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Eel Management plans for the United Kingdom Northern Ireland (UK) Eastern River Basin District

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NORTH EAST RIVER BASIN DISTRICT EEL MANAGEMENT PLAN [EMP]

1.0 Overview of Matters Addressed in the Plan in Compliance with Council Regulation (EC) No 1100/2007

The NE EMP covers the area identified as the North Eastern RBD of the Island of Ireland for the purposes of Directive 2000/60/EC with the addition of some minor catchments in south Co. Down and Co. Armagh that more logically sit with this EMP than with the Neagh Bann EMP. This approach was agreed with the Irish authorities.

The target level of escapement is ~ 1.6t per annum. Methodology to determine this target is described.

There are no eel fisheries.

There are no known significant mortalities by other factors.

Eel are able to migrate, grow and escape to sea naturally.

Any failure to meet the target level of escapement will be due to low natural recruitment. The target will be achieved naturally, in the long term, as soon as recruitment is adequate.

Measures to monitor and verify this are described.

Surveillance to detect and deter illegal fishing is described.

1.1 Description of the Eel Management Unit/River Basin District :

This eel management plan covers the North-Eastern coastal fringe of Northern Ireland, comprising the North Eastern River Basin District as defined for Eco-region 17 (The Island of Ireland) for Water Framework Directive purposes, with the addition of those County Down coastal catchments draining into Carlingford Lough from Northern Ireland and those parts of the river catchments of South County Armagh not draining north to Lough Neagh but draining southward to the Irish Republic (Map 1.1).

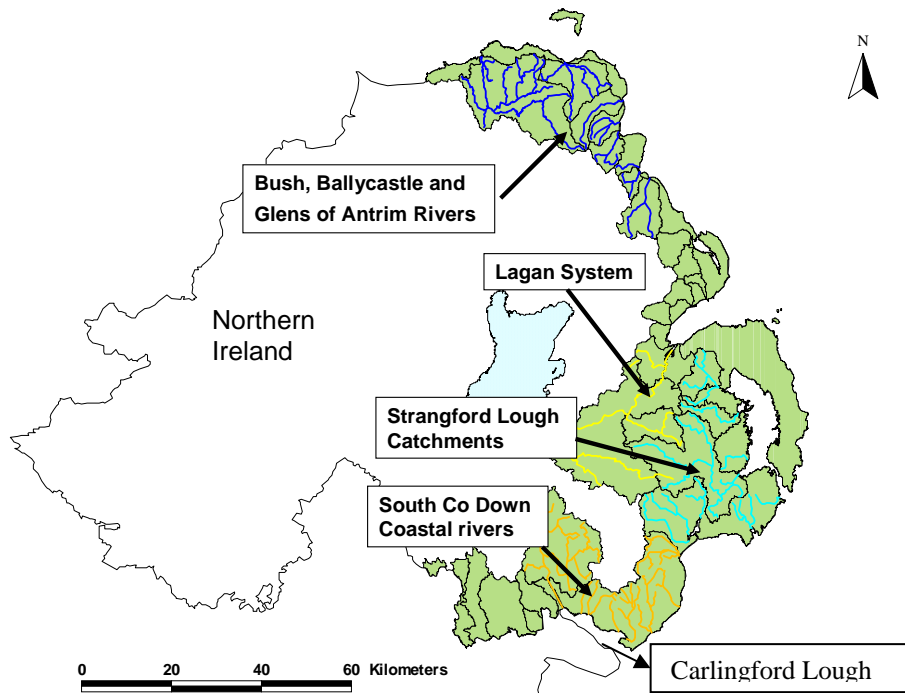
This Eel Management Plan is entirely contained within one member state (UK, Northern Ireland). A small part of the area (see map 1.2b below) contains the headwaters of streams draining to the Fane catchment in the Republic of Ireland (RoI). The Republic of Ireland Eastern EMP will include the RoI portion of the River Fane system.

The relevant fishery authorities within the RBD are the Department of Culture Arts and Leisure (DCAL) and the Fisheries Conservancy Board (FCB), and the scientific authority is the Agri-Food and Biosciences Institute for Northern Ireland (AFBINI).

This EMP contains a diverse range of river and lake habitats, ranging from high gradient mountain streams of low productivity and little or no production of eel, to lowland inter-drumlin lakes in areas of high productivity and with significant capability, at least on a per unit area basis, to produce eel. Due to this diversity the description below is divided into four sections (see Map 1.1). The potential eel productive area in the region is largely in two

of these sections or catchment groups, i.e. the River Lagan and associated rivers entering the Irish Sea at Belfast, and the collected catchments draining to the fiord-like Strangford Lough.

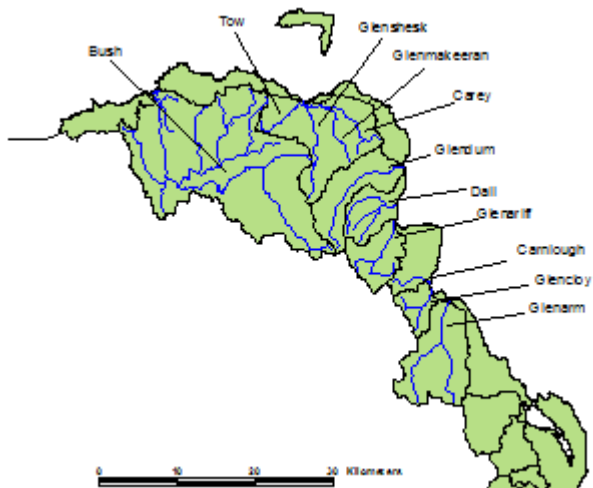
1.2. Maps:



Map 1.1 The NI NERBD Eel Management Plan area

1.2 Description of the principal individual river catchments and catchment groups within the RBD, with reference to eel.

1.2a The rivers draining to the north of the RBD, to the Atlantic Ocean or entering the North-Western Irish Sea north of Belfast



Map 1.2a Map of the Bush, Ballycastle and Glens of Antrim catchments of the RBD.

