Biology and Management of European Eel (Anguilla anguilla, L) in the Shannon Estuary, Ireland

FOREWORD TO CURRENT EDITION

This document was originally submitted during March 2003 to the Zoology Department, National University of Ireland, Galway in fulfillment of the requirements for the degree of Doctor of Philosophy, which I was awarded later that year. This document was formatted for online publication at www.EuropeanEel.com during February 2014. The only changes made to the document were updates to the location figures, as the original mapping could not be accessed due to software issues. Likewise, a number of the photographs have been substituted as the originals could not be located, or were of inadequate resolution. However the remainder of the content, with the exception of formatting changes, is identical to the original unpublished thesis and should be cited as such. No material changes to the text, data tables, or data figures have been made and these are all the originals.

Since this thesis was originally completed, the European Eel has been listed as ‘Critically endangered’ and the European Council Regulation 1100/2007 “Establishing measures for the recovery of the stock of European eel” has now been adopted in all EU member states, including Ireland. The current study contains important and relevant information that can be taken into account during the management of eel stocks. Many of the findings of this study are as relevant today, as they were in the 1990’s when the majority of this research was undertaken. This is the primary source of this substantial source information, and none of the content contained within has been published elsewhere with my permission.

Inland Fisheries Ireland chose, for whatever reason, to not consider the current study or consult with its author during the preparation of Ireland’s Eel Management Plans. The important work contained in this thesis was therefore omitted from all consideration in the Shannon International River Basin District Eel Management Plan. This was despite the fact that Ireland’s eel management plan considers a range of unpublished research material from the periods immediately prior and subsequent to my work on the River Shannon. Some of the achievements I made during this study were also falsely credited to themselves by Inland Fisheries Ireland. The partial sponsors of this project, the ESB, did not even request a copy of this document on completion; despite being responsible for the management of eels on the River Shannon, and indeed after part-funding this work. The research project for this thesis was undertaken while I was an employee of the ESB, and written in the years after I was made redundant by ESB. No resources of the National University Of Ireland were used during the fieldwork, although I received guidance from my supervisor and other assistance, which is acknowledged in the original document. This work is based on my own ideas, and represents and account my own work and achievements in relation to eels, during my time as an employee of ESB Fisheries. I believe that the omission of my work has undermined the Shannon International River Basin Eel Management Plan. In particular, I have in the past discredited elver trapping indices used by Inland Fisheries Ireland at sites which I worked at.

exhaustively during the 1990’s. I also regularly look for better conditions for eels and other diadromous fish on the River Shannon, and the release of this thesis is part of a sustained campaign that I will be leading to bring about more sustainable management on the lower River Shannon, for both diadromous fish and also the general ecology of the Old River Shannon. See my website www.OldRiverShannon.com for more information.

In addition to increasing scientific understanding of the biology and ecology of River Shannon juvenile eel populations, exceptional results were obtained in relation to the actual physical catching of glass eels and elvers during my study. Indeed, during the most intensive period of my study over 20 million juvenile eels were intercepted, and this exceeded the landings of any of the previous regional catches since 1980, and (temporarily) reversed the decline in eel catches recorded on the River Shannon. All the eels I captured were released into the River Shannon catchment upstream of the dams. One of the key findings of my study is that catch effort, and the quality of this effort, can have a highly significant influence on results obtained. Inland Fisheries Ireland’s activities at some of my former subject sites is dubious to say the least. Current elver traps at both Ardnacrusha and Parteen weirs are not operated optimally, in my opinion. Moreover, the rest of the Shannon eel management plan falls short of providing what a critically endangered species like the European eel deserves, in a river catchment where so much could be achieved.

