Barrow<	CatchmentRiverSiteNo.No.Rov. <t< td=""></t<>

Table 0-4 Summary data from WFD Rivers Survey 2012

RBD	Catchment	River	Site	No. Sets	No. Runs	Area (m2)	Density (no./m2)	No. Eels captured
SERBD	Barrow	Tully Stream	Soomeragh BrB	1	3	102	0.0099	1
SERBD	Barrow	Barrow, River	Pass BrB	2	1	10951	0.0006	7
SERBD	Barrow	Barrow, River	Upper Tinnahinch Lock_A	2	1	20645	0.0007	15
SERBD	Barrow	Barrow, River	Ballykeenan Lock_A	2	1	11143	0.0013	14
SERBD	Barrow	Barrow, River	Graiguenamanagh BrA	2	1	15549	0.0007	11
SERBD	Barrow	Barrow, River	Bagenalstown (Slipway to lock)_A	1	1	16377	0.0007	12
SERBD	Barrow	Barrow, River	Dunleckny (Swimming pool)_A	2	1	25531	0.0004	9
SERBD	Barrow	Barrow, River	Leighlinbridge Lord Bagenal Hotel_A	1	1	16380	0.0002	3
SHIRBD	Shannon Lwr	Tullamore River	Br. SW of Ballycowen BrA	2	3	786	0.0000	0
SHIRBD	Shannon Lwr	Little Brosna River	Riverstown BrA	2	3	1646	0.0000	0
SHIRBD	Shannon Lwr	Kilcrow River	Ballyshrule BrA	2	3	1720	0.0012	2
SHIRBD	Creegh	Creegh River	Drumellihy BrA	1	3	1071	0.0019	2
SHIRBD	Shannon Lwr	Ballyfinboy River	Ballinderry BrA	2	3	254	0.0000	0
SHIRBD	Shannon Lwr	Nenagh River	Ballysoilshaun BrA	2	3	980	0.0000	0
SHIRBD	Feale	Owveg River (Kerry)	Owveg BrB	2	3	344	0.0000	0
SHIRBD	Shannon Est sth	Owvane River (Limerick)	Br. u/s (SE of) Loghill_A	3	3	609	0.3171	193
SHIRBD	Tyshe	Tyshe River	West br. Ardfert at Friary_A	1	3	92	0.1740	16
SHIRBD	Tyshe	Tyshe River	West br. Ardfert at Friary_B	1	3	170	0.2235	38
SHIRBD	Shannon Lwr	Bilboa River	Br. u/s Blackboy Br Bilboa BrA	4	3	553	0.0000	0
SHIRBD	Caher	Caher River	Br. 2 km d/s Formoyle_A	2	3	223	0.0045	1
SHIRBD	Shannon Lwr	Dead River	Pope's BrA	2	3	161	0.0000	0

RBD	Catchment	River	Site	No. Sets	No. Runs	Area (m2)	Density (no./m2)	No. Eels captured
SHIRBD	Shannon Lwr	Dead River	Pope's BrB	2	3	250	0.0080	2
SHIRBD	Shannon Est Sth	Maigue, River	Castleroberts BrA	2	1	13148	0.0008	10
SWRBD	Blackwater	Awbeg River (Buttevant)	Kilcummer BrA	3	1	3910	0.0026	10
SWRBD	Blackwater	Bride (Waterford), River	Footbr. N of Ballynella_A	3	1	3126	0.0003	1
SWRBD	Blackwater	Bride (Waterford), River	Footbr. N of Ballynella_B	3	1	2806	0.0000	0
SWRBD	Argideen	Argideen River	Ballinoroher Ford_B	3	3	430	0.1651	71
SWRBD	Adrigole	Adrigole River	0.5km d/s of Glashduff Adrigole confluence_A	2	3	430	0.0419	18
WRBD	Glenamoy	Glenamoy River	Glenamoy Village_A	3	2	419	0.0597	25
WRBD	Moy	Deel River (Crossmolina)	Bridge at Castle Gore_A	3	3	4085	0.0022	9
WRBD	Bunowen	Bunowen River (Louisburgh)	Tully BrA	3	3	334	0.0120	4
WRBD	Corrib	Black River (Shrule)	Br. at Kilshanvy_A	2	3	262	0.0115	3
WRBD	Corrib	Black River (Shrule)	Br. at Kilshanvy_B	2	3	206	0.0145	3
WRBD	Corrib	Owenbrin River	Br. u/s L. Mask_A	3	3	339	0.0088	3
WRBD	Easky	Gowlan River	Track west of Lough Black_A	2	3	205	0.0292	6
WRBD	Easky	Gowlan River	Track west of Lough Black_B	2	3	257	0.0194	5
WRBD	Dunneill	Dunneill River	Donaghintraine BrA	3	3	389	0.1647	64
WRBD	Dunneill	Dunneill River	Dromore West_A	2	3	468	0.0278	13
WRBD	Moy	Moy, River	U/s Ardnaree BrA	1	1	17861	0.0001	1