This sub-region is characterised by relatively unproductive short coastal catchments, and there are no extant eel fisheries. There is no eel production from the 172 ha of lakes in the sub-region, because the lakes are either artificial (117 ha) or are inaccessible to eels (55 ha). Some of the rivers are steep with natural waterfalls which restrict upstream movement of eel.

The River Bush

The River Bush, better known as a UK and ICES Salmon Index river for the North East Atlantic, enters the Atlantic Ocean on the north coast of Northern Ireland at Portballintrae, near the town of Bushmills. The catchment of circa 500 Km² has no natural lakes, and there is no local history of eel fishing. The underlying geology is igneous basalt. There is no estuary, the river entering the sea with an immediate change from fresh to salt water over a sand and stone beach. Eels have free access from the sea but a waterfall 2 km from the sea forms a natural barrier which restricts upstream movement of eel. While eels are present in small numbers, principally in the short 2 km stretch from the sea to the natural waterfall, the over-riding fishery interest is for salmon and trout. The river has total counting facilities at the River Bush Salmon research station for both emigrating and immigrating salmon. Eels are occasionally observed at the salmon counting station but not in significant numbers.

The Ballycastle Rivers

The rivers Tow, Carey and Glenshesk enter the Atlantic Ocean at the town of Ballycastle. The geology and general character of the rivers is similar to that of the River Bush. Although eel are present in the rivers, the eel populations have never been considered significant, and there is no history of eel fishing.

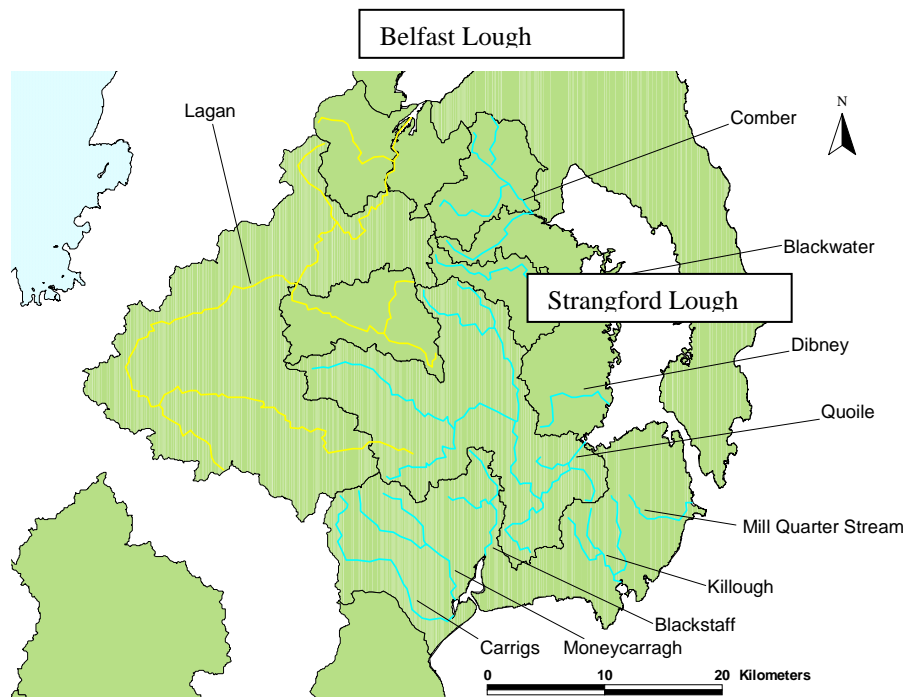
The Glens of Antrim Rivers

The Glens of Antrim are a series of steep valleys draining from the Antrim Plateau eastwards to the northwest Irish Sea. There are many small steep, relatively unproductive streams but the principal ones are the Glendun, Dall, Glenarriff, Glencloy, Glenarm, and Glynn. These streams have little eel production due to their basaltic underlying geology, steep gradients, and an absence of lakes accessible to eel.

Eels do exist in small numbers in the lowest reaches of the Glens of Antrim rivers, within a few km of the sea, but habitat area is limited. There is no known history of eel fishing in these catchments.

1.2b The River Lagan catchment

Map 1.2b. Catchments feeding Belfast Lough (Lagan) and Strangford Lough (Quoile and other streams)



The River Lagan is a small river with a catchment of 570 Km² entering the Irish Sea at Belfast Lough at the port of Belfast. It drains a mix of rich agricultural land, some large urban areas in the towns of Belfast and Lisburn, and unproductive high ground to the north of Belfast and also in the south of the catchment. The River Lagan catchment contains a small local stock of eels in its slow flowing lowland stretches and connected lakes. There are 13 lakes on the system which are accessible to eel, with a combined area of 77 ha. Weirs on the main stem of the river may slow down upstream migration, but the weirs have not been assessed for such an impact. This survey will be conducted during the first phase of this EMP, and where deficiencies are found weirs will be upgraded to make them suitable for eel.

There is one eel weir on the River Lagan, which has been derelict since the 1950s. There are no data for historic fishing activity or catches at this weir, and there is no current fishing activity targeting eel.

