Eastern Eel Management Unit Eel Management Plan

Introduction

This chapter has been prepared in accordance with Council Regulation (EC) No. 1100/2007 to describe measures to be carried out within Ireland's Eastern Eel Management Unit (EEMU) for the recovery of the stock of European eel. The chapter will give an overview of the physical characteristics of the EEMU. The state of the current eel stock and the eel fishery will be described and analysed for the EEMU. Local stocks and fisheries will be analysed to estimate the current level of escapement at the catchment level. The quality of the eel habitat will be assessed and pressures or risk factors will be identified. Finally, we will describe current and future monitoring and management actions that will ensure that target levels of escapement will be achieved.

The Department of Communications Energy and Natural Resources, Inland Fisheries Division, and the Department of Culture, Arts and Leisure Northern Ireland, inland Waterways and Inland Fisheries, convened a meeting on the 11th March 2008 in Dublin and subsequently exchanged written agreements (13th March and 20th March 2008 (ref:C17/9/161)) on the transboundary EMPs and agreed full co-operation in this regard. Scientists from the Marine Institute, Central Fisheries Board and DCAL – AFBINI have also agreed co-operation. One eel management plan will be submitted in respect of the Eastern Eel Management Unit incorporating the Eastern River Basin District and part of the transboundary Neagh-Bann River Basin District and this will be prepared by the Eastern Regional Fisheries Board and submitted by DCENR.

The Eastern Regional Fisheries Board (ERFB) is a statutory body, established under the Fisheries Act 1980, operating under the aegis of the DCENR. The ERFB is responsible for maintaining and improving environmental quality and developing and protecting the fisheries resource within its region. Eel fishing licences and authorizations are issued on a Regional basis.

The Loughs Agency aims to provide sustainable social, economic and environmental benefits through the effective conservation, protection, management, promotion and development of the fisheries and marine resources of the Foyle and Carlingford Areas.

Lead organisation: ERFB, in conjunction with the Loughs Agency

Area Covered: Eastern River Basin District and southern part of the Neagh Bann River Basin District

Contact details: Pat Doherty, ERFB

1. Description of Management Unit

The EEMU covers an area of approximately 6,657 km² in the east-central portion of Ireland. It includes the Eastern River Basin District (ERBD), defined as the physiographic region within Hydrometric Areas 7-10 that drains to the Irish Sea (ICES VIIg), and adjacent transitional and coastal waters. The Republic of Ireland (RoI) and Northern Ireland (NI) have agreed that the EEMU will also include rivers within the southern part of the Neagh-Bann River Basin District that flow into Carlingford Lough from the RoI and into Dundalk Bay (see section 2.2 of National Report). These extra-ERBD areas account for 15% of the surface area and 16% of the wetted area of the Eastern Eel Management Unit (figure 1.1).

Unique features of the EEMU include a large population (over 40% of the RoI's population) and significant numbers of urban areas, including the greater Dublin area. However, agriculture is still the dominant land use.

There is a clear north south distinction in habitat within the EEMU. Approximately 84% of surface waters within the EEMU are calcareous. The total area of river channels in the EEMU is 2,182 ha. The ERBD alone contains 524 natural lakes but only 20 lakes exceed 10 ha in size. The area covered by natural lakes is about 2,882 ha with lakes exceeding 10 ha in size accounting for 1,740 ha. Of these larger lakes, thirteen occur in the northwest of the ERBD, or mid-west of the EEMU, and the remaining 7 in the uplands in the south. There are only 6 lakes and 2 reservoirs greater than 50 ha. The total lacustrine surface of the EEMU (both ERBD and non-ERBD parts), including impoundments, is 4,861 ha.

There is also a significant quantity of transitional waters within the EEMU. Four coastal lagoons and 14 transitional waters occur within the EEMU, comprising a total surface area of 5,982 ha.

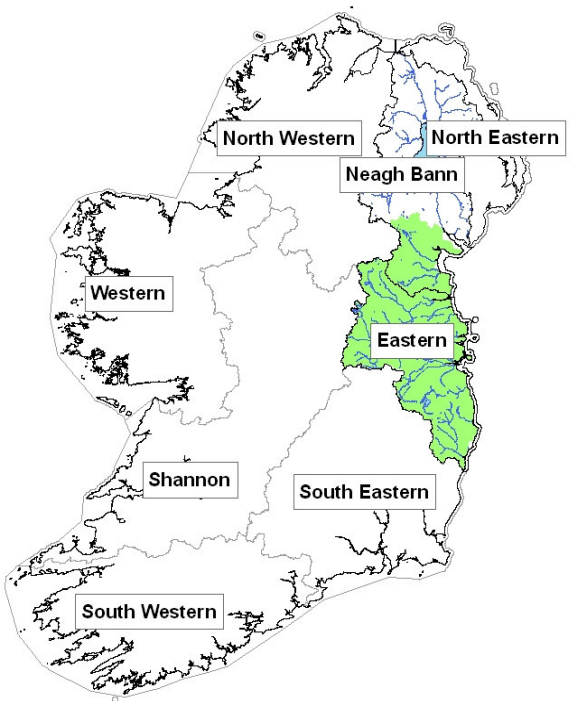

Figure 1.1. The Eastern Eel Management Unit (green) in relation to the Eastern and Neagh-Bann River Basin Districts.

1.1. List of Catchments

The EEMU includes the fisheries districts of Dundalk, Drogheda, Dublin, and Wexford (figure 1.2). The Dundalk district covers an area of 968 km^2 and its major catchments are the Glyde, Dee, and Fane rivers. The Drogheda district covers an area of 2,193 km^2 and it is

predominantly composed of the Boyne catchment. The other principle catchments in the district include the much smaller Nanny and Devlin catchments. The Dublin district covers 1,993 km^2 and the dominant catchment is the Liffey. The part of the Wexford district that lies within the ERBD consists of three main river basins, the Dargle in the north, the Vartry in the centre and the Avoca in the south. It comprises approximately 756 km^2 of land area. A full list of the catchments within each district, along with their wetted area is available in Appendix 1.