RBD	Catchments	River Name	River Site	No. Eel	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
ERBD	Boyne	Athboy River	Br. nr Clonleasan Ho_B	1	22	22	22	0.014	0.014	0.014	0.014
ERBD	Avoca	Glenealo River	Br. d/s Upper Lake_B	7	24.4	19.7	32.1	0.025	0.011	0.062	0.178
ERBD	Nanny	Nanny (Meath), River	Br. at Julianstown_A	24	23.4	9.2	48	0.031	0.002	0.215	0.721
ERBD	Dargle	Glencree River	Br. u/s Dargle R confl_A	1	38.8	38.8	38.8	0.092	0.092	0.092	0.092
NBIRBD	Castletown	Big River (Louth)	Ballygoly BrA	4	26.9	11.2	33.6	0.043	0.002	0.065	0.172
NBIRBD	Dee	White River (Louth)	Coneyburrow BrB	1	17.2	17.2	17.2	0.009	0.009	0.009	0.009
NWIRBD	Clady	Clady River (Donegal)	Bryan's BrA	3	37.3	31.7	45	0.105	0.061	0.167	0.314

Table 0-5 Summary length and weight data from WFD Rivers Surveys

RBD	Catchments	River Name	River Site	No. Eel	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
NWIRBD	Eany water	Eany Water	Just d/s Eany Beg/More confl_A	3	24.7	17.2	30.7	0.023	0.007	0.037	0.07
SERBD	Nore	Dinin River	Dinin BrA	2	32.5	32.5	32.5	0.061	0.06	0.062	0.122
SERBD	Burren	Greese, River	Br. NE of Belan House_A	1	65.7	65.7	65.7	0.575	0.575	0.575	0.575
SERBD	Burren	Greese, River	Br. NE of Belan House_B	1	63.1	63.1	63.1	0.512	0.512	0.512	0.512
SERBD	Barrow	Burren River	Ullard BrA	2	50.5	50.3	50.6	0.253	0.251	0.256	0.506
SERBD	Barrow	Tully Stream	Soomeragh BrB	1	29.8	29.8	29.8	0.04	0.04	0.04	0.04
SERBD	Barrow	Barrow, River	Pass BrB	7	45	26.7	56.5	0.186	0.013	0.366	1.303
SERBD	Barrow	Barrow, River	Upper Tinnahinch Lock_A	15	34.4	15.3	52.5	0.092	0.008	0.265	1.374
SERBD	Barrow	Barrow, River	Ballykeenan Lock_A	14	26.8	10	47.3	0.065	0.004	0.185	0.71

RBD	Catchments	River Name	River Site	No. Eel	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
SERBD	Barrow	Barrow, River	Graiguenamana gh BrA	11	24.7	8.5	59.8	0.138	0.044	0.487	0.826
SERBD	Barrow	Barrow, River	Bagenalstown (Slipway to lock)_A	12	37.6	24.5	46.6	0.098	0.022	0.208	1.171
SERBD	Barrow	Barrow, River	Dunleckny (Swimming pool)_A	9	39.4	31.5	55.2	0.098	0.053	0.235	0.784
SERBD	Barrow	Barrow, River	Leighlinbridge Bagenal Hotel_A	3	28.7	22.3	33.7	0.038	0.014	0.063	0.115
SHIRBD	Shannon Lwr	Kilcrow River	Ballyshrule BrA	2	52.4	47.8	57	0.187	0.187	0.187	0.187
SHIRBD	Creegh	Creegh River	Drumellihy BrA	2	29	28	30	0.056	0.054	0.057	0.111
SHIRBD	Shannon Est sth	Owvane River (Limerick)	Br. u/s (SE of) Loghill_A	193	16	6.9	35.6	0.012	0.001	0.086	2.272
SHIRBD	Tyshe	Tyshe River	West br. Ardfert at Friary_A	16	18.1	8.7	34.5	0.014	0.001	0.08	0.218