1.2c Strangford Lough and its afferent steams (Quoile and other minor catchments)

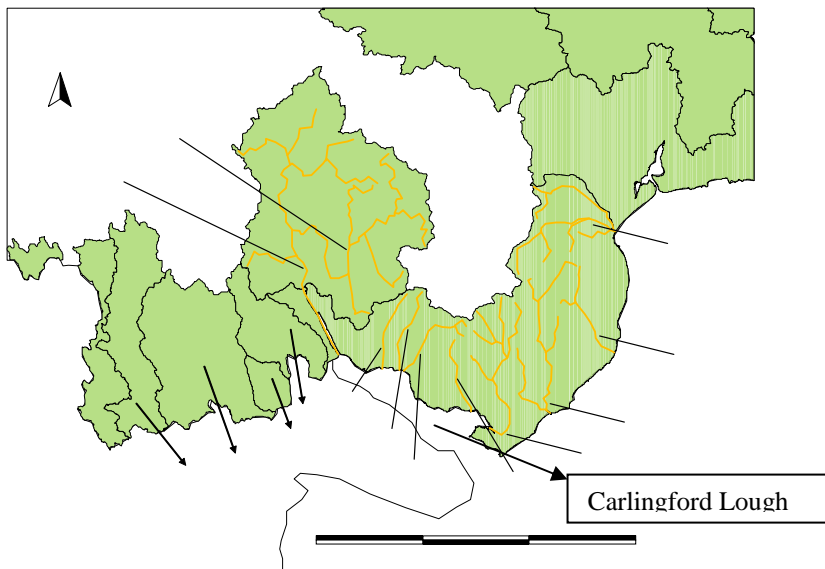
Strangford Lough is a large coastal fiord-like embayment or sea lough with a narrow entrance to the Irish Sea (Map 1.2b). It is a marine habitat, with small inflowing freshwater streams draining a mix of agricultural land, including 'improved' pastureland and some arable soils. There are over 50 small lakes in a drumlin landscape to the east, with a combined area of about 36 ha, which are interconnected and draining to Strangford Lough

by streams. The largest afferent stream is the River Quoile, the estuary of which is impounded in a brackish pondage (195 ha) by a barrage constructed for flood control (Plate 1)



Plate 1 The Quoile barrage at the mouth of the estuary on the River Quoile.

1.2d The streams of southern County Down south of Strangford Lough, the Mourne Mountain streams, streams draining to that part of Carlingford Lough in Northern Ireland, and drainage from South County Armagh over the Northern Ireland border to County Louth in the Republic of Ireland.



Map 1.2c South County Down, and County Armagh streams draining south

This southern area of the RBD contains minor coastal streams entering the Irish Sea on the Down coast south of Strangford Lough, and numerous small steep watercourses draining the Mourne Mountains. These streams are generally nutrient poor, running off granite geology and poor soils. Although eels do recruit to these streams, production is thought to be minor. The Newry and Clanrye rivers, which flow into the brackish then marine Carlingford Lough contain populations of eel but do not support eel fisheries.

The western part of this area includes some waters flowing across the border to the Republic of Ireland (i.e. Kilcurry, Cully and Creggan Rivers). These streams are the headwaters of the River Fane, which flows into Dundalk Bay in the Irish Republic. There are no eel fisheries in the Northern Ireland (UK) portion of these catchments, and the Fane system is covered by the RoI Eastern EMP.

1.3 Coastal and transitional waters in the NE RBD

This eel RBD contains the following “coastal” and “transitional” waters:

- The marine embayments of Strangford Lough, Dundrum Bay, and that portion of Carlingford Lough contained within Northern Ireland and under the fisheries administration of the Loughs Agency.
- The partially impounded estuaries of the River Lagan in the city of Belfast, and of the River Quoile from the town of Downpatrick to Strangford Lough at the Quoile barrage.

None of these coastal and transitional waters have any current eel fisheries. All are accessible to eel from the sea and interconnected with fresh water rivers.

2.0 Description and analysis of the present situation of the eel population in the Northern Ireland North Eastern River Basin District.

Eel are known to be present throughout this RBD, with the exception of some loughs in the upper parts of catchments. Little is known about eel production across the RBD, but the few data are summarised below.

Three lakes in this region have been selected as potential fish monitoring sites in the trial implementation phase of the Water Framework Directive. In addition to the standardised gill netting, fyke nets were used specifically to target eel. Eight net-ends (4 fyke nets) were set over a single night each in Clea Lakes (June 2006), Castlewellan (October 2006), and six ends (3 fyke nets) set in Derryleckagh Lake on one night in August 2008. Catches were low, at 16 in Clea, 13 in Castlewellan and only 3 in Derryleckagh.

No size or age data are available for 3 Derryleckagh eels, but the Castlewellan eels were larger and older than those caught in Clea Lake (Figure 2.1). Castlewellan is further from the sea, and at higher altitude than Clea.

Also plotted on the graph for comparison are age-length data from Quoile River silver eel weir catches from 1983 and 1984, which were of similar age, but older on average than the Clea fish caught in 2006.

Eel are still present and widespread through the Quoile and Lagan river systems, though stock densities are not known. No eels were caught during a fyke net survey of the Quoile pondage in 1994 (Thompson, 1994), but 34 eels were recovered after a fishkill in 2000. Small numbers of eels were caught during electric fishing for trout in the Annacloy and the Glasswater tributaries of the Quoile in 2001, but they were absent from the majority of sites (Hodgson, 2001). Note, however, that the surveys would have targeted habitats favoured by trout and, therefore, were likely to underestimate numbers of eels.