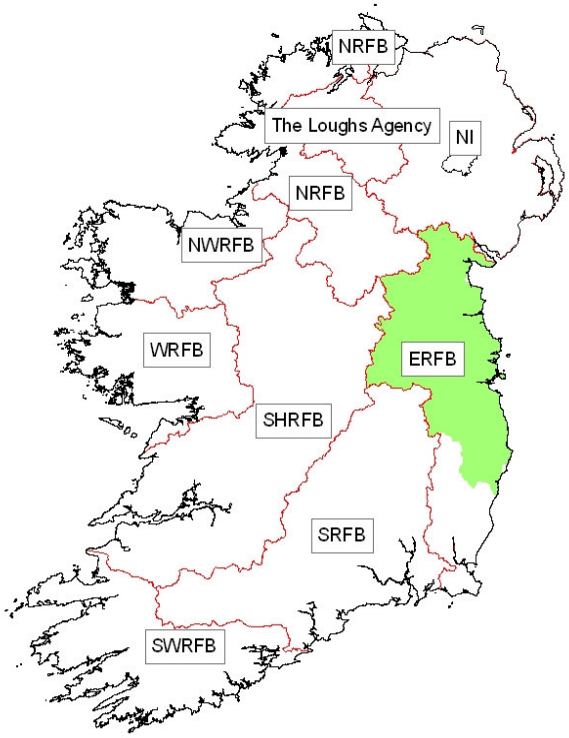

Figure 1.2. The Eastern Eel Management Unit (green) in relation to the jurisdictions of the relevant Fisheries Boards (red).

1.2. Habitat breakdown within Catchments

Quantification and classification of the available freshwaters within each RBD were calculated with a GIS based on 1:50,000 Ordnance Survey of Ireland mapping. A statistical model relating river reach characteristics (catchment area upstream and the stream link magnitude) to river width measurements from a large number of sites across Ireland was used to estimate fluvial wetted areas. Finally, the Geological Survey of Ireland related the water chemistry of ground-waters to bedrock type so that the nature of waters could be estimated based on the underlying bedrock. See section 3.2 of the national report for details.

The main catchments of the Dundalk district (table 1.1, Figure 1.3), the Glyde, Dee, and Fane, contain 242 ha of fluvial habitat and 778 ha of lakes. Overall the district contains 1,039 ha of wetted area, approximately 45% of which is fluvial and 95% of which is Calcareous. Transitional waters include the Castletown estuary (18,700 ha), the Glyde estuary (1,200 ha) and the Fane estuary (900 ha)

The Drogheda district is dominated by the Boyne catchment (table 1.1, Figure 1.3). The Boyne catchment has a low gradient and contains 772 km of stream channels of various orders. The Nanny and the Devlin catchments are smaller containing just 223 km of fluvial channels between them. Overall, the Drogheda district contains 2,455 ha of surface water, approximately 41% of which is fluvial. The district includes 2 significant estuaries, the Boyne (316 ha) and the nanny (20 ha).

The Dublin district contains a total of 3,087 ha of freshwater wetted area, 75% of which is contained in Lakes (table 1.1,1.2, Figures 1.3,1.4). The dominant catchment within the district is the Liffey. The district is the most densely populated in Ireland. Some of the most rapidly expanding towns in the country, such as Naas, Celbridge and Newbridge lie along the Liffey to the West of Dublin. The population of these towns has expanded by more than 30% in the last 10 years. Despite the fact that 21%of the Liffey catchment area is continuous and discontinuous urban fabric, agricultural land still makes up 61% of the area. There is a surprisingly high percentage of peat bog coverage (11%), with 3% managed forests also providing significant land use higher in the catchment. Overall, 70% of the wetted area within the Dublin district is calcareous. Transitional waters are relatively common with estuaries at Liffey (480 ha), Rogerstown (305 ha), Mayne (189 ha), Tolka (357 ha), North Bull Island, Broadlough (80 ha), and Broadmeadow (333 ha).

The Wexford district is the most southerly in the EEMU and its habitat is remarkably distinct from the other three districts. Its waters are exclusively siliceous and hence of poor productivity for eels. However, the district contains just 253 ha of fluvial habitat and 213 ha of lacustrine habitat, representing approximately 8% of the surface water of the ERBD. Despite its proximity to Dublin, the district contains some of the most beautiful scenery in Ireland, and therefore experiences heavy tourist pressure. Urban areas cover 6% of the district's area, while agriculture, predominantly pasture, accounts for a relatively low 51%. It contains the greatest proportion of forestry lands at 23%. Forestry can create its own unique pressure on water quality by causing acidity problems, particularly on the poorly buffered geology of the Wicklow Mountains, as well as problems with suspended solids from erosion and harvesting of tree crops. The district also contains the highest proportion of bogs and wetlands in the ERBD at 19% of the catchment area. Transitional waters are limited to the Avoca estuary (18 ha).

Table 1.1. Summary statistics for the wetted area within the Fisheries Districts of the Eastern Eel Management Unit.

