

# Research & Development Report

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2012



lascach Intíre Éireann  
Inland Fisheries Ireland



**INLAND FISHERIES IRELAND**

**RESEARCH AND DEVELOPMENT**

**REPORT 2012**

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## RESEARCH SUMMARY DOCUMENT 2012

### Chairman's Statement



The 2012 Research Summary provides an outline of the research related projects and activities undertaken by Inland Fisheries Ireland during the past year. On behalf of the Board of Inland Fisheries Ireland. I would like to compliment the Research and Development division on the applied research conducted and resulting analysis, which are essential in providing the managers with the knowledge to support the conservation, development and protection of the inland fisheries resource. The weather, particularly the wet summer, experience in 2012 was not conducive to a field based research programme; given this however it is a credit to the IFI staff that the majority of planned research as outlined in the 2012 business plan has been completed.

The current economic climate and resultant budget reductions and staffing constraints place limitation on the amount of research that can be conducted. These restraints, which have now been in place for a number of years, have resulted in increased operational efficiencies, a prioritisation of projects and delivery of multiple outputs from each survey.

This report while capturing at a high level some projects based activities does not document the other roles of the R&D division; which include the provision of expert advice pertaining to the inland fisheries resource across a number of government departments, the servicing of Irelands reporting commitments on a number of EU directives and regulations, contribution to numerous consultation requests from a diverse range of sources and provision of a research licencing service. The Board of IFI recognises the expertise, experience and dedication of the IFI scientists and research staff and their contribution to the conservation and protection of the valuable inland fisheries resource. I would like to take this opportunity to thank all those whom have contributed to the research activities within Inland Fisheries Ireland and to the IFI regional based staff, without whose local knowledge and expertise many of the survey programmes would not be completed.

**Brendan O'Mahony**  
**Chairman**  
**Inland Fisheries Ireland**

## Foreword



Welcome to Inland Fisheries Ireland's Research Summary report which précis some of IFI's larger projects' objectives and achievements; the intent being to give the reader a sense of the applied research role rather than to document all projects and areas of advice delivered during 2012. The 2012 field research season proved very challenging; due to the adverse weather and flooding events. Given these constraints, and through extensive re-planning and rescheduling, we are very happy to report that the majority of the planned 2012 survey work was delivered as laid out in the 2012 business plan.

IFI's R&D function is tasked with delivery on a key national strategic goal "to develop and deliver high quality, cost effective, applied scientific research and development services to meet the IFI's customers' needs". This goal is to be delivered through:

- conducting scientific research on fisheries to deliver economic and heritage benefits by ensuring sustainability and conservation of fish in their ecosystems
- conducting research in conjunction with sister agencies to provide advice for the management and understanding of ecosystem function in aquatic fisheries habitats
- ensuring adherence to operational procedures which harmonize with our environment and cultural heritage
- supporting and preserving the quality and diversity of aquatic ecosystems and ensuring compliance with relevant European Union and national legislation
- providing an advisory service to relevant bodies.

While this foreword will not enable me to comment directly on each project, I will take the opportunity to highlight a couple of the European Funded (EU) projects that came to completion this year namely the EELIAD project which provided information on the migration path of the European eel and the AARC project which focused on enhancing our knowledge on the status of salmon in the River Shannon. It is wonderful to be involved in these international research projects but it is a matter of real pride to have delivered against these project goals.

Many of the projects outlined are conducted in partnership with other agencies and academics institutions and are focused on delivery of the requirements National and international legislation and commitments. There continues to be a strong focus on ensuring that a national coordinated approach is brought to research programmes and that those sharing of information duplication of work can be avoided.

Finally, I would like to thanks all the R&D staff for their expert contributions and dedication over the past year. I would also like to acknowledge the support, knowledge and expertise provided by regionally IFI staff without whom all research projects would have struggled.



**Cathal Gallagher**  
**Head of Research and Development**  
**Inland Fisheries Ireland**

## **EELIAD Eel Research**

### **Remit of Project**

Inland Fisheries Ireland is a partner in the **EELIAD** project which is a research initiative to investigate the ecology and biology of European eels. The information gained will be integrated into models to determine the most important factors that influence silver eel production and migration success. The fulfillment of this objective will provide a means to evaluate the likely success of the EU Eel Recovery Plan, to enable management actions to be most effectively directed to enhance and conserve eel stocks across Europe, and to determine the dynamics of eel population structure and reproductive success.

### **Why is the Project being undertaken?**

This study is being undertaken to provide information on marine migration of eels to better understand eel ecology and migration success. Field studies on migration routes, behaviour and spawning, will be supported by the use of cutting edge biotechnological analyses to determine population structure, and innovative modeling approaches that will incorporate these data into fishery management models. EELIAD will link with other groups and projects, such as INDICANG (a network of monitoring programmes that report on the status and the development of eel populations over the Atlantic Area) and the joint EIFAAC/ICES Working Group on Eel. The project is being undertaken to provide scientific data that will be of direct use to the conservation of eel stocks as it will help to clarify the reasons for the recent decline in the stock.

### **Planned Completion Date**

Winter 2012



**Plate 1. A 2.3 kg silver eel fitted with a pop-off Satellite tag**

### Who will benefit from the Project?

The project will provide managers with information to change and improve the way that eel fisheries and habitats are managed across Europe to ensure that enough silver eels migrate to their spawning grounds to reproduce and sustain the species.

### When will interim / final reports be available?

Spring 2013

### Progress-to-date

IFI have been involved, with the co-operation of ESB Fisheries, in tagging large eels. In autumn 2011, 16 large eels (1.9-2.1kg) were fitted with satellite tags and released to sea off the west coast to determine migration routes, behavior and spawning.

### Findings of Interest

The satellite tags record depth, temperature and light on the eel migration route across the Atlantic. Different tags were programmed to pop-off at differing time periods in 2012. The objective is to track the migration route across the Atlantic towards the Sargasso Sea. The tags float to the surface and connect with the Argus satellite which downloads the data on depth and other parameters and give a GPS position of the tag. Silver eels have been recorded migrating south west past the Azores for distances of over 2,000km. Valuable information of depth, diurnal migration, swimming speed and predation has been obtained.

### Next Steps

The information gained from marine tracking studies will be analysed to provide information on marine migration of eels.

<b>PROJECT TEAM</b>	P Gargan & Gustavo Becerra Jurado, IFI
<b>TOTAL BUDGET €</b>	€115,000
<b>FUNDING SOURCE</b>	EU FP7 Programme
<b>RESOURCES UTILISED</b>	IFI staff, liaison with ESB and commercial fishermen, tagging equipment
<b>DELIVERABLES</b>	Fulfillment of project requirements under EU EELIAD Project requirements



## National Eel Management Plan

### Remit of Project

In response to advice from the International Council for the Exploration of the Sea (ICES) that the European eel (*Anguilla anguilla* L.) is endangered and that the fishery is unsustainable the EC regulation establishing measures for the recovery of the European eel (Council Regulation 11000/2007) was adopted. This regulation for the recovery of the eel stock required Ireland to establish an eel management plan to reduce eel mortality and ensure an increase in the number of silver eel escaping Ireland to spawn. Ireland's management plan involved closure of the fishery, mitigation of hydropower, ensuring upstream eel migration at barriers and improvement in water quality. In June 2009 the EU accepted our national plan as an adequate response to the issues raised in the regulation. A review of the management plan was forwarded to the EU in June 2012. Monitoring objectives for the time period 2012 – 2015 were outlined with the next review due in June 2015.