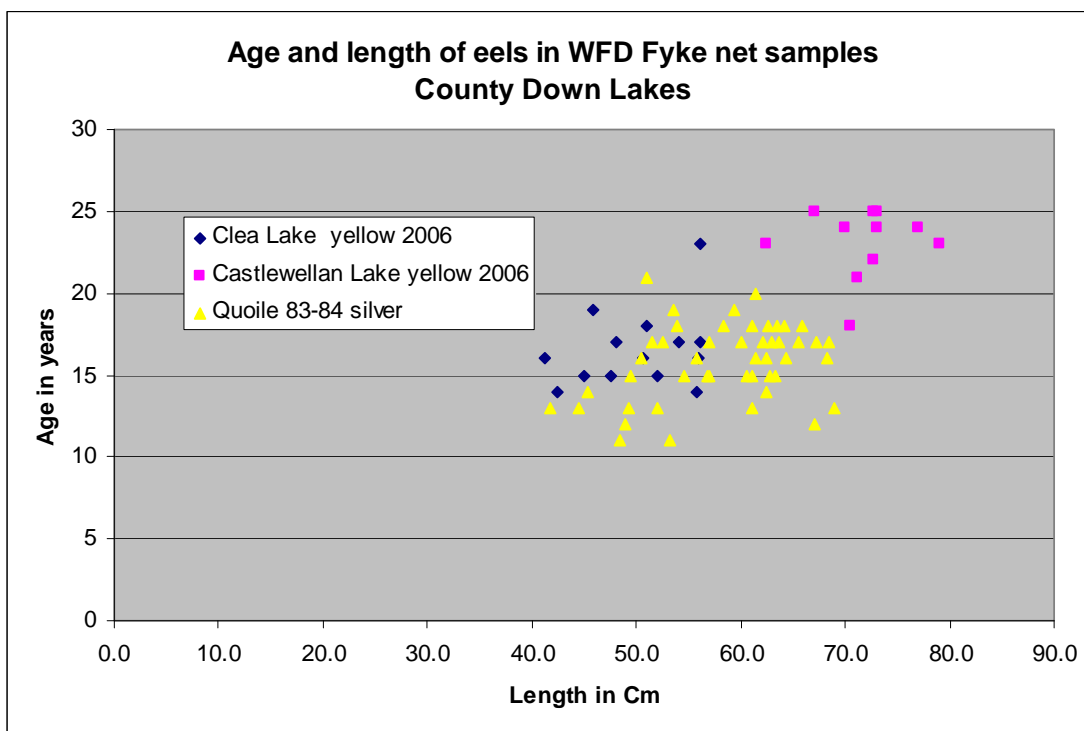


Fig 2.1 . Age – Length data for samples of eels – NI NERBD lakes and rivers

Also available and plotted on the graph are age-length data from a Quoile river silver eel weir dating from 1983 and 1984. The age-length profiles of these eels confirm the view that the Castlewella lake eels may well be partially land-locked, with restricted emigration potential resulting in long residence in freshwater.

Data is available for a sample of Quoile river yellow eel from 1969. This is important data in that it relates to a period before the opening of the upper of two barrages. This upper barrage, may have restricted access upstream and which have retained eels within a brackish impoundment between the two barrages. The data (Fig.2.2) Show a large number of small eels and fewer larger older ones. The small eel (less than 50 cm), as evident from contemporary notes, were mainly in the reach between the two barrages.

It should be noted that the Quoile river system is now more accessible to eel than at any time since 1950, as the fish pass gates in the Lower Barrage between the estuary and the sea were renovated for eel and other fish passage in 2005.

Johnstone (2004) noted that it would appear that eel stocks were at a low level in the Quoile system. This was based on two studies: a netting survey carried out on the pondage (Thompson, 1994) did not account for any eels despite the setting of fyke nets in an area where commercial eel fishing rights were leased by DARD until 1999. It should be noted, however, that in 2000, a de-oxygenation incident caused by storm driven rapid turnover of a portion of the quoile pondage killed 34 individual eels among other less hardy fish species. Eel are still present and widespread through the Quoile and Lagan river systems, though stock densities are not known. During electrofishing by Hodgson (2001) for trout, small numbers of eels were noted in the Annacloy and the Glasswater tributaries of the Quoile, but they were absent from the majority of sites. The latter observation may be influenced that eel habitat may not be adequately covered in a trout focussed survey.

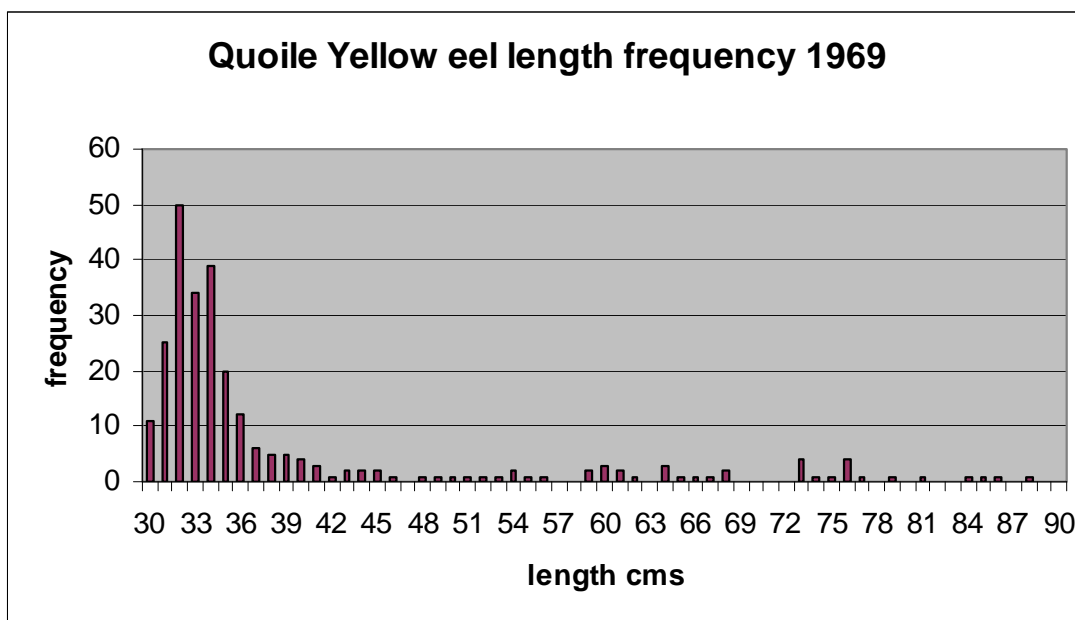


Fig 2.2 Length frequency of a sample of Quoile river yellow eels (N = 260), (1969).