	Surface-area		Wetted area (ha)		
	Catchment (ha)	Non calcareous (%)	Lacustrine	> 1st order fluvial	1st order fluvial
Drogheda	2940	2	1493	852	110
Dublin	1993	31	2373	638	77
Wexford	756	100	213	220	33
Dundalk	968	1	782	210	43
EEMU	6657	30	4861	1920	262

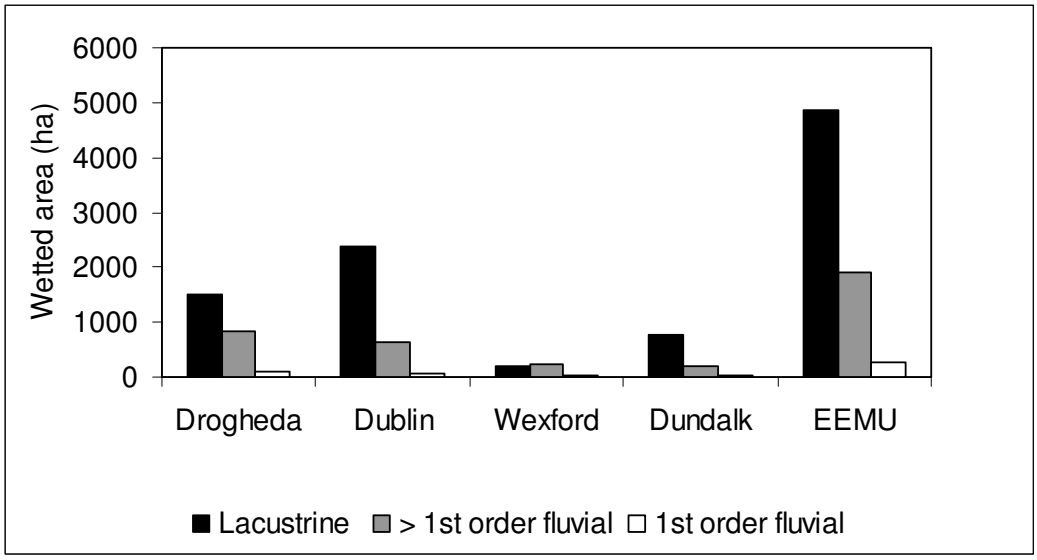

Figure 1.3. The distribution of the wetted area between the relevant Fisheries Districts and habitats of the Eastern Eel Management Unit.

2. Description & Analysis of Present Eel stocks

Data within the EEMU as a whole is not sufficient for any firm conclusions regarding the status of the stock to be drawn at this time. The status of the stock is estimated using a national model as outlined in Section 5 of the National Report. The results of this analysis are shown in section 4 of this chapter.

Historical data collection is ongoing in the NDP Project (section 1.1 of National Report) and this may facilitate some assessment of the stock to be made. It is intended to undertake eel specific surveys in the first 3 years of the plan (section 7 of National Report).

3. The EEMU Commercial Eel Fishery

3.1. Commercial capacity and effort

The EEMU Region has a long tradition of fishing for brown eel in Loughs Muckno and Ramor and some smaller lakes and of a very substantial number of eel weirs and 'fishing milldams', particularly on the Fane and Blackwater rivers. Boyne, Broadmeadow and Liffey estuaries are fished from time to time. The effort probably leads to stock depletion taking some years to recover. Fishing rights on both Lough Ramor and Lough Muckno are privately owned. Fyke nets are used on both lakes but long-lining is prohibited in the latter.

There has been a decline in the capacity of the brown eel fishery since 2002 (figures 3.1-3.3). The capacity of the silver eel fishery has remained largely constant in terms of coghill nets but has declined in terms of fixed traps. The proportion of licences issued that returned catch information is relatively high in the EEMU. Furthermore, a relatively high proportion of returns are for active licences. Fyke licences allow the use of 20 nets, while longline licences allow for 1000 hooks (see section 4.1.1 national plan).

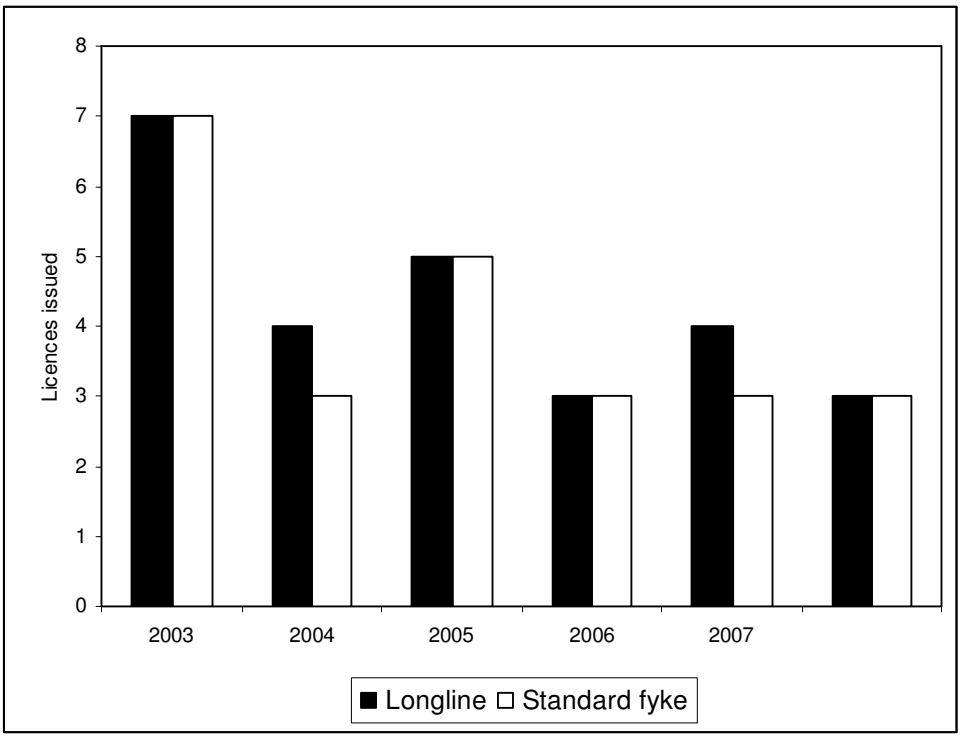

Figure 3.1. Capacity of the EEMU brown eel fishery.