The eel management plan contains a number of monitoring objectives to ensure compliance with the management actions. Inland Fisheries Ireland was tasked with carrying out these objectives.

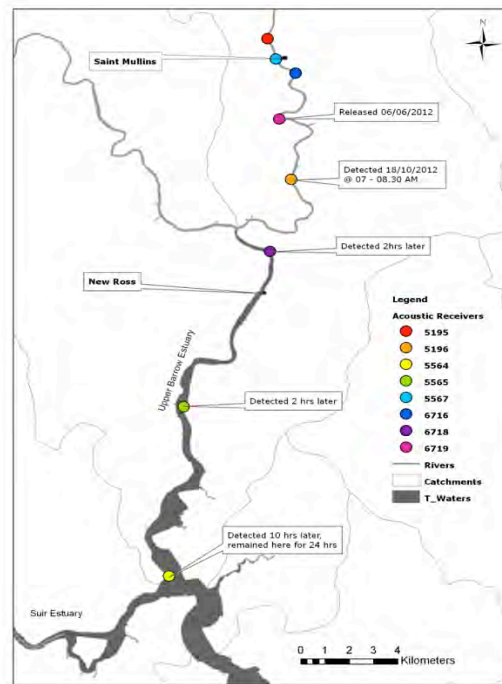
### Why is the Project being undertaken?

The project is being undertaken to fulfil Ireland's obligations under the monitoring objectives set out in its eel management plan. The objectives are;

- To estimate Silver Eel Escapement (in collaboration with ESB, NUIG, Marine Institute)
- To estimate silver eel escapement indirectly using yellow eels
- To monitor the impact of fishery closure on yellow eel stock structure
- Inter-Calibration with Water Framework Sampling
- To compare current and historic yellow eel stocks
- To establish baseline data to track changes in eel stock over time
- To evaluate impedance of upstream colonisation: migration and water quality effects.
- To determine parasite prevalence and eel quality

### Planned Completion Date

The review of the 3 year management plan was completed and forwarded to the Department of Communications Energy & Natural Resources in June 2012. The next review is due in June 2015, covering the monitoring period 2012 – 2015.



**Plate 2. Telemetry eel Study River Barrow**

### **Who will benefit from the Project?**

The information obtained will be important in evaluation the present status of the eel stock nationally and the impact of the measures undertaken under Ireland's eel management plan for the recovery of the eel stock.

### **When will interim / final reports be available?**

The annual report of the eel monitoring programme will be due in March 2013. A review of the 3 year cycle will be due in June 2015.

### **Progress-to-date**

2012 was the first year in the second three year cycle of monitoring. Survey work was completed in late November 2012. The national elver monitoring programme was carried out for a third year. The aim of the programme is to monitor the level of elver recruitment arriving in Ireland and create a long-term time series to track changes in recruitment levels. Elver monitoring was undertaken at six locations in 2012. Improvements in trapping facilities were made at two locations; Ballysadare and on the River Liffey.

In the yellow eel monitoring programme, three lakes (Meelick Bay in Lough Derg; Lough Oughter and Lough Muckno,) were sampled. Fyke netting was also undertaken in the Barrow estuary to compare eel density with historical data. In 2012, to obtain additional information on eel stocks, the Eel Monitoring Programme linked with the Water Framework Directive sampling of key locations including Lough Derg, Lough Cullin, Lough Arrow and the Boyne Estuary.

Monitoring of the silver eel run on the Fane system, downstream of Lough Muckno, was undertaken from August to November 2012. At all locations surveyed nationally, various morphological measurements were recorded and a continuation of the mark recapture (MR) study was carried out in the Shannon, Erne and Fane catchments with all eels tagged with passive integrated transponders (PIT). Morphological measurements (length; weight; eye diameter; pectoral fin length etc.) were taken to determine life stage and estimate maturation. A number of eels were sacrificed for further analysis in the laboratory (parasite prevalence, age, growth).

### Findings of Interest

Ten eels were tagged with an acoustic tags in the Barrow estuary in June (in collaboration with the IFI Habitats Directive staff) to determine home range. Information on eel movement was recorded by listening stations deployed at selected distances throughout the estuary. This study revealed that three of the 10 eels tagged undertook a downstream migration during the silver eel migration season in October, over a very short time period. One eel travelled 26 kms in 14 hours (Figure1). The eel then remained close to a receiver for 14 hours. This pilot study has highlighted the need to actively search for tagged eels using a mobile detector in order to investigate the extent of eel territoriality in the Barrow system.

### Next Steps

Work will continue with the 2012 – 2015 monitoring programme.

<b>PROJECT TEAM</b>	Dr. Ciara O’Leary, Dr. Gustavo Becerra Jurado, Dr. Robert Cruikshanks, Dr. P. Gargan
<b>TOTAL BUDGET €</b>	€189k
<b>FUNDING SOURCE</b>	Department of Communications Energy & Natural Resources
<b>RESOURCES UTILISED</b>	IFI staff, Boat equipment, Fyke nets, Tagging equipment
<b>DELIVERABLES</b>	Fulfillment of the monitoring objectives set out in Ireland’s eel management plan

## **Salmon CL Attainment project**

### **Remit of Project**

The general decline in salmon stocks internationally over the past two decades and since 2007 changes in the way that salmon are managed in Ireland has led to many salmon rivers being closed to commercial fishing and angling. Salmon stocks in each individual river are now assessed scientifically and if best available information indicates that there is less than the number of salmon required to spawn in each river (the salmon conservation limit) then the salmon stock is protected and no harvesting is permitted. After scientific assessment in 2011, 52 rivers were identified as having a surplus over the conservation limit, while 89 rivers either has no identifiable surplus or insufficient information and were closed for harvesting salmon by commercial fishing or angling.

Apart from direct counts of adult salmon in-river from counters and rod catch data from fisheries open to angling (harvest or catch-and-release fisheries) an indirect method such as juvenile salmon fry assessment (termed catchment-wide electrofishing) has provided a quantifiable threshold value to determine fishery performance and facilitate rivers being open for catch and release angling in the subsequent year. This type of assessment has been carried out at over four thousand sites in 124 rivers since this programme began in 2007.

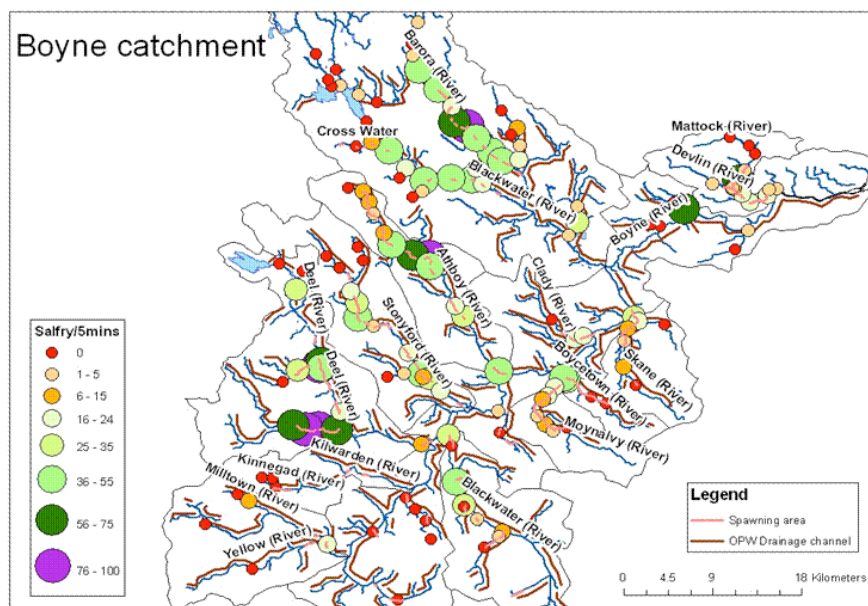
Under the CL Attainment Programme the efficiency of partial counters on a number of salmon rivers is investigated using PIT tag technology. The dynamics of adult populations also required investigation to advise on the proportion of 1SW and MSW fish in different stocks or populations and on run-timing. These data will contribute to refining Conservation Limits for individual rivers. A study on the impact of seal predation on salmon stocks in the Slaney and Moy rivers began in 2012.