Plate 2. Aerial photograph of the small group of mixohaline lakes sampled at Strangford in 2008

A recent survey undertaken in a small group of mixohaline lakes at Strangford (Plate 2) netted 240 yellow eels as part of a fish removal programme. The length frequency distribution of these eels is shown in Figure 2.3. The lack of any eels smaller than 30 cm is probably due to the sampling method, since fyke net meshes rarely capture smaller eels. The total eel biomass for the surveyed lakes, was estimated as 71.6 kg, or 17.9 kg ha⁻¹, suggesting that these are relatively productive habitats for eels. Given that the majority of eels captured ranged in age from 6-21 years (Figure 2.4) this would mean an annual silver eel output of around 1.3 kg ha⁻¹. (calculated from the mean weight of silvers and their mean age at time of migration (taken as 15 yrs)).

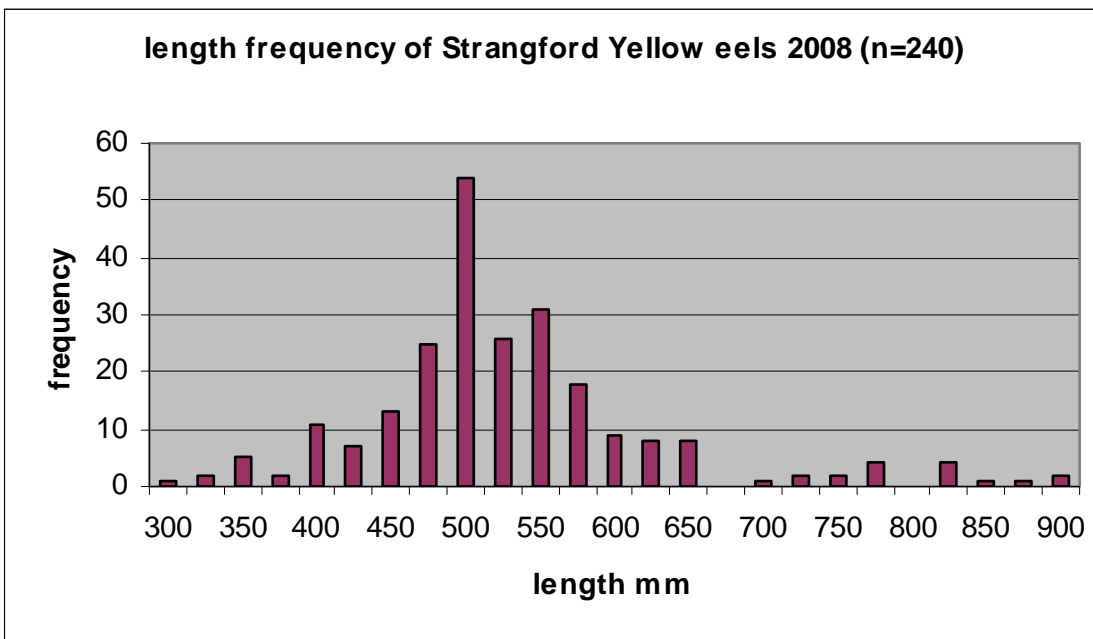


Fig 2.3 Length frequency of Strangford yellow eels sampled in 2008.

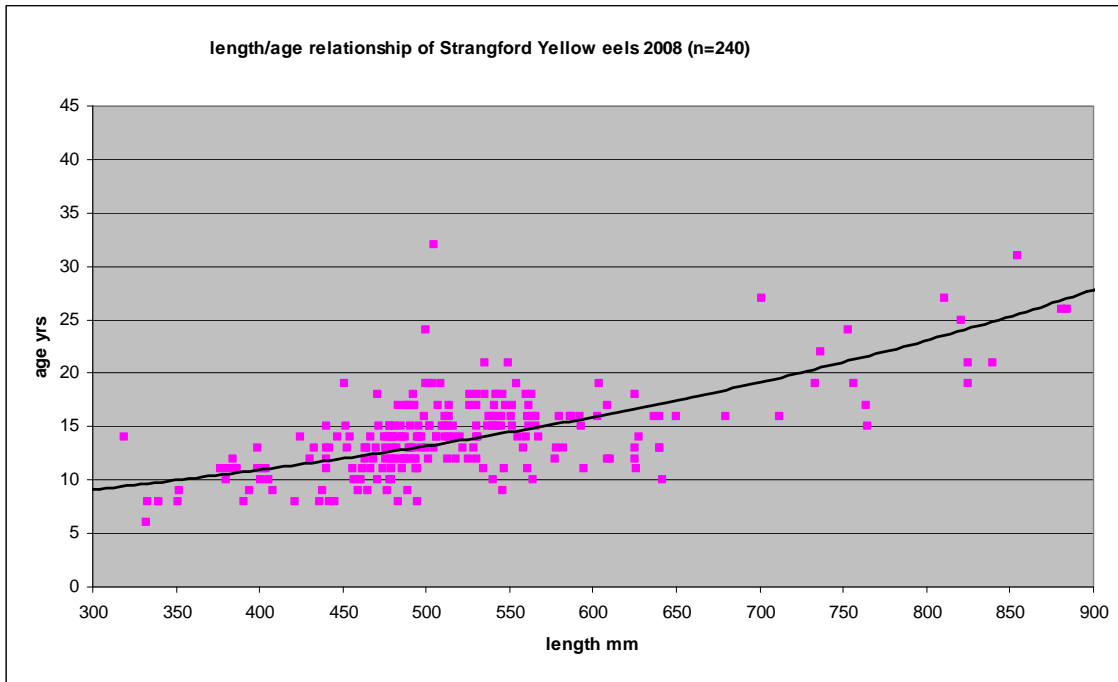


Fig 2.4 Length at age relationship of Strangford yellow eels sampled in 2008.