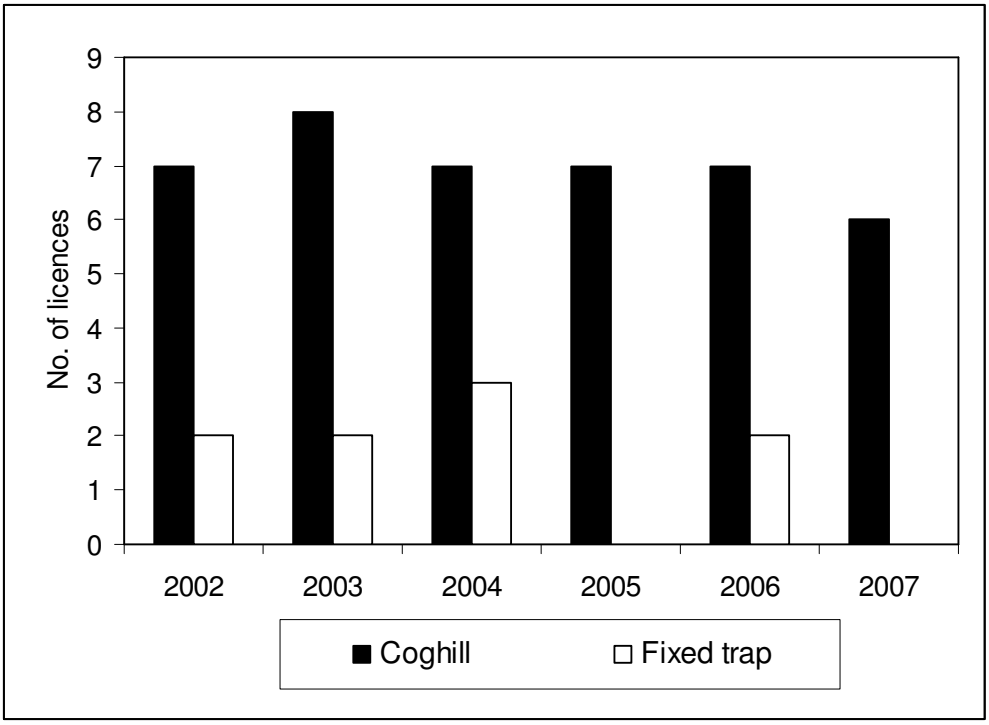

Figure 3.2. Capacity of the EEMU silver eel fishery.

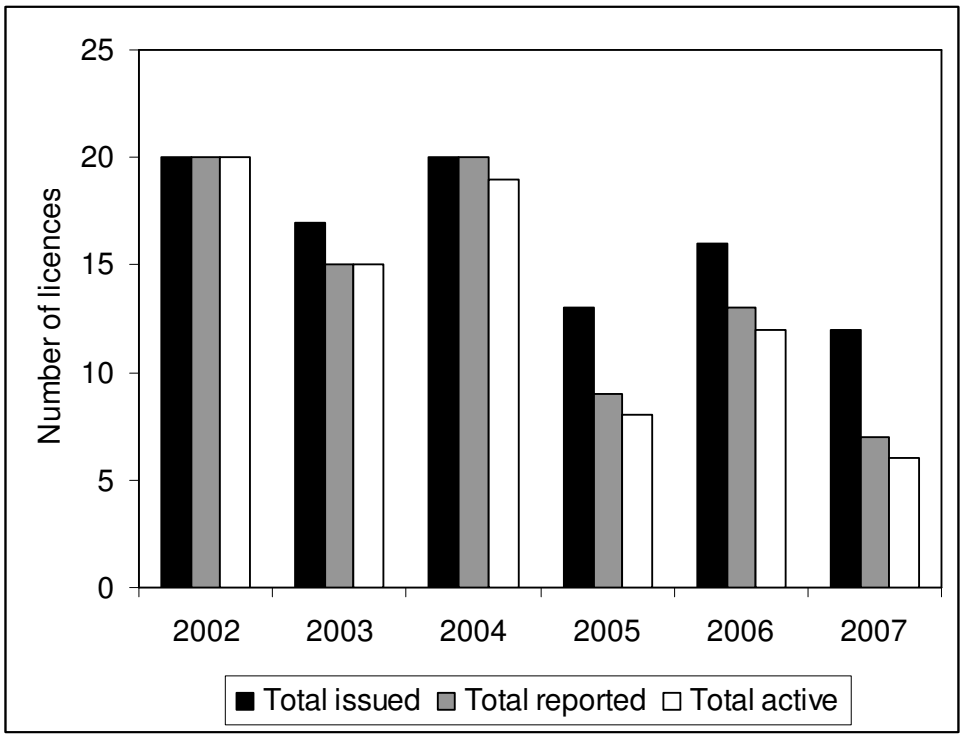

Figure 3.3. Capacity, level of reporting and reported effort of the EEMU fishery.

3.2. Commercial catch

3.2.1 – Glass eel / elver

Glass Eel and Elvers are currently not exploited in the EEMU.

3.2.2 – Brown eel

There has been a dramatic decline in the reported brown eel catch in the EEMU since 2002 (figures 3.4,3.5). In 2002 the brown eel catch was 7,800 kg or over 12% of the contemporary national eel catch. In contrast the 2007 catch of just 1,487 kg represented just 2.6% of the reported national catch. It is unclear how this relates to stock as the number of active reported licences has decreased over the same period.