### **Why is the Project being undertaken?**

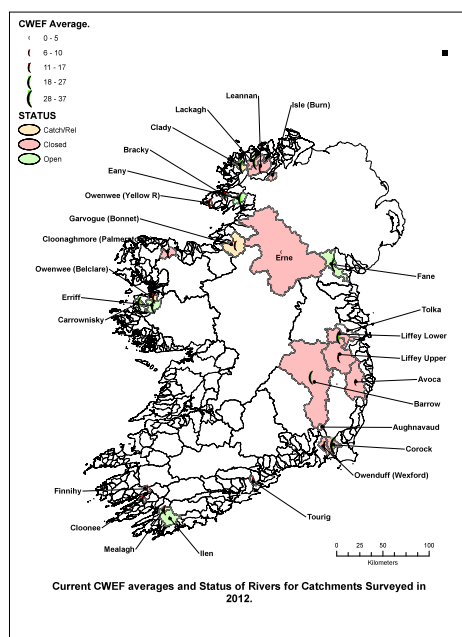
The project is being undertaken to provide data on the status of salmon stocks in rivers where no direct means of stock assessment is available. A PIT tag programme was undertaken to provide an estimate of full salmon upstream counts at partial counter sites on the Boyne and Fane. Collection of salmon biological data (scales, lengths, weights and run-timing) was undertaken for stock descriptions from different fisheries.

### **Planned Completion Date**

December 2012



**Plate 3. Juvenile Index sample results from the R. Boyne**



**Plate 3.1 Catchment-wide electrofishing results for catchments surveyed in 2012**

### Who will benefit from the Project?

The project is designed to provide scientific information of salmon stocks nationally to determine if stocks are meeting conservation limits. Fishery managers, scientists, local river proprietors and anglers will all benefit from a better understanding of the biology and stock status of salmon nationally.

## **When will interim / final reports be available?**

March 2013

## **Progress-to-date**

Catchment Wide electro-fishing was completed in 24 catchments in 2012 to assess abundance and distribution of salmon fry. A total of 530 sites were electro-fished. In the first six years of the programme (2007-2012), 238 catchment surveys in 124 catchments have been undertaken comprising 4,958 site surveys.

A threshold of 17 salmon fry (annual average over all years) was developed by the SSC for rivers for catch and release in 2012 in the absence of any other information or where information is limited or insufficient. Five rivers (lower Liffey, Barrow, Carrownisky, Clady, and Lackagh) predicted not to have a salmon surplus in 2012, that had an average salmon fry index  $\geq 17$  over the 2007-2012 period were opened on a catch & release basis in 2013, to provide rod catch data for estimation of stock size.

## **Findings of Interest**

For the 24 salmon catchments surveyed in 2012, the salmon fry abundance ranged from an average of zero fry on the Erne, to a catchment average of 37.21 salmon fry on the Clady. The Cloonaghmore, Garvogue, Bracky, Owenwee (Yellow), Leannan, Fane, Lackagh, Barrow, Erriff, Eany and Clady all recorded a catchment wide average of  $>17$  fry. Salmon fry densities of over 15 Salfry/min were also recorded on the Owenwee (Belcalre), Owenduff and Cloonee catchments.

Generally there was good agreement between the Standing Scientific Committee scientific assessment of attainment of salmon conservation limit from rod catch or counter data and the results of the catchment-wide electro-fishing surveys. However, some rivers, primarily small rivers with a rod catch  $< 10$  rivers, were, based on electro-fishing results, very unlikely to be meeting their derived CL. (Dargle, Vartry, Emlagh, Isle Burn, Straid, Donagh, & Culoort).

Results to date indicate that the catchment wide electro-fishing technique has good potential for salmon stock assessment. It is anticipated that at least 5 years data will be required before meaningful relationships between juvenile abundance and conservation limits can be developed. The technique is likely to provide the best estimate of salmon stock status in small rivers where rod catch was low ( $<10$  salmon annual rod catch) and cannot be used to estimate salmon stock size currently. CW electro-fishing is also important in providing managers with detailed information on salmon fry distribution and abundance. The absence or low density of salmon fry may be related to water quality issues, obstructions, or habitat damage and areas of low abundance can be investigated. These data should be used to target any remediation works that may be required.

A PIT tagging (Passive Integrated Transponder) programme was undertaken on the Boyne to assess the salmon runs where the partial counter at Blackcastle weir only counts part of the run. An unquantified proportion ascends uncounted over the “open” part of this weir. Traditional draft net fishermen, under the supervision of staff from IFI Drogheda, sampled salmon in the tidal portion of the catchment in 2012 and a total of 232 fish were PIT tagged over the summer months. 14 salmon were detected passing the PIT tag readers at Blackcastle. Some PIT tagged fish were also radio tagged to determine the proportion of fish migrating to and above the weir. A full analysis of these data is ongoing.

Salmon scales were collected and analysed for life history information from the commercial fishery on the Munster Blackwater and Suir and rod fisheries on the Owenmore river (Connemara) and Sneem river (Co. Kerry).

### Next Steps

Work will continue on the assessment of attainment of salmon conservation limit project in 2013

<b>PROJECT TEAM</b>	Dr. P. Gargan, Dr. W. Roche, IRI RBD Staff nationally. Tony Holmes, UCC
<b>TOTAL BUDGET €</b>	€99,000
<b>FUNDING SOURCE</b>	Conservation Stamp Fund
<b>RESOURCES UTILISED</b>	IFI staff, electro-fishing equipment, tagging equipment
<b>DELIVERABLES</b>	Assessment of salmon stock status in a range of catchments nationally

## Celtic Sea Trout Project

### Remit of Project

The CSTP aims to understand and describe sea trout stocks in the Irish Sea in order to enhance sea trout fisheries and strengthen their contributions to quality of life, to rural economies and to national biodiversity. This INTERREG IVa funded (Ireland-Wales axis) project will investigate the complex freshwater and marine ecology of sea trout and translate it into fishery management and conservation benefits for countries bordering the Irish Sea.

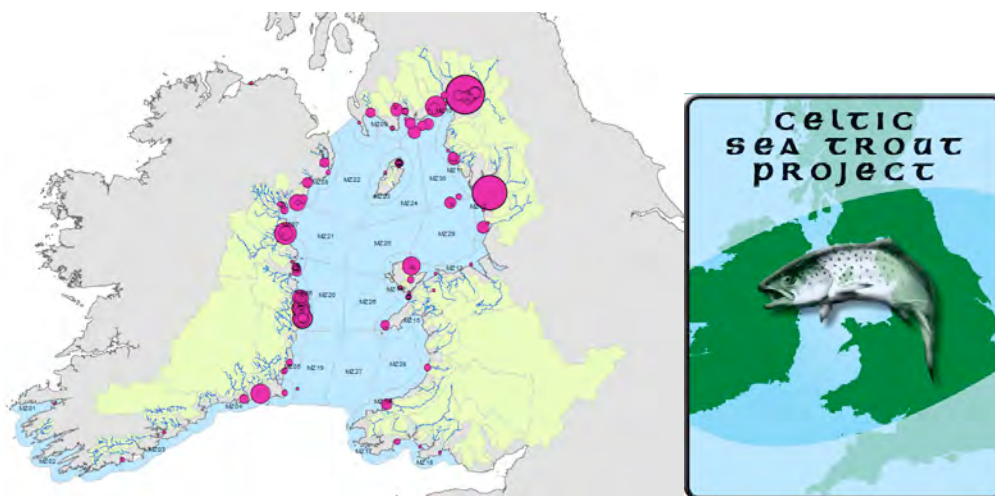
### Why is the project being undertaken?