2.2 Recruitment

Several sites around the Northern Ireland coastline were examined for glass eel in February and March of 2004, 2005 and 2006, using hoop and drag nets (Evans, 2004, 2005; Plate 3). Three of the sample sites were in this E RBD area: Carlingford Lough/Newry Canal, (South Down coastal) Quoile barrage (which soon proved to be too hazardous to fish and was dropped) and Shrigley River (Strangford Lough). In addition, glass eel were sampled at the tidal limit of the River Lagan, at Stranmillis, Belfast, in 2005 and 2006. Samples of the catch were measured for length and weight (Table 2.2).



Plate 3. Drag net used in glass eel surveys 2004 – present.

The work demonstrated that glass eels were still arriving annually to Northern Ireland's East coast, from Belfast southward. Some sites, particularly Carlingford Lough at the mouth of Newry Canal, had locally significant quantities of glass eel arriving (table 2.2).

Table 2.2 Data on glass eel sampling, North Eastern RBD sites, 2004- 2006 (D. Evans, unpublished data)

2004 data	shrigley 1	shrigley 2	cford 1	cford 2	cford3	lagan1	lagan2	lagan3
mean length mm	69.2	68.8	69.7	69.4	68.7	not sampled in 2004		
mean individual weight g	0.4	0.38	0.41	0.35	0.31			
number kg-1	2525	2632	2420	2857	3226			
2005 data	shrigley	shrigley 2 no 2nd sample	cford1	cford2	cford3	lagan1	lagan2	lagan3
mean length mm	72.4		70.2	70.4	69.1	68.4	67.6	68.3
mean individual weight g	0.33		0.31	0.32	0.31	0.37	0.33	0.39
number kg-1	3040		3225	3125	3225	2703	3030	2564
2006 data	shrigley	shrigley 2 no 2nd sample	cford1	cford2	cford3	lagan1	lagan2	lagan3
mean length mm	72.4		70.2	70.4	69.1	66.5	no additional samples	
mean individual weight g	0.33		0.31	0.32	0.31	0.38		
number kg-1	3040		3225	3125	3225	2653		

Despite the fact that monitoring of glass eel immigration involves working at night in potentially hazardous conditions, this work has continued annually on an *ad-hoc* basis, at the Carlingford site in particular. While not quantitative, it indicates that there is still annual glass eel supply to this coast (Table 2.3). It is recommended that glass eel spot sampling continues, and, resources permitting, is structured to improve the long term value of the data. There could be merit in fitting permanent structures or traps for counting glass eel and elver where tidal head sluices with a fall exist (e.g. Lagan) for use in annual monitoring and to avoid hazardous night sampling.

DATE	lbs	kg	CPUE
Saturday 3/4/04	11	5	4667
04/04/2004	8	3.6	3360
05/04/2004	7	3.2	2987
06/04/2004	6	2.7	2520
07/04/2004	4	1.8	1680
Total	36	16.3	mean 3043

Experimental Glass eel fishing at Carlingford, 3rd to 7th April 2004.
CPUE based on 3hrs netting mean 2800 glass eel kg-1

DATE	lbs	kg	CPUE
Tuesday 20/4/04	0.5	0.2	249
21/04/2004	0	0	0
22/04/2004	0	0	0
23/04/2004	7	3.2	3492
24/04/2004	0	0	0
Total	7.5	3.4	mean 1871 (over 2 nights)

Table 2.3. Experimental Glass eel fishing at Carlingford, 20th to 24th April 2004.
CPUE based on 3hrs netting mean 3300 glass eel kg-1

2.3 Description of eel fisheries in this River Basin District

There are no active eel fisheries in this RBD.

Historically, there were eel fisheries on the River Lagan and in the Quoile river, fishing for silver eels at eel racks on watermill weirs. The eel weirs on the River Lagan are only known due to the retention of “eel weir” as a local name for sites on the river, and these weirs are now derelict and have been unused within living memory. The Quoile system was fished commercially for small quantities of eel until the 1960’s in the river section, and until later (1999) in the estuarine impoundment, where fishing rights are in state ownership. Eel weirs on the Ballynahinch tributary of the Quoile at Rademan and Drumconagher have not been fished since 1967 and 1998, respectively (Johnstone, 2004). The Department of Agriculture let the eel fishing rights of the Quoile by tender until 1999, when the last lessee catch returns were about 500 kg annually from fyke nets and a

fixed wing net (large fyke) in the exit channel. Since 2000, the Quoile commercial eel fisheries have been closed.

2.4.1 Estimate of potential downstream escapement of silver eel in the absence of anthropogenic mortalities

In the absence of any robust data on eel populations and production in the RBD, either recently or prior to 1980, the escapement target can only be estimated, “with reference to the ecology and hydrography of similar systems”, i.e. option c in Article 2.5 of the Regulation. The area of lakes and rivers available and productive to eel in the RBD is about 800 ha, of which 640 ha is in the lakes in the Lagan and Quoile catchments, with the addition of an estimated 160 ha of productive river area. At 5 kg per hectare, (Moriarty and Dekker 1994), this would yield a “pristine” escapement from full recruitment of about 4 tonnes, and an EU regulation target escapement of about 1.6 tonnes.

2.4.2 Actual current escapement

Actual current escapement is not known, but is free and unimpeded,

2.5 Condition of eel habitat, migration obstacles, sources of mortality, pollution, contamination and or parasitic infection.