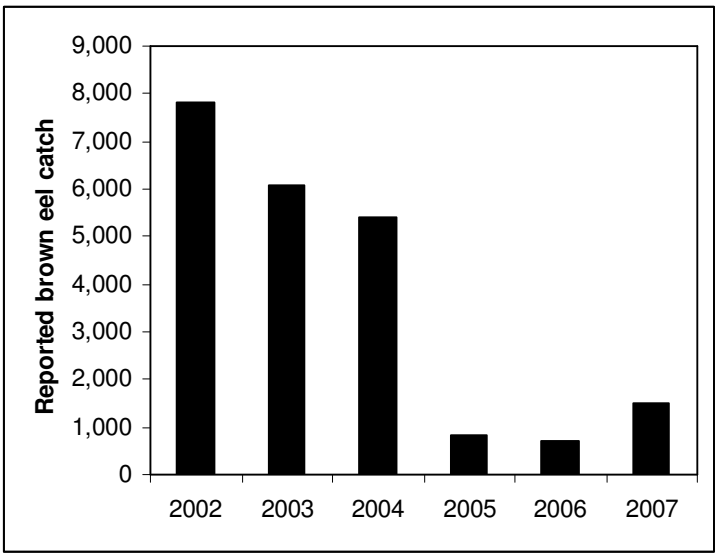

Figure 3.4. The reported brown eel catch in the EEMU.

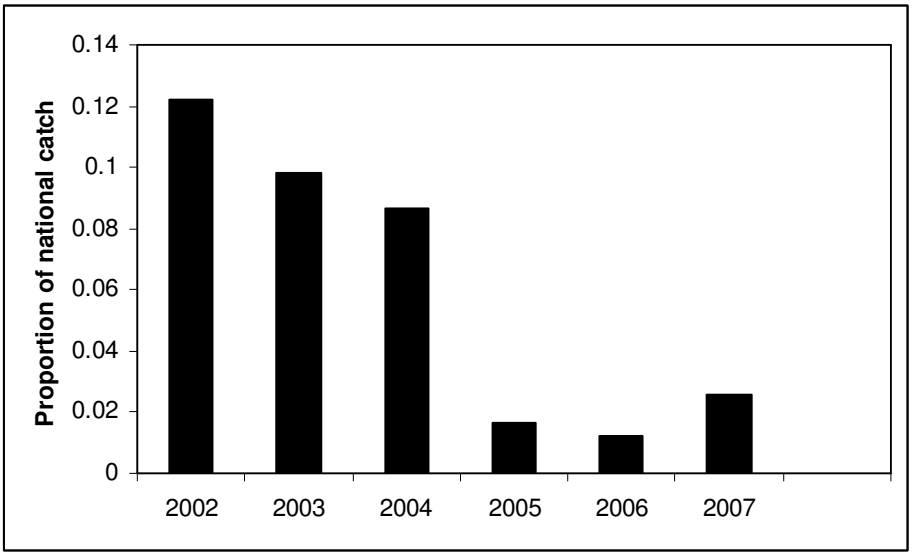

Figure 3.5. The proportion of the national brown eel catch taken in the EEMU.

3.2.3 – Silver eel

There also appears to have been a dramatic decline in the reported silver eel catch in the EEMU since 2003 (figure 3.6). In 2002 the silver eel catch was 2,360 kg or over 5% of the contemporary national eel catch. In contrast the 2007 catch of just 90 kg represented less than 0.3% of the reported national catch. It is unclear how this relates to stock as the number of active reported licences has decreased over the same period.

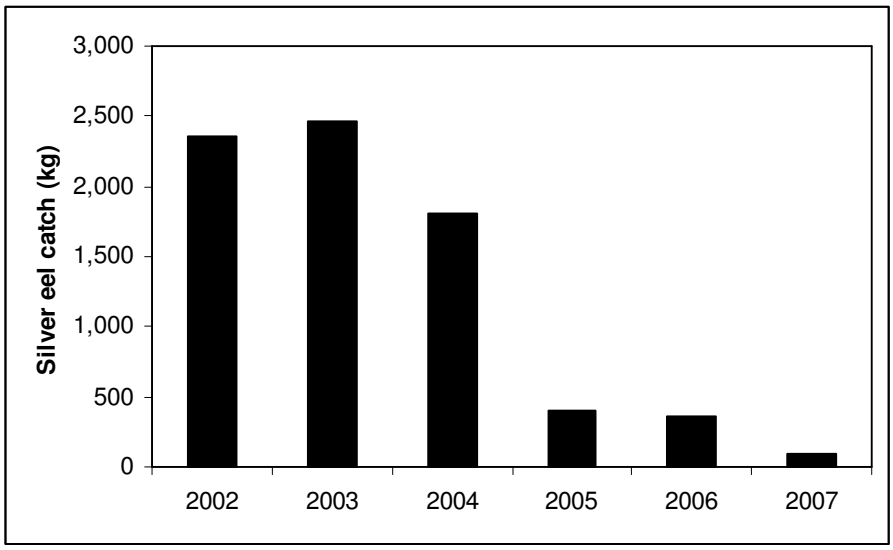

Figure 3.6. The Silver eel catch reported in the EEMU.

3.3. Recreational Fishery

There is no targeted recreational fishery for eel in the EEMU. Recreational eel fishing is only carried out by a minority of anglers and there is no legal, or voluntary, declaration of catch which is probably small. Some "recreational" fishing using fyke nets and baited pots takes place and this is authorized and reported under the commercial legislation.

General comments on regional eel angling fishery	Internal eel angling market	Tourist angling for eels
Limited interest and participation	• Not targeted by majority of Irish anglers • Very small group of individual anglers angle for eels in White Lake during summer period • Individuals targeting eels likely to be targeting “specimen eels”	Occasional German tourist known to fish for eels specifically

4. Escapement - local stock modelling

The Eel Regulation requires that each Eel Management Plan reduce anthropogenic mortalities so as 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. Thus, the potential production of silver eels (in biomass terms) for the EEMU prior to the decline in recruitment following 1982 was estimated. The biomass of silver eels currently escaping from the EEMU was also estimated. Both of these estimates required a habitat based extrapolation of productivity information from index catchments not necessarily within the EEMU. EEMU specific impacts were then imposed on this potential productivity to derive an approximate estimate of current escapement. See sections 5 and 9 of the National Report for details.