Many sea trout fisheries in rivers entering the Irish Sea are suffering decline; but the pattern is mixed and in most cases the causes of change and thus potential solutions are poorly understood because of a lack of knowledge about some aspects of sea trout biology. Questions include:

- Where do they go at sea and how are their stocks structured and interlinked?
- What is their marine ecology (feeding, growth, survival and life history variation)?
- What environmental and other pressures are they exposed to?
- How do their life histories (and thus fishery quality) respond to environmental variation?

Studies are being conducted on the genetics and microchemistry of sea trout to provide stock discrimination tools. Baseline data is also being collected on age and growth, fecundity, sex ratio and other biological characteristics to provide information for rational management. The potential role of sea trout as an indicator of climate change is also being investigated. Ultimately this novel information and understanding will contribute to improved practical management of sea trout fisheries.

**Planned completion date:** Summer 2013



**Plate 4. Some Initial results from the CSTP project**



## Who will benefit from the project?

Fisheries managers will have fundamental information on the ecology of sea trout at sea and on factors that may influence sea trout stock strength. Fishery owners and managers will have baseline information on CSTP 'priority' systems to allow for monitoring of change. Anglers and some angling clubs, many of whom have been centrally involved in collecting scale samples from all priority rivers, will have information on the status of sea trout stocks from fisheries around the Irish Sea together with data on migration, feeding and the impact of key environmental factors.

## When will interim/final reports be available?

Web-based progress reports ([www.celticseatrout.com](http://www.celticseatrout.com)) have been posted regularly to inform anglers and fisheries managers. Report to Ireland-Wales management due in Sept 2013. Final report detailing all scientific outputs due in late 2013.

## Progress to-date

Inland Fisheries Ireland is a major partner in this research based project working with other research and fisheries agencies, which are primarily based in Wales. 2012 was a year of intense activity in the laboratory where a broad range of tissue samples were taken from hundreds of individual sea trout and distributed to various project partners for downstream processing. All data were databased and scale reading was undertaken for river and marine samples.

## Findings of Interest

Analysis of length data, supported by some scale analysis, showed that finnock dominate sea trout populations in Ireland in the area covered by CSTP. Over 1,000 marine caught sea trout were sampled in the Irish Sea using a variety of methods over the course of the project.

## Next steps

This will include completion of the analysis and reporting to INTERREG. One of the fundamentals in the CSTP was to provide data/analysis to support management decisions regarding sea trout in the Irish Sea. Development of long-term collaboration amongst fisheries workers and users of the fisheries across the Irish Sea is another plank of eth CSTP. Logically that supports a roll-out of a project on the marine ecology of sea trout on the west coast of Ireland, based on some of the principles of the CSTP, which is another likely development.

<b>PROJECT TEAM</b>	W. Roche, P. Gargan & J. Coyne IFI
<b>TOTAL BUDGET €</b>	€466k (75% funded by funding measure)
<b>FUNDING SOURCE</b>	INTERREG IVa (Ireland-Wales)
<b>RESOURCES UTILISED</b>	IFI staff, angler sampling (rod sampling in river and sea), IFI facilities and equipment
<b>DELIVERABLES</b>	Fulfillment of project deliverables under INTERREG IVa (Ireland-Wales) requirements

## **Marine Sport Fish: National Bass Project**

### **Remit of Project**

Inland Fisheries Ireland (IFI) is the state agency responsible for the protection, management and conservation of Ireland's inland fisheries and sea angling resources. This role requires IFI to advise the Minister for Communications, Energy and Natural Resources on policy and national strategies and to this end a draft policy objective has been developed for bass which is:

- To ensure the conservation and protection of bass and their aquatic habitat and also facilitates long term sustainable economic and social benefit for Ireland

Bass is the only marine species managed for angling. Bass and management of the species have been identified as priority activities by Inland Fisheries Ireland and the IFI research programme reflects the importance of bass as an angling species and concerns about its conservation status. Nationally and internationally it is recognized that few of the required data are currently available to assess the status of the Irish bass stock and to develop a rational conservation policy. IFI's national bass programme, which will be delivered over a four year period 2012 – 2015, is designed to provide fisheries managers with the data required to meet some elements of the draft policy objective.

### **Why is the project being undertaken?**

Fishery managers require scientific advice to conserve, protect and manage fisheries rationally. To satisfy managers, baseline data on the current status of bass stocks are required. O-group, pre-adult and adult bass will be targeted for survey work to provide relative indices of stock and year-class strength, and population structure. Regular stock assessments will be undertaken to provide the necessary data to contribute to management of the bass resource.

### **Planned completion date**

Multi-annual programme operating from 2012-2015.

### **Who will benefit from the project?**

Fisheries managers (national and international) will have data to allow for objective assessment of the conservation status of Irish bass stocks.

### **When will interim/final reports be available?**

Report on all research activities published by IFI annually. National Bass Programme website being developed currently.

### **Progress to-date**

The bass work programme comprised several elements in 2012. A limited survey of angler bass catches was completed in 2012 to contribute to requirements for Ireland under the EU Data

Collection Framework (DCF) to ensure adequate data on fish stocks and their fisheries are collected to support scientific monitoring and stock assessment.

A pilot study of the microchemistry of bass otoliths and scales was initiated to investigate the potential of developing such tools to study bass migration patterns and possibly for stock discrimination. IFI's bass scale archive was consolidated and bass sampling was carried out in several locations. Planning for Year 1 of a 4 year study of bass undertaken.

### Findings of Interest

The DCF study highlighted the catch-and-release nature of the bass fishery, and the fact that the numbers of bass retained by anglers is low, indicating the conservation-orientated approach of many bass anglers in Ireland.

### Next steps

Deliver year 1 of the 4 year work programme to provide a basis for reporting bass stock status. Engage fully with anglers who potentially can contribute samples of bass scales for analysis.

<b>PROJECT TEAM</b>	W.Roche, D. Ryan, S. O'Reilly, F. Kelly
<b>TOTAL BUDGET €</b>	€20,000
<b>FUNDING SOURCE</b>	EU Data Collection Framework
<b>RESOURCES UTILISED</b>	IFI staff countrywide, laboratory equipment
<b>DELIVERABLES</b>	DCF report 2012 Survey programme for 2013

## Pike Research

### Overview

Because pike is a key angling species in Ireland, it is necessary for IFI fishery managers to understand the basic biology and ecology of the fish under different conditions. Little research has been conducted on pike in Ireland in the recent past; this three year project, which is being conducted in cooperation University College Dublin, will help address this deficiency and fill in some of the large gaps in our knowledge of this species.