The eel habitat in the RBD varies almost entirely from natural to highly modified. Describing the areas listed by subdivision as outlined in the EMP descriptions above, habitats are as follows:

A (map 1.2a above) River Bush and Glens of Antrim Rivers

The rivers here are unproductive for eel, being short small catchments, without accessible lakes, but probably also largely unchanged from original natural productivity of eel.

B (map 1.2b above) River Lagan and Belfast Lough catchments

This area contains all the City of Belfast urban streams, and the River Lagan, and much is modified physically. However, it is arguable that some of this modification has actually improved the value of the habitat for eel. Examples include, the impoundment of the estuarine River Lagan to a rich brackish urban pondage, the land drainage altered channel form of the lower 20 Km of the River Lagan, and the presence of numerous weirs associated with former industry, and the presence of canalised stretches. These modifications, dating from the 1700's and later, all create pondage from former fast or moderate flowing river stretches, which along with 20th Century eutrophication, may make the area more eel-productive than in its “pristine” state. The critical issue is whether or not the weirs and dams are passable to eel. A programme of fish pass construction for salmon in the 1990s may have affected eel passability, but a key action for this catchment will be an eel-specific survey of current distribution in relation to barriers or potential barriers.

C (map 1.2b above (Quoile and other Strangford Lough catchments)

Apart from the Quoile barrier and pondage constructed in the 1950s, most of the rivers in this area are small drainages, without barriers, and are accessible to eel. The Quoile tidal barrier and impoundment, constructed in the 1950s, created eel habitat from what was

previously a shallow estuary. The opening of a former barrier at the town of Downpatrick on the Quoile river, along with refurbishment of the fish passage arrangements on the tidal barrier in 2005 should now allow full upstream passage of immigrating eel.

D (map 1.2d South County Down and South County Armagh streams).

This area has not been surveyed for eel, but there are no major issues for eel access, and recruitment is known to occur to the coast, as evidenced by the index site at Carlingford (Table 2.3). There are some minor modified coastal areas protected by sluices through which eels have free access in and out which may need investigation, but it is possible that the retention of fresh or brackish water lagoons behind tidal restricting sluices (for instance off Dundrum bay) may actually create and add to the eel habitat of the region, as for the Quoile impoundment (see above).

2.6 Pollution, contamination and or parasitic infection.

The RBD is free of major pollution issues which would affect eel. Some parts of the Lagan (area B) and Quoile (area C) are subject to eutrophication of both rivers and lakes, to a level where eel productivity is likely, if anything to be elevated above historical reference level. Occasional pollution incidents occur through organic enrichment but kills of eel are very rare.

The River Lagan was known to have high levels of PCB contamination in eels in the early 1990s. There are no more recent data, and this should be addressed.

The Northern Ireland Eastern RBD is thought at this point to be free of *Anguillicola crassus*. All samples of eel processed through the fisheries Laboratory of AFBI are routinely screened for this parasite.

3.0 Restocking

There is no stocking activity in this RBD and there are no plans to stock, as the areas are considered to be largely accessible to any naturally immigrating eel, and silver eel production and escapement is not considered to be significantly impacted by anthropogenic factors. Further investigations could examine the possible capture of glass eel in Newry canal/Carlingford area for assisted migration or stocking to local lakes within the RBD.

4.0 Monitoring arrangements

Monitoring of eel stocks in this RBD will be harmonised with the Water Framework Directive (WFD) sampling, and salmon management (SMP) electro-fishing programmes. Those sites and rivers where existing or planned programmes will collect data on eel are given in Table 4.1. There are no eel fisheries to monitor.

Only one additional site is considered to be required to complete eel monitoring for the RBD, i.e. a new site representing a lake on the Lagan system (sub region 2). This falls outside of currently planned and agreed fishery monitoring, and will have to be commissioned separately.

The first reporting round collating eel data from WFD and SMP monitoring will be completed for the first review of this EMP in 2012.

Table 4.1 WFD and SMP monitoring sites which will provide eel data for the North Eastern eel RBD.

Monitoring programme	Site (and Basin Subunit as per maps above)	Grid reference	Data type	Target Monitoring frequency
Water Framework Lake	Derryleckagh Lough (4)	128257	Semi Quantitative lake survey with fyke nets	Triennial
Water Framework Lake	Castlewellan Lake (4)	325368	Semi Quantitative lake survey with fyke nets	Triennial
Water Framework Lake	Clea Lakes (3)	507551	Semi Quantitative lake survey with fyke nets	Triennial
<i>Eel specific survey for Eel regulation</i>	<i>Proposal – site needed for lagan system (2)</i>	<i>Site Not yet agreed</i>	<i>Semi Quantitative lake survey with fyke nets</i>	<i>Triennial</i>
Water Framework River Site	BLACKWATER (ARDS) R AT BALLYMARTIN ROAD BR (3)	502623	Quantitative river site with electrofishing	Triennial
Water Framework River Site	ENLER R AT KENNEL BR (3)	456698	Quantitative river site with electrofishing	Triennial
Water Framework River Site	LARNE R AT OWENS BR (1)	D378009	Quantitative river site with electrofishing	Triennial
Water Framework River Site	BALLYEMON R AT CLOGHS UPPER (1)	D224277	Quantitative river site with electrofishing	Triennial
Water Framework River Site	KILLYGLEN BURN AT DRAINS BR (1)	D392052	Quantitative river site with electrofishing	Triennial
Water Framework River Site	CAREY R AT TORTEIGE (1)	D174398	Quantitative river site with electrofishing	Triennial
Water Framework River Site	GLENDUN R AT KNOCKNACARRY BR	D240326	Quantitative river site with electrofishing	Triennial
Water Framework	BALLYHOLME BAY	J523823	Quantitative river site with	Triennial