Pristine escapement for the EEMU is estimated at 22 tonnes, whereas current escapement is estimated to be approximately 7 tonnes i.e. 33% of pristine (Fig. 4.1). The EEMU is not currently achieving the 40% escapement target. If no management action is taken, escapement will steadily fall until 2020, dropping to approximately 5%. A complete closure of the fishery will not achieve the target, but rather will result in a brief rise to 36% before falling steadily to approximately 17% by 2020.

Achievement of the 40% target will require a recovery of recruitment, which in turn requires concerted action across Europe through the implementation of the Eel Regulation. It will not be possible for the EEMU to define realistic management measures that will achieve and maintain 40% escapement in the long term. Instead, interim measures are required, aiming at recovering recruitment sufficiently so that management measures can be defined that achieve 40% escapement. These interim measures involve setting target levels of anthropogenic mortality that would achieve recovery of the stock within a given time frame provided the same low level of pressure was achieved across Europe (see Section 5.3 of the National Report).

The impact of the proposed management measures on anthropogenic mortality and the timeframe for recovery of the recruitment are presented in Chapter 8 (i.e. the Management Measures section).

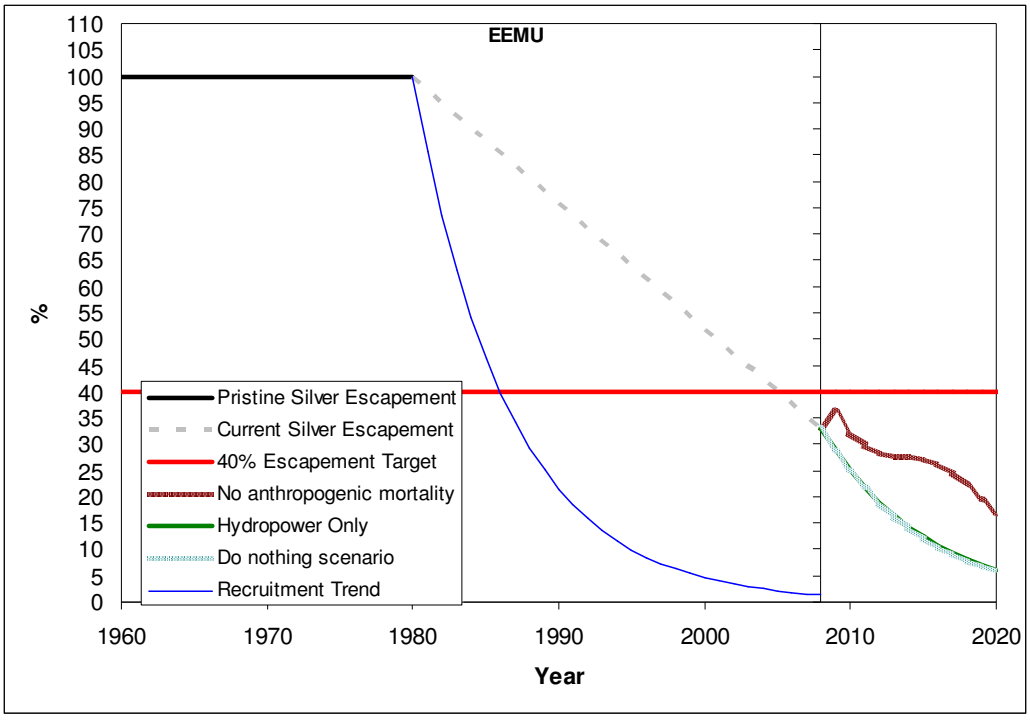

Figure 4.1. The proportion of pristine escapement estimated to leave Irish waters currently and in the future under various management scenarios.

5. Environmental quality assessment

The EEMU is the most densely populated region containing a population of approximately 1.5 million or 39% of Ireland's population. It also contains significant industrial capacity, although agriculture remains the highest overall land use.

The ERBD waters have been characterised under the Water Framework Directive (WFD). Details for the non-ERBD (i.e. Neagh-Bann IRBD) part of the EEMU were unavailable at time of writing. In the ERBD, the combination of heavy agricultural, urban and hydromorphological pressures meant that 84.1% of water bodies, covering 74.1% of the ERBD, are either "At Risk" or "Probably At Risk" of not achieving good ecological status by 2015 as required under the WFD. A total of 21% of rivers were characterised at being "At Risk" or "Probably At Risk" from point sources, 82% from diffuse sources, 6% at risk from hydrological impacts (abstraction) and 64% from morphological impacts. Urban and agricultural pressures were most significant in terms of diffuse pollution, with canalisation and intensive land use being the most significant hydro-morphological pressures.

A total of 16% of lakes were characterised at being "At Risk" or "Probably At Risk" from point sources, 15% from diffuse sources, 35% at risk from hydrological impacts and 50% from morphological impacts. Diffuse, mainly agricultural, pressures were most significant in terms of diffuse pollution causing 4 lakes to be at risk (Glendalough Upper & Lower, Lough Ramor and Leixlip Reservoir), with impoundments and intensive land use being the most significant morphological pressures. The most overall significant predictive impact was from abstraction pressure which caused 35% of lakes being classed as "At Risk" (1a). Finally, 92% of transitional water bodies were considered to be "At Risk" or "Probably At Risk" from pollution pressures.

Data for the R. Fane on contamination, pathogens and parasites have been reported in National Report section 3.4

6. Stocking

6.1. Previous Stocking

There is no history of stocking within the EEMU.

6.2. Stocking as Part of the EMP

Stocking is currently being considered as a potential management option (see Section 7.5 in the National Report). However, this option requires further investigation and feasibility assessment, which will be guided by the Eel Scientific Committee (see chapter 6 National Report).

7. Monitoring

7.1. Escapement Monitoring

The national approach to escapement monitoring has been outlined in chapter 7 of the National Report.

7.2. Sampling of Catch & Effort, present & future

Given the proposed closure of the fishery, sampling of catch and effort will not be required.