The key finding of my study, ignored by Inland Fisheries Ireland in their Eel Management Plan, was that despite the global downturn in eel numbers hugely significant catches of both glass eels and elvers could be made with determined and focused effort. At the time of writing this foreword we are entering into the third consecutive year of a major glass eel and elver runs to our shores. However, virtually nothing is being done on the River Shannon and other parts of Ireland to maximise the use of these (potentially only temporary) abundance increases of glass eels and elvers for restocking and safeguarding the future of the European eel. I strongly advocate the Sustainable Eel Group (www.SustainableEelGroup.com) approach to eel management, and believe that this is the way forward for the River Shannon. The ESB fisheries management programmes have been an absolute failure with escapement of salmon to above the Shannon dams currently at levels of less than 5% of its escapement target. Although much work has been done on the Shannon in relation to eels, this work has provided little practical benefit to the eels themselves, and has only provided scientific publications and junkets abroad for those involved. There is an urgent need for a 'hands on' based approach to eel management on the River Shannon, and the provision of suitable downstream bypasses for silver eels and effective glass eel and elver trapping programmes, extending out into the estuary itself. Current ESB fishery management programmes are always designed (i.e. Bunowen PIT tag project) to avoid the 'elephant in the room', which is the absence of effective fish passage facilities at Ardnacrusha and Parteen, and the inadequacy of the compensation flow for the Old River Shannon. In the future the
requirements of diadromous fish must come first, water requirements for the Old River Shannon to meet the requirements of the EU Habitats and Water Framework Directives must come second, and the priority of hydroelectricity generation must fall into third place. The Shannon scheme is owned by the people of Ireland and the current ban on eel fishing, and virtual absence of salmon above the dams has reduced the quality of life for hundreds of people formerly engaged in traditional and recreation fishing in this area. It is time for some new thinking on the River Shannon, and actions that will benefit the catchment residents as a whole not just ESB staff and their consultants.

In the current study much use was made of conical nets. Although they were useful in the current study to show that the eels were actually there, I would now consider that methods such as dip netting, tela nets and in particular the Maine type fyke net to be more suitable for use as gear for use in any future glass eel fishery. Like the coghill nets that are currently used in the ESB’s trap and overland transport programme for silver eels (trap less than 30%, let the rest through the turbines), this is not the way forward due to the damage that these methods can cause to the eels themselves. There is plenty of scope to have a glass eel and elver fishery on the River Shannon to rival those in Maine (USA), and on the River Severn (UK). Limerick has the potential to be an elver hub, based on the criteria of the Sustainable Eel Group, providing benefits to eels and traditional fishermen alike.

This study remains one of the most important research projects on eels ever undertaken in Ireland, and it is hoped that by making this report more freely available online that it may be of use to eel workers in countries where genuine efforts to restore eel populations are being made. The development of the internet, blogging and social media means that everyone has the ability to raise their views now and be heard. This is why I have chosen to publish this document here, and why I will continue my campaign for more sustainable management of the River Shannon through the social media and websites of the www.OldRiverShannon.com and www.EuropeanEel.com. The internet has changed how we live our lives; let’s use it to change how we manage the River Shannon in the interests of saving the European eel and other diadromous species which use this great river.

This is a document for information purposes only however, and data from it should not be extracted for use in other publications without the prior consent of the author.

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“There were, indeed, eels - and in such abundance, exposed at every shop, whiskey-hovel, or lodging window - eels of three, four or five pounds, which would seem to imply that they constituted the chief food of the people. This turned out to be the fact. These animals descend the Shannon in such multitudes, that, in the autumn, after the flood, the rapids and falls in the narrow parts of the river need only be crossed by a purse net, and tons weights of eels are frequently taken in one night. Although, throughout Kerry, I could never prevail on the people to cook much less to eat them - at Athlone, if one may judge from the abundant display, they are in the highest repute”

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Abstract

The River Shannon is the largest river in the British Isles (catchment area 11,700 Km²; mean annual discharge 176m3sec-1). Hydro-electrification of the river in its lower reaches during the 1920’s significantly reduced natural recruitment of the catadromous European eel (Anguilla anguilla, L.) to the catchment, and this has been mitigated since 1959 with a trapping and overland transport programme. Although this endeavor was initially effective, eel stocking levels progressively declined from the early 1980’s onwards - mainly as a result of poor natural recruitment associated with the international decline of the species. This deficit is threatening the local conservation and fishery status of the eel.

As part of an integrated management programme, an intensive study on juvenile eel was undertaken during the period March 1995 to March 1999. One of the key findings of this study was that despite the global downturn in the abundance of this species, significant stocks of juvenile eel continue to enter the Shannon estuary. The immigration patterns and development characteristics of glass eel were found to be similar to those found in previous studies on the Shannon and other European Rivers. The highest abundance of glass eel in the estuary was recorded during early spring and water temperature and tide height were identified as important stimuli of activity. A total of 16 non-target fish species were recorded during experimental estuarine fishing operations. The ascent of pigmented elvers into freshwater was associated with water temperatures above 10-12°Celsius, declining river discharge and tide height. Larger juveniles eels migrated throughout the season, but the majority of elvers had a shorter migration period from mid-June to mid-August. Passage efficiency for eel and other fish at Ardnacrusha generating station was found to be low, and it was concluded – through the examination of angler’s catches - that trout are important predators of juvenile eel in the upper Shannon estuary. The feasibility of collecting juvenile eel restocking material by electrical fishing was also demonstrated.