### Project Deliverables

The key objectives will center on the following areas:

- Phyloecology – use micro-satellite (DNA) samples to study pike from different parts of Ireland, Britain and other European countries to look at the possible origins of Irish pike stock/s.
- Review pike data in the Inland Fisheries Ireland in order to update information on the biology of Irish pike in relation to diet, differential growth patterns and longevity of male and female fish.
- A “stable isotope” study of pike (using flesh samples) across a range of different ecological habitats will provide information on the variation in the fish’s diet, across age classes, with particular reference to the transition from an invertebrate to a piscivorous diet.
- The survival of pike transferred to new waters from their natal habitat will be evaluated.

### Planned Completion Date and availability of final report

This project will be completed in January 2013, with a final report and data delivered to IFI by March 2013. Annual progress reports are also part of this deliverable.

### Status

In 2010 a detailed work programme is in place for the three year project. At this juncture both laboratory and field studies have been in progress for some time and excellent progress has been made in relation to both the ecological and genetic aspects of the project.

	Additional data are being prepared for publication.
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## Environmental River Enhancement Programme (EREP)

### Overview

The Environmental River Enhancement Programme (EREP) project aims to undertake a programme of capital enhancement works and of enhanced maintenance on Office of Public Works (OPW) channels over a second 5 year period (2013 to 2018). The project will also report on the impacts of these works in terms of biodiversity and hydromorphology impacts. The EREP team will work with OPW staff, throughout the project, to identify, develop and implement environmentally friendly drainage maintenance.

### Project Deliverables

- Enhancement design plans and walk-over reports for all channels identified for EREP.
- Provide an EREP training programme to OPW staff
- Carry out RHAT assessments
- Undertake Biodiversity Monitoring
- Produce an EREP information leaflet.

### Status

- In 2013 IFI and OPW commenced a second five year EREP programme with the same objectives as those outlined above. Essentially the current programme will learn from, and, build on, the previous one. Currently a number of scientific publications are being prepared on various aspects of the 2008 – 2012 programme.

<b>Project Directors:</b>	Dr. Martin O'Grady and Dr. Jimmy King
<b>PROJECT MANAGER :</b>	Dr. Karen Delanty
<b>TOTAL BUDGET € :</b>	€355,000
<b>FUNDING SOURCE:</b>	Office of Public Works
<b>RESOURCES UTILISED:</b>	IFI resources
<b>DELIVERABLES:</b>	Development and maintenance plans, training, surveys, data, analysis and reports



**Plate 5. Trout spawning on an introduced gravel bed in a drained river**

## **Water Framework Directive (WFD) Surveillance Monitoring of Fish Stocks in Lakes, Rivers and Transitional waters**

### **Remit of Project**

The Water Framework Directive specifies that monitoring of a variety of biological elements (including fish) is undertaken in order to assign an overall ecological status to a water body. Inland Fisheries Ireland has been assigned the responsibility by the Environmental Protection Agency (EPA) to deliver the fish monitoring requirements of the WFD. The fish monitoring programme has been conducted annually since 2007 at specified locations. This programme is providing information on the ecological status of fish species present in each waterbody as well as information on their abundance, growth and population demographics.

### **Why is the project being undertaken?**

Each EU Member State is required to implement restorative measures to preserve those water bodies that are currently in High or Good ecological status and to restore those water bodies that are currently impaired, in order that they achieve at least Good ecological status by 2015. In order to achieve this, each Member State must assess the current ecological status (High, Good, Moderate, Poor or Bad) of surface waters through monitoring of a variety of biological and physico-chemical elements. Ongoing monitoring of these water bodies can then track the effectiveness of corrective measures put in place to restore those that do not meet the requirement of Good ecological status. Monitoring locations for all physico-chemical and biological elements (phytoplankton, macrophytes, phytobenthos, benthic invertebrates and fish) have been set out by the EPA in 2006 and monitoring began in 2007 in line with the required WFD timescale.

### **Planned completion date**

The WFD is an ongoing legislative requirement under which all matters relating to the quality, quantity and ecology of freshwater, transitional waters and inshore marine waters will be protected and managed. The first three year phase (2007 – 2009) of the monitoring programme was completed in 2009. The second three year phase commenced in 2010 and was completed at the end of 2012.

### **Who will benefit from the project?**

The data collected to date for the WFD fish monitoring programme not only fulfils legislative requirements but provides an invaluable source of information on fish species distribution and abundance for decision makers, angling clubs, fishery managers and owners and other interested parties.

### **When will interim/final reports be available?**

Interim (preliminary) reports on each water body are published to the dedicated WFD fish website ([www.wfdfish.ie](http://www.wfdfish.ie)) throughout the monitoring season (June – October). These reports are replaced



regularly with more detailed reports on each water body once all the relevant fish data has been processed. Final reports for all water bodies surveyed during 2012 will be published to the WFD fish website ([www.wfdfish.ie](http://www.wfdfish.ie)) in early 2013. A comprehensive summary report for the 2012 surveillance monitoring programme will also be available in due course. A report on the ecological status of each waterbody in relation to the fish stocks is also provided to the EPA on a yearly basis as input to the River Basin Management Plans.

### **Progress to-date**

The first three year surveillance monitoring cycle (2007 – 2009) has been completed, with a total of 276 water bodies being surveyed, encompassing 70 lakes, 134 river sites and 72 transitional water bodies. More than 70 fish species and 150,000 individual fish were recorded.

During 2010, 25 lake waterbodies, 43 river waterbodies and 25 transitional waterbodies were surveyed and over 50,000 fish were captured, measured and examined. In 2011, 30 lake waterbodies, 58 river waterbodies and 2 transitional waterbodies were surveyed and over 38,000 fish were captured, measured and examined. In 2012, a further 23 lake waterbodies, 58 river waterbodies and 3 transitional waterbodies were surveyed and over 23,000 fish were captured, measured and examined. All fish have been identified, counted and a representative sub-sample have been measured, weighed and aged. Scale samples were taken from a large range of fish species and a sub-sample of fish were retained for laboratory analysis of sex, stomach contents and parasitism.

### **Findings of Interest**

A total of 16 fish species (sea trout are included as a separate 'variety' of trout) and one type of hybrid were recorded among the 23 lake waterbodies surveyed during 2012. Eel was the most common fish species recorded, being captured in 22 of the 23 lakes surveyed (95.6 %). This was followed by brown trout, perch, pike and roach which were present in 73.9%, 60.8%, 56.5% and 30.4% of lakes respectively. Sea trout were only captured in two lakes in the west and north-west, Doo Lough and Dunglow Lough. Arctic char were recorded in four lakes in the west and north-west; Doo Lough, Lough Mask, Lough Sessiagh and Kindrum Lough. Perch, followed by pike were the most widely distributed non-native species recorded during the 2012 surveillance monitoring programme, with perch being present in 14 lakes and pike being present in 13 of the 23 lakes surveyed.

A total of 16 fish species (sea trout are included as a separate 'variety' of trout) and one type of hybrid were recorded in the 58 river waterbodies surveyed during 2012. Species richness ranged from 12, plus one hybrid in the River Barrow (Passlands), to one, in both the Glenealo (Upper Lake) and Tully Stream, Site A. Brown trout was the most common species recorded, being present in 95% of sites surveyed, followed by salmon (78%), eels (71%), three-spined stickleback (71%), stone loach (45%) and minnow (38%).

A total of 26 fish species (sea trout are included as a separate 'variety' of trout) were recorded among the three transitional water bodies surveyed during 2012. Twenty-three fish species were captured in the Boyne Estuary, 14 in the Gweebarra Estuary and ten in the Erne Estuary. Six species including, five-bearded rockling, flounder, lesser sandeel, pollack, sand goby and three-spined stickleback, were common to all three water bodies. A number of important angling species were recorded during the surveys in 2012: brown trout, sea trout, salmon and cod.