7.3. Catch Sales/Dealers/Export

This section is dealt with in the National Report under Section 4.3.

8. Management Measures

8.1. Management actions

Scientific advice has indicated that the EEMU silver eel escapement is currently approximately 33% of pristine production (EU target = 40%) and will decline as a consequence of poor and declining recruitment over the last 18+ years to approximately 5% in 2020. International stock assessment has related the likelihood and time-frame of recovering recruitment to levels of anthropogenic mortality. It is unlikely that management measures can be defined to keep escapement above the 40% target in the long term (see section 4). Recovering recruitment will allow Ireland to define management measures that ensure 40% escapement. In the interim, recovery of recruitment is an appropriate alternative target that can be directly linked to management actions (see section 5.3 of the National Plan). Anthropogenic (human) mortality must be reduced across Europe by 85%, on average, just to halt the decline in the extremely low level of current recruitment.

The current level of anthropogenic mortality in the EEMU should just about contribute to halting the decline in recruitment. However, it should be noted that current recruitment is expected to lead to much lower levels of silver eel escapement than currently observed. Merely halting the decline is scientifically unacceptable and management actions must aim above this level. The closer to zero that mortality is reduced, the more assured we are of achieving a recovery and the quicker the recovery will occur (see Fig. 8.1).

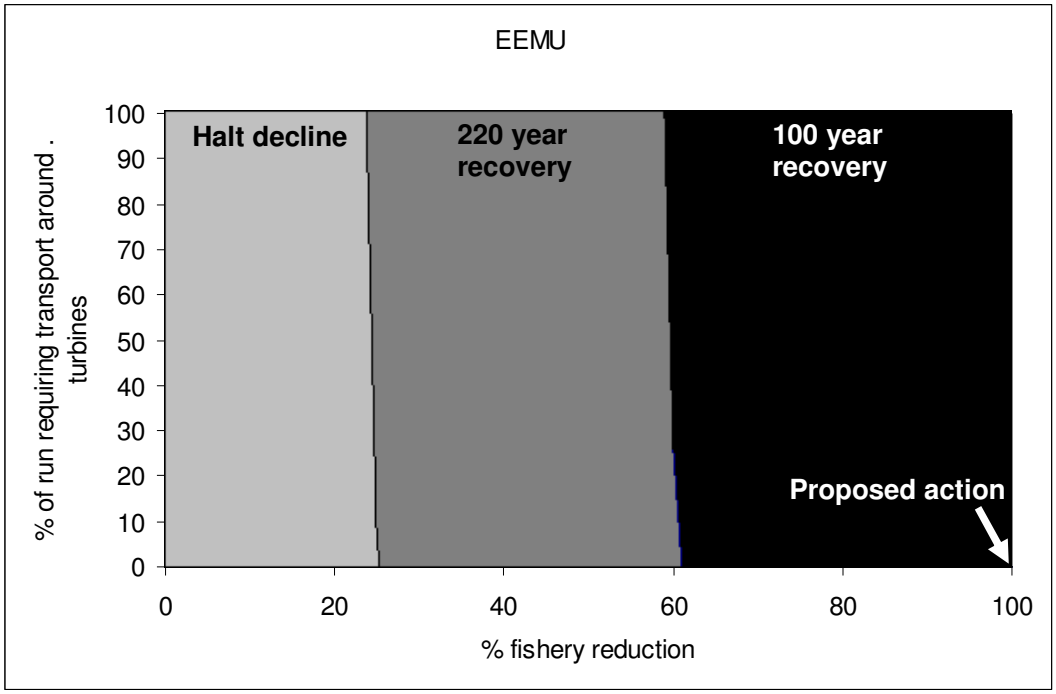

Figure 8.1. The relationship between time-frame to recovery and the level of anthropogenic mortality for the EEMU resulting from combinations of fishery reduction and trap and transport of the Liffey silver eels around the hydropower stations. The darker the shade the faster the recovery and the safer the action. White does not stop the decline in recruitment.

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

Action 1a: Cease fishery and close eel market

Timescale: 2009
Review: 2012, 2015, 2018

Given the implications of the scientific advice, the consideration of practical management implications and the need to conserve and recover the stock in the shortest possible timeframe (contingent upon equivalent actions across Europe), the precautionary approach is being

adopted in accordance with the recommendations of the National Eel Working Group and the eel fishery will be ceased and the market closed. Consequently, there will be a need for an increase in targeted eel protection and patrols for eels.

Proposed Foyle Area and Carlingford Area (Conservation of Eels) Regulations 2008

It is intended to introduce a Loughs Agency wide conservation and protection measure to protect Eels from over exploitation. The regulatory measure will introduce the following prohibitions on taking Eels;

- A person shall not take Eels by any means other than rod and line.
- Any Eel taken by any means shall be carefully handled and returned to the waters from which they were taken without avoidable injury.
- A person shall not sell or offer for sale within the Foyle Area or the Carlingford Area Eels caught by rod and line.

Action 1b: Recreational fishery
The proposed legislation will prohibit the possession of eels and this will therefore prohibit angler anthropogenic impact.

Action 1c: Diversification of fishery
CFB and eel fishermen will be engaged in investigating possible diversification for the former commercial fishermen.

Management Action No. 2. *Mitigation of hydropower*
Develop best practice document on the safe passage of eels through hydro-electric power stations and other barriers including water abstraction points.

Action 2a*: Trap & Transport :* not currently applicable

Review: 2012, 2015, 2018

Action 2b*: Quantify Turbine Mortality and morbidity*

Timescale: 2009-2011 with precision estimate
Review: 2012, 2015, 2018

Estimates of mortality and morbidity are required for the hydropower facility at Leixlip on the Liffey. A standard methodology will be developed by the Eel Scientific Committee to enable reasonably precise estimates of turbine mortality and morbidity to be calculated. This information will allow an estimate of the requirement of trap and transport to be calculated.