River Site	STREAM/COTTON R AT BALLYHOLME BR (2)		electrofishing	
Water Framework River Site	ANNACLOY R AT ANNACLOY BR (3)	J449484	Quantitative river site with electrofishing	Triennial
Water Framework River Site	DRUMANESS TRIBUTARY U/S OF DRUMANESS (3)	J398497	Quantitative river site with electrofishing	Triennial
Water Framework River Site	LAGAN R AT SHAWS BR (2)	J325690	Quantitative river site with electrofishing	Triennial
Water Framework River Site	SHIMNA R AT IVY BR, TOLLYMORE FOREST (4)	J353323	Quantitative river site with electrofishing	Triennial
Water Framework River Site	ANNALONG R AT ANNALONG BR (4)	J374198	Quantitative river site with electrofishing	Triennial
Water Framework River Site	BUSH R AT BUSHMILLS NEW BR (1)	C939409	Quantitative river site with electrofishing	Triennial
Water Framework River Site	BLACKSTAFF (SOUTH DOWN) R AT TULLYMURRY BR	J429411	Quantitative river site with electrofishing	Triennial
Salmon Management River Catchment	River Lagan (100 sites, 2)	Whole river system	Semi-quantitative salmonid survey noting other spp	Annual
Salmon Management River Catchment	River Bush (>100 sites) (1)	Whole river system	Semi-quantitative salmonid survey noting other spp	Annual
Salmon Management River Catchment	Glendun River (1)	Whole river system	Semi-quantitative salmonid survey noting other spp	Annual
Salmon Management River Catchment	Shimna river (4)	Whole river system	Semi-quantitative salmonid survey noting other spp.	Annual

5.0 Management actions

5.1 Measures to reach the 40% escapement objective.

This RBD has no eel fisheries and no hydropower or other direct anthropogenic mortalities on eel. As far as is known, eel are free to recruit, ascend to rivers and lakes, grow and emigrate. It is not known whether the 40% target (1.6 tonnes total escapement) is being met, but given adequate recruitment all eel are considered to be free to migrate, grow and emigrate naturally. Any failure to meet the target will be entirely due to low level of natural recruitment. This situation will be kept under review. Stocking would be the only management measure that could increase eel production in the RBD, over and above any future increase in natural recruitment. However, stocking would be prohibitively expensive and is not considered a viable option.

The Following actions will be commissioned in order to improve knowledge of eel production in the RBD and assessment of compliance, for completion over the period 2009-2011.

- A precautionary survey is required of fish passes on weirs on the rivers Lagan and Quoile, with specific regard to eel accessibility. If and where deficiencies are found, eel passage will be enabled where practicable, perhaps by improvements to existing salmon passes.
- Investigations into those minor modified coastal areas protected by sluices to assess eel access and eel populations above them.
- An up-to-date re-assessment of contamination levels and the status of *Anguillicola crassus* infections
- Lake and river eel populations will be assessed over the next 4 years to the first EMP review, by adding eel work to surveys already under way for salmon management and for the Water Framework Directive. It is recommended that one additional eel lake survey site is added to these programmes, in the Lagan catchment.
- Glass eel recruitment spot sampling will be continued annually at the sites already established for the estuaries of the Quoile, Lagan and Newry rivers.
- No old eel fisheries will be re-opened, nor will new fisheries be permitted, in the RBD, other than for glass eel/elver for potential assisted migration upstream.
- Any requests for new water abstraction licenses or small scale hydropower in the RBD will be critically assessed and eel protection measures built in to schemes

5.2 Time Schedule for attainment of the objective

It is considered, for this RBD, that the 40% escapement objective, (1.6 tonnes of silver eel) relative to an historical period with full recruitment, will be attained naturally as soon as recruitment is adequate.

5.3 Additional measures for transitional waters adjacent to but not covered by the EMP

The assumption that all eels make an obligate migration into freshwater, and that eel production is entirely associated with freshwater habitats is questioned by some studies. Recent research has shown that marine/brackish waters may support spawner production in eel stocks, challenging current management practices. This RBD has some ideal locations in which to examine this question, as it supports several river catchments with adjacent marine areas known to contain at least some eel, that are relatively un-impacted by factors associated with eel declines elsewhere (e.g. barriers to migration or xenobiotic pollution). A PhD research programme, which commenced in 2008, under the co-supervision of AFBI and Queens University, Belfast will combine traditional (estimation of abundance, growth, fecundity, lipid concentrations) and novel ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and $\delta^{34}\text{S}$, fatty acid analyses and otolith microchemistry) methods to assess freshwater and marine habitat use. This project to run from 2008 to 2011 will examine yellow and silver eels from freshwater, brackish and marine habitats across Northern Ireland including the Quoile estuary, and Lagan impoundment in this RBD.

6. Control and Enforcement

Policing and protection

There are no active legal commercial fisheries in this eel RBD, and all fishing reported will be assumed to be illegal. Surveillance is the responsibility of the Fisheries Conservancy Board (FCB) and DCAL. Staff operate patrols to detect and deter illegal fishing. This surveillance shall be resourced and deployed to fulfil the requirements of this plan.

References

Evans, D.W. 2004. Northern Ireland Glass eel Survey. DARD Science and Queens University Belfast, Internal report to DCAL NI.

Evans, D., 2005. Report on Glass eel surveys. Unpublished report to the Department of culture, Arts and Leisure for Northern Ireland, Inland fisheries Branch

Hodgson, J (2001) A detailed habitat survey of the Glasswater and Annacloy Rivers Co Down with respect to sea trout populations. MSc Thesis Queens University, Belfast.

Johnstone, P. 2004. Assessment of the arrangements for fish passage at the Quoile barrage and proposed improvements. In Environmental Impact Statement for the reconstruction of the Quoile Barrage, 2004. Atkins Ltd

Thompson, N. G. (1994) A study of fish stock and water quality of the Quoile pondage. MSc Thesis, Queens University Belfast.