RBD	Catchments	River Name	River Site	No. Eel	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
SHIRBD	Tyshe	Tyshe River	West br. Ardfert at Friary_B	38	10.6	6.6	22.1	0.002	0.001	0.021	0.086
SHIRBD	Caher	Caher River	Br. 2 km d/s Formoyle_A	1	18.6	18.6	18.6	0.012	0.012	0.012	0.012
SHIRBD	Shannon Lwr	Dead River	Pope's BrB	2	34.9	33.8	36	0.073	0.063	0.083	0.146
SHIRBD	Shannon Est Sth	Maigue, River	Castleroberts BrA	10	26.5	12.2	33.9	0.038	0.003	0.072	0.383
SWRBD	Blackwater	Awbeg River (Buttevan t)	Kilcummer BrA	10	21.7	10.5	51	0.044	0.002	0.291	0.441
SWRBD	Blackwater	Bride (Waterfor d), River	Footbr. N of Ballynella_A	1	23.2	23.2	23.2	0.024	0.024	0.024	0.024
SWRBD	Argideen	Argideen River	Ballinoroher Ford_B	71	17.6	8	37.8	0.014	0.001	0.086	0.992
SWRBD	Adrigole	Adrigole River	Adrigole confluence_A	18	23	12	30.8	0.02	0.002	0.04	0.356
WRBD	Glenamoy	Glenamo	Glenamoy	25	15.1	7.2	30	0.009	0.001	0.045	0.229

RBD	Catchments	River Name	River Site	No. Eel	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
		y River	Village_A								
WRBD	Моу	Deel River (Crossmo lina)	Bridge at Castle Gore_A	9	33.1	22.4	53.5	0.076	0.02	0.271	0.604
WRBD	Bunowen	Bunowen River (Louisbu rgh)	Tully BrA	2	10	8.1	11.9	0.002	0.001	0.003	0.004
WRBD	Corrib	Owenbri n River	Br. u/s L. Mask_A	1	33.9	33.9	33.9	0.059	0.059	0.059	0.059
WRBD	Easky	Gowlan River	Track west of Lough Black_A	5	29.2	21.6	34.4	0.045	0.018	0.073	0.227
WRBD	Easky	Gowlan River	Track west of Lough Black_B	4	31.6	27.3	37.5	0.053	0.034	0.084	0.211
WRBD	Dunneill	Dunneill River	Donaghintraine BrA	64	21.3	9.1	34.1	0.018	0.001	0.065	1.138
WRBD	Dunneill	Dunneill River	Dromore West_A	13	32	20.5	52.1	0.061	0.012	0.182	0.791
WRBD	Moy	Moy,	U/s Ardnaree	1	34.3	34.3	34.3	0.078	0.078	0.078	0.078

RBD	Catchments	River Name	River Site	No. Eel	Average Length (cm)	Min. Length (cm)	Max. Length (cm)	Average Weight (kg)	Min. Weight (kg)	Max. Weight (kg)	Total Weight (kg)
		River	BrA								

Table 0-6 Summary data	from WFD	Transitional	Waters 2012	

RBD	Catchment	Estuary	No. Nights	No. Nets	No. Eels	CPUE	Average Length (cm)	Min. Length (cm)	Max. Length (cm)
ERBD	Boyne	Boyne Estuary	1	27	32	1.185	35.9	27.0	59.5
NWIRBD	Gweebarra	Gweebarra Estuary	1	30	17	0.567	36.8	29.0	51.0