Also in 2012 sampling methods in all water body types were further refined. A joint sampling exercise between the IFI WFD fish monitoring team and Northern Ireland Environment Agency staff was carried out successfully during the transitional water surveys with the aim of developing harmonised sampling protocols for fish in transitional waters for the island of Ireland. Various electric fishing methods were trialed in large deep river channels to identify the optimum arrangement of equipment and personnel. A standard operating procedure (SOP) is currently in progress.



**Plate 6. Seine netting on the Boyne transitional waterbody, IFI & NIEA October 2012**



**Plates 6.1 and 6.2 High voltage electric-fishing on the River Barrow, May 2012**

## Next steps

Detailed reports on each water body surveyed in 2012 will be available in Q2 and a comprehensive summary report on the 2012 surveillance monitoring programme will be available in Q3. Fieldwork for the 2013 surveillance monitoring programme will be conducted between June and October 2013 with fish processing and data analysis progressing over the winter months.

<b>PROJECT TEAM</b>	<p>Fiona Kelly, Project Director          Lynda Connor, Project Manager          Ronan Matson, Rory Feeney, Emma Morrissey,          Ciara Wogerbauer, Kieran Rocks          Sam Thomas (July 12 to Oct 12)          Sinead O'Reilly ( July 12 to Oct 12)          Karen Kelly ( July 12 to Oct 12)          Bernadette O' Neill ( July 12 to Oct 12)          Kilian Kelly ( July 12 to Oct 12)          Letizia Cocchiglia ( July 12 to Oct 12)</p>
<b>TOTAL BUDGET €</b>	Funding received for 2012 was €0.5 million
<b>FUNDING SOURCE</b>	Funding for 2012 was provided by the Department of Communications, Energy and Natural Resources
<b>RESOURCES UTILISED</b>	Six full time staff and four temporary staff were employed on the project throughout 2012. Survey work was conducted in conjunction with further full time and temporary staff employed in regional IFI offices.
<b>DELIVERABLES</b>	<p>Dedicated WFD fish website (<a href="http://www.wfdfish.ie">www.wfdfish.ie</a>) reporting all findings.</p> <p>Weekly preliminary reports throughout the field season circulated to regional IFI staff as well as being placed on the dedicated WFD fish website.</p> <p>Detailed reports on each water body surveyed circulated to regional IFI staff as well as being placed on the dedicated WFD fish website.</p> <p>Final summary report for 2012 surveillance monitoring programme available in 2013.</p> <p>GIS database</p> <p>GIS Map viewer on website updated.</p> <p>Ecological status for rivers, lakes and transitional waters delivered to the EPA.</p>

## **Fisheries Development Programme for Waterways Ireland**

### **Remit of Project**

Inland Fisheries Ireland (IFI) are contracted by Waterways Ireland to provide fisheries management aquatic plant management and water quality monitoring and pollution abatement services, on the Royal and Grand Canals, the Barrow Navigation and the Shannon-Erne Waterway.

### **Why is the project being undertaken?**

The programme reflects the statutory obligations of Waterways Ireland and its objective of providing a quality waterways habitat commensurate with its use by a wide diversity of user groups. It further recognises the fisheries management and environmental needs of these watercourses. In addition, the programme pays due cognisance to the obligations imposed by the Water Framework Directive (WFD).

### **Planned completion date**

The programme is ongoing, the current contract ran from January to December 2012.

### **Who will benefit from the project?**

The overall aim of the work is to optimise the angling potential of these multi-purpose recreational waterways whilst ensuring that Waterways Ireland's Water Framework Directive obligations with respect to aquatic ecosystem health are achieved. Furthermore, relevant biological data and management information is provided to a variety of statutory bodies and stakeholder interests.

### **When will interim/final reports be available?**

Regular progress reports are submitted to Waterways Ireland throughout the year and a summary document prepared annually.

### **Progress to-date**

Fish stock assessments were conducted on the Shannon-Erne Waterway and on sections of the Barrow Navigation and the Royal and Grand Canals in 2012.

For the purposes of WFD compliance monitoring, water samples were collected from 11 Artificial Water Bodies (AWBs) in the Royal and Grand Canals and the Shannon-Erne Waterway. Forty-four sites were sampled on four occasions in 2012. Quantitative assessment of aquatic plant communities was conducted in August.

IFI also maintained vigilance of a number of feeder streams to the canals in 2012. These feeders can be a source of contamination and their monitoring is an important tool in identifying pollution sources to the main channels.

Aquatic plant management surveys were conducted along the entire length of the Royal and Grand Canals. These surveys aid rational management of plant communities which may impact negatively upon amenity use, while also allowing broad scale examinations of the distribution and status of an array of invasive species. IFI staff piloted a biosecurity protocol for angling competitions on the Shannon-Erne Waterway during the World Pairs Angling Competition which was held in September 2012.

### Findings of Interest

In general, populations of coarse fish, typically dominated by roach, remain healthy. Of particular note were the excellent stocks of tench, a prized angling species, recorded on several sites on the Grand Canal.

All 11 AWBs achieved Good Ecological Potential (GEP) in terms of the physico-chemical criteria for the WFD. A high faecal coliform count was recorded in a culverted drain discharging to the Royal Canal at Kilcock Harbour in August 2012. Repair work was carried out by Kildare County Council in October and, while there was a general improvement in water quality, faecal coliform counts remained relatively high in the drain during follow up surveys. IFI will continue to monitor the situation at Kilcock into 2013.

Surveys for Asian clam (*Corbicula fluminea*) were carried out on the westerly reaches of the Grand Canal and on angling centres on the Shannon-Erne Waterway. To date, this species has not been recorded from these waters. Control programmes for a variety of invasive aquatic and riparian plant species were conducted in cooperation with IFI's invasive species team. Himalayan balsam (*Impatiens glandulifera*) was recorded for the first time on the Grand Canal, near Daingean, in 2012. Manual removal was carried out at the time of the discovery, and on one other occasion in 2012.

Monitoring of the section of the Grand Canal where control of the invasive plant, New Zealand Pigmyweed (*Crassula helmsii*) commenced during winter 2011/12 continued throughout the year. While some very limited re-growth was apparent in late 2012, it is estimated that approximately 99% of the original plant biomass had been removed from the treated area.

### Next steps

The programme will continue throughout 2013. The status of invasive species will continue to be monitored closely. IFI staff will work collaboratively with colleagues in Waterways Ireland and a variety of external organisations to maximise the value of such work.

<b>FUNDING SOURCE</b>	Waterways Ireland
<b>RESOURCES UTILISED</b>	IFI resources
<b>DELIVERABLES</b>	Annual report for IFI and Waterways Ireland,



supported by data and analysis. Provision of data  
and to relevant stakeholders and interests



**Plate 7. Electrofishing on the Grand Canal**



**Plate 8. Himalayan balsam from the Grand Canal**

## **Control of Aquatic Invasive Species and Restoration of Natural Communities in Ireland**

### **Remit of Project**

The CAISIE Project (Control of Aquatic Invasive Species and Restoration of Natural Communities in Ireland) is tasked with contributing to the halting of biodiversity loss in Ireland by preventing further impacts on native biodiversity from high impact aquatic and riparian invasive species. The project commenced in January 2009 and is focused on two main geographical areas: (1) Lough Corrib and (2) the Grand Canal and Barrow Navigation. The CAISIE project is funded by the EU LIFE+ programme with co-financing from the National Parks and Wildlife Service.