Action 2c: New turbine Installations
Ensure that all new installations should include an evaluation of all direct and indirect impacts on eels and that measures are undertaken so as to minimise these impacts. The efficacy of screens should be monitored for at least the first 3 years following installation (see section 3.5.2.2 of the National Report).

Action 2d: Engineered solutions
A long term strategy that may involve turbine design and modification and modification/creation of alternative downstream routes. Trap and transport will be employed until the efficacy of engineered solutions has been demonstrated (see section 3.5.1 of the National Report).

Management Action No. 3. *Ensure upstream migration at barriers (including small weirs etc.)*

***Action 3a**: Existing barriers*
It is not currently known to what extent existing barriers impede upstream migration of eels in Ireland. This will be dealt with through the monitoring programme described in Chapter 7 of the National Report. Following this evaluation, management measures will be considered as appropriate with a view to improving accessibility and negating any current impact.

***Action 3b:** New potential barriers*
Ensure that all new installations should include an evaluation of all direct and indirect impacts on eels and that measures are undertaken so as to minimise these impacts (see section 3.5.2.2 of the National Report).

***Action 3c:** Assisted migration and stocking*
In the event of a stocking programme being shown to be likely to yield a net benefit to the stock, this will be carried out in accordance with Chapter 6 of the National Report.

***Management Action No. 4.** Improve water quality*

***Action 4a:** Ensure compliance with the Water Framework Directive*
Timescale: 2015
Review: 2012, 2015, 2018

***Action 4b:** Fish health and bio-security issues*
Timescale 2009
Review: continuous
Refer to Chapter 8 of the National Report.

8.2. Projected impact of management actions

The management actions proposed for the EEMU will result in no fishing and very little turbine related mortality. According to the stock assessment of Astrom and Dekker (2007), the levels of anthropogenic mortality in 2009, 2010 and 2011 are consistent with a recovery time of approximately 80 years (assuming equivalent EU wide action).

8.3. Raising awareness of the state of the stock

Raising public awareness among the wider public on eels as a species in serious decline through educational and awareness raising programmes.

Ensure that consideration of eels is included in Environmental Impact Assessment, Water Framework Directive Programme of Measures, and relevant land and foreshore management (e.g. drainage and dredging operations.

9. Post EMP monitoring

The national approach to post EMP monitoring has been outlined in chapter 7 of the National Report.

Appendix I – Water bodies in the EEMU and their estimated productivity

Catchment surface area (km2)	Cat. (km2)
Fluvial wetted area (ha)	Fluv. (ha)
Lake wetted area (ha)	Lake (ha)
Non-calcareous geology (%)	N.-calc. (%)
Estimated pristine production (kg)	Prist. Pot. (kg)
Estimated current potential production (kg)	Curr. Pot. (kg)
Estimated current escapement (kg)	Curr. Esc. (kg)

		Cat. (km2)	Fluv. (ha)	Lake (ha)	N.-calc. (%)	Prist. Pot. (kg)	Curr. Pot. (kg)	Curr. Esc. (kg)
Castletown (River)	Dundalk	62	10	4	88	32	24	-
Dee (River)	Dundalk	389	122	87	2	1027	677	-
Fane (River)	Dundalk	128	21	553	0	2854	1881	-
Flurry (River)	Dundalk	30	1	0	60	3	2	-
Glyde (River)	Dundalk	360	100	138	0	1183	781	-
Termonfeckin	Drogheda	27	4	0	0	20	14	-
Boyne (River)	Drogheda	2613	878	1488	2	11621	7676	-
Delvin (River)	Drogheda	77	19	4	4	112	73	-
Nanny (River)	Drogheda	223	61	0	5	294	195	-
Ballough (Stream)	Dublin	33	10	0	0	50	32	-
Ballyboghil	Dublin	45	11	0	0	55	37	-
Broad Meadow (River)	Dublin	172	57	0	0	283	187	-
Dargle (River)	Dublin	128	41	39	78	208	125	-
Dodder (River)	Dublin	113	44	27	50	245	156	-
Liffey (River)	Dublin	1150	464	2024	21	2000	1331	-
Newcastle [Wicklow]	Dublin	19	4	0	100	8	5	-
Newtownmountkennedy	Dublin	17	4	0	100	8	4	-
Rathnew (River)	Dublin	21	5	0	100	10	6	-
Shanganagh	Dublin	40	8	1	94	19	10	-
Tolka (River)	Dublin	151	44	0	0	219	145	-
Vartry (River)	Dublin	104	24	282	100	591	336	-
Avoca (River)	Wexford	646	224	212	100	843	480	-
Potter's (River)	Wexford	45	12	1	100	25	15	-
Redcross (River)	Wexford	37	11	0	100	21	12	-
Three Mile Water	Wexford	28	6	0	100	12	7	-
EEMU		6657	2182	4861	21	21742	14189	7700

Transitional Waters	Exploited for				Wetted area
	Brown	Silver	Glass	Elver	(ha)
Fane Estuary					9
Glyde Estuary					12
Boyne Estuary	n	n	n	n	316
Nanny Estuary	n	n	n	n	22
Rogerstown Estuary	n	n	n	n	305
Broadmeadow Water	n	n	n	n	334
Mayne Estuary	n	n	n	n	184
Tolka Estuary	n	n	n	n	358
North Bull Island	n	n	n	n	213
Dargle Estuary	n	n	n	n	3
Broad Lough	n	n	n	n	80
Avoca Estuary	n	n	n	n	18
Ballymascanlan Estuary					89
Inner Dundalk Bay					3335
Castletown Estuary					188
Bann Estuary					250
Newry Estuary					288
Carlingford Lagoons					2
Kilcoole Marsh	n	n	n	n	23
Liffey Estuary Lower	n	n	n	n	481
Liffey Estuary Upper	n	n	n	n	19.5