### **Why is the project being undertaken?**

Aquatic invasive species (AIS) are internationally recognised as a principal threat to the biodiversity of native inland water ecosystems. The impact of AIS on biodiversity can be mediated by competitively excluding or out-competing the less robust native species, by preying on native species or by altering the natural aquatic or riparian habitat in which they reside. These species pose a growing threat to Ireland's unique biodiversity and to economic interests such as fisheries, tourism and agriculture. The CAISIE project aims to control high impact invasive species (notably the Curly-leaved waterweed *Lagarosiphon major* in Lough Corrib and a range of AIS in the Grand Canal and Barrow Navigation) and prevent their further impacts through the development and demonstration of effective control methods, a programme of stakeholder engagement and awareness raising, and policy development and dissemination.

### **Planned completion date**

The project will be completed in January 2013 and the final report will be submitted to the European Commission in April 2013.

### **Who will benefit from the project?**

The CAISIE project will result in a wide range of benefits. Controlling aquatic invasive plants such as Curly-leaved waterweed, New Zealand pigmyweed and Japanese knotweed will provide increased access to waterways for recreational angling and boating. In addition, the control of all the invasive species targeted by the CAISIE project will limit their further spread within or to other waterways enhancing the overall protection of our native aquatic species and general biodiversity in Ireland. The development of novel and innovative control methods will provide new tools to tackle future invasions and other research will help to better understand the AIS impacts in our environment. Habitat rehabilitation measures will help to restore impacted native aquatic habitats and ecosystems in the project areas. Preventing the introduction, establishment or spread of AIS can ultimately prove economically beneficial through reducing or eliminating the need for future control and habitat restoration works.

## **When will interim/final reports be available?**

The final report will be available in June 2013.

## **Progress to-date**

In Lough Corrib, under the CAISIE project, over 78% of the lake area originally infested by the curly-leaved waterweed has been treated to date. Here, innovative control methods such as using light-excluding jute matting have been trialled successfully and further developed. Indeed, this method has been trialled on other AIS and received both national and international attention. Many previously infested bays have now been re-opened for angling. In the Grand Canal and Barrow Navigation, a range of AIS have been controlled including Japanese knotweed, Nuttall's pondweed and New Zealand pigmyweed. Indeed, in the latter case, control operations have practically eradicated this weed from the Grand Canal. Further to this, control trials have been undertaken on the Asian clam and Himalayan balsam. In general, much informative research has been conducted which has allowed us to better understand the impacts of AIS in Ireland. Considerable effort has been put into producing AIS biosecurity guidelines for stakeholders including anglers, boaters, kayakers and scuba divers. Many stakeholder events have been attended to promote general awareness on the threat posed by AIS and to encourage stakeholders to put in place biosecurity practices that may prevent the further introduction and spread of AIS in Ireland's waterways.

## **Findings of Interest**

### **Lough Corrib**

- Over 78 % of the original 92 hectare infestation of Curly-leaved waterweed in Lough Corrib has been treated.
- Native species have re-established in treated areas after weed control.
- Previously infested areas have been re-opened for angling and boating.
- A 'rapid reaction' capability to quickly respond to new threats of AIS in Lough Corrib has been implemented.
- Weed control operations have prevented the spread of Curly-leaved waterweed to the lower section of Lough Corrib.
- New control methods have been developed to successfully treat Curly-leaved waterweed in Lough Corrib. Jute matting has since been used in other weed infested waters in Ireland and internationally.
- Considerable progress has been made to identify a suitable biological agent to control Curly-leaved waterweed.

### **Grand Canal and Barrow Navigation**

- The distribution and abundance of AIS in the Grand Canal and Barrow Navigation have been established.



- New control methods have been successfully developed or adapted to treat a range of AIS in the Grand Canal and Barrow Navigation.
- All sites with Giant hogweed, Japanese knotweed, New Zealand pigmyweed and Nuttall's pondweed on the Grand Canal and Barrow Navigation have been treated.
- Himalayan balsam has been contained in the Barrow Navigation below Athy.
- Dace have been prevented from entering the main Grand Canal channel.
- Native species have re-established in treated areas.

### Stakeholder engagement and Biosecurity

- CAISIE drove AIS Biosecurity Policy in Ireland and within IFI. The CAISIE Project has been integral to the development of AIS biosecurity initiatives in Ireland and in engaging with stakeholders.
- A range of invasive species education and awareness material has been produced and circulated including biosecurity guidelines for various stakeholder groups.
- Approximately 70 events to promote biosecurity have been attended and the project has successfully encouraged the implementation of AIS biosecurity among stakeholders.
- CAISIE has been integral to the mandatory disinfection of angling gear at two international angling competitions.
- A suite of practical tools for stakeholders, including IFI and its sister agencies, to tackle any future invasions of AIS have been developed. This includes guidelines on effective measures to control AIS.

### Next steps

The final report will be drafted and submitted to the European Commission by April 2013. A project Layman's Report will be produced for stakeholders. 'After LIFE' Conservation and Communication plans will be developed to set out key aspects of the CAISIE project that will be continued after it concludes.

	Dr. Michael Millane, (Project Leader), Mr. Bryan Deegan (Project Manager) Dr. Michael Millane (Research Officer) Ms. Helen Moran (Research Assistant)
<b>TOTAL BUDGET €</b>	<b>€1,533,466</b>
<b>FUNDING SOURCE</b>	EC LIFE+ and National Parks and Wildlife Service
<b>RESOURCES UTILISED</b>	<b>IFI, MERC Consultants, Waterways Ireland and Geo-mara</b>
<b>DELIVERABLES</b>	Contribute to the halting of biodiversity loss in Ireland by preventing further impacts on native biodiversity from high impact aquatic invasive species, through the development and



**Plate 9. Curley leaved waterweed (*Lagarosiphon major*) removed after mechanical cutting control in Barrusheen Bay, L. Corrib (October, 2012)**

## **Habitats Directive**

### **Remit of Project**

The remit of the project is to examine the status of the 'conservation fish species' i.e. shads, lamprey species, pollan, char and smelt, in Irish waters. The shads, lamprey species and pollan are listed in the EU Habitats Directive, along with Atlantic salmon.

### **Why is the Project being undertaken?**

There is a legal obligation on Ireland to report on the status of species listed in the EU Habitats Directive on a six-year cycle (Article 17). The Minister of CENR, as the inland fisheries minister, is charged with this responsibility for the Habitats Directive fish species - as reinforced in Statutory Instrument 477 of 2011. IFI carries out this function for the Minister.

### **Planned Completion Date**

Under Article 17 of the Habitats Directive, there is an ongoing onus on the state to report in six-yearly cycles to the EU. The final year of the current reporting cycle was 2012. The next reporting date is mid-2013, to cover the period 2007 - 2012 and a new six-year cycle of monitoring and status assessment will commence in 2013.

### **Who will benefit from the project?**

The knowledge base generated on status and distribution of the relevant species will be important in identifying any necessary conservation or infrastructural measures required for the species survival. Some of these measures will be consistent with requirements of the Water Framework Directive (WFD) or of measures in the National Biodiversity Plan. Of particular interest here is the issue of artificial barriers to fish passage and the conservation implications for migratory fish species such as Atlantic salmon and the sea- and river lamprey.

### **When will interim / final reports be available?**

Interim reports are produced annually on work carried out in that year. These are available for the three years 2009, 2010 and 2011 on the IFI website at:

<http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html>

The Article 17 documentation will be submitted in spring 2013 to the National Parks and Wildlife Service (NPWS) who compile all national information for transmission to the EU. The previous report was summarised to the EU and is available on-line from NPWS

[http://www.npws.ie/publications/euconservationstatus/NPWS\\_2007\\_Conservation\\_Status\\_Report.pdf](http://www.npws.ie/publications/euconservationstatus/NPWS_2007_Conservation_Status_Report.pdf)

## **Progress to-date**

The programme is an on-going one, the requirement to undertake monitoring and surveillance of the Habitats Directive fish species being enshrined in the recently-enacted Statutory Instrument 477 of 2011. Given the tenuous or uncertain status of several of the species, the development of statistically-meaningful and repeatable survey techniques is an important requisite.

The team worked with IFI's WFD team in regard to pollan status in the large Shannon lakes, using hydroacoustic and netting techniques. Both L. Ree and L. Derg (twice) were surveyed in the 2009 - 2012 period.

The survey team has developed a sampling technique to assess spawning success and recruitment of post-larval and juvenile shad in the SAC channels of the south-east. Further robustness-testing of this strategy will be undertaken annually in the 2013 - 2018 period. The technique will also be trialed for Killarney shad and for pollan post-larvae, going forward.

The merit of angling surveys to sample for spawning adult shad at traditional spawning locations in the SACs of the south east has been identified and used to advantage in the 2009 - 2012 period. This will be availed of further in the next 6-year monitoring period.

Juvenile lamprey status was assessed in 19 catchments over the period 2009 - 12. This included catchments in the Foyle system, surveyed jointly with the Loughs Agency and a series of larger systems such as the Suck, Liffey and Lee. This data set adds to that commissioned by NPWS in the 2003 - 2006 period to provide a broad picture of juvenile lamprey status over the 2003 - 2012 period. This will provide a baseline against which the forthcoming 2013 - 2018 surveillance programme's data outcomes can be compared.

The survey team compiled a data set on brook lamprey spawning activity and habitat attributes at spawning locations and a scientific publication providing a broad overview on this topic, in an Irish context, is currently *In Press*.

## **Findings of Interest**

A telemetry trial, using radio tagged shad and submerged listening stations, was undertaken in the Barrow estuary in 2012. Initial assessment of results points to this being a valuable source of information on habitat use, residency and movement of adult shad during the spawning period. It is proposed that additional trials be undertaken in other SAC estuaries in the period 2013 - 2018.

IFI staff from the Boyne catchment recorded a Twaité shad in the course of controlled netting and tagging of adult salmon in the Boyne estuary, working with local draft net fishermen.

While adult sea lamprey have been observed and spawning sites located in the main stems of some large rivers, the occurrence of juvenile sea lamprey in catchment-wide surveys is very low.

Float-over surveys for sea lamprey spawning activity and habitat indicated a paucity of habitat in much of the R. Moy main stem whereas the R. Laune presented an almost-continuous availability of gravelled habitat. In neither case was there evidence of any sizeable degree of spawning activity. Float-over surveys on the Slaney and Munster Blackwater replicated those carried out in 2003. There was a broad degree of comparability in each river between the early and more recent surveys, in terms of locations of redds or spawning sites and in terms of numbers of redds recorded.

The catchment-wide juvenile lamprey surveys provided wide contrasts in level of occurrence. Sampling on the Fergus catchment yielded a high degree of sites with no suitable habitat i.e. areas of fine sediment deposition with 9 of 48 sites proving positive for juvenile lamprey. The comparator survey on the Mulkear catchment indicated substantial populations of juvenile lamprey at the majority of sampling stations.

In a replication of surveys conducted by IFI in 2004, surveys in four Donegal lakes yielded char in all waters, as was the case previously.

### Next Steps

Six-year status review to be generated, working with National Parks and Wildlife Service, for submission to the EU in mid 2013.

Six-year work programme, to cover the period 2013 - 2018, to be developed and rolled out. This will be based on a platform of using repeatable survey techniques and on selection of suitable habitat units, bearing each taxonomic group in mind, in which to sample.

<b>PROJECT TEAM</b>	James King; Nicola O' Gorman; Sean Rooney; Daniel Cierpial
<b>TOTAL BUDGET €</b>	€200 k
<b>FUNDING SOURCE</b>	Exchequer-funded National Programme
<b>RESOURCES UTILISED</b>	IFI R&D resources; Access to local IFI staff and logistics in variety of River Basin Districts; synergy with IFI's Water Framework Directive survey team; networking with NPWS, NIEA and AFBINI



**Plate 10. Shad tagged for telemetry study in Barrow estuary April - May 2012**



**Plate 10.1 L. Derg survey with WFD 2012, hydroacoustic monitoring to identify potential pollan shoals**

## MulkearLIFE Project

### Overview

MulkearLIFE ([www.mulkearlifeproject.com](http://www.mulkearlifeproject.com)) is a €1.74 million European Commission funded LIFE+ Nature project working on the restoration of part of the Lower Shannon Special Area of Conservation (Mulkear River catchment) for Atlantic Salmon, Sea Lamprey and European Otter. Inland Fisheries Ireland is the coordinating project partner together with the Office of Public Works and Limerick County Council. Additional funding support comes from National Parks & Wildlife Service. Other supporters include Coillte, ESB, Department of Agriculture, Teagasc, IFA and ICMSA. MulkearLIFE is one of the first and most important integrated catchment management projects in Ireland and is a flagship EC LIFE Nature project – one of only two catchment based projects awarded funding in Ireland in the last 20 years. The Mulkear, together with its principal tributaries (Dead, Bilboa and Newport rivers), drains a catchment area of approximately 650 km<sup>2</sup> spanning counties Limerick and Tipperary. The Mulkear River is one of the top five salmon rivers in Ireland when its relative size is considered, producing a significant annual salmon run. It also holds substantial populations of Sea Lamprey and Otter are known to be widespread, however, recent evidence suggests numbers are in decline. The main project objective is to restore, through in-stream rehabilitation works, degraded habitats along stretches of the Mulkear River and its principal tributaries.

### Project Deliverables

- Greater awareness & understanding of issues affecting the SAC and how to manage the catchment.
- Enhancement of the populations of Atlantic Salmon, Sea Lamprey and Otters in the Mulkear Catchment.
- Development of practical, costed and transferable management prescriptions for habitat rehabilitation for Atlantic salmon, Sea lamprey and European otters for other Natura 2000 sites.

### Planned Completion Date and availability of final report

It is now expected that the EC will extend the project to the end of 2014 with the final report delivered to the EU in late 2014 early 2015. The project plan and IFI requirements ensure the delivery of detailed reports throughout the lifecycle of the project.

### Status

The project reports considerable progress in 2012 in enhancing the populations of Atlantic salmon and Sea lamprey through in-stream rehabilitation work, bank protection and stabilization work and in addressing obstacles to the annual adult sea lamprey river upstream migration for spawning and recruitment.

## Key Achievements to Date

- Installed 12 rubble mats on the Mulkear River, utilising almost 2,000 tonne of rock, helping to enhance populations of Atlantic Salmon and Sea Lamprey and improving instream and riparian biodiversity.
- Strategically placed over 300 random boulders on the Annagh, Bilboa and Newport Rivers improving instream biodiversity.
- Treated over 120 kms of river channel (riparian habitat) to control non-native invasive plant species (with focus on Giant Hogweed & Knotweed species) and manually removed other invasive species (Himalayan Balsam) from High Nature Value sites in the catchment.
- Successfully installed three fish passes specifically designed to assist Sea Lamprey ascend major barriers on the Lower Mulkear.
- Installed artificial otter holts in areas of low otter density and improved otter habitat through the planting of thousands of trees.
- Established Mulkear Conservation Volunteers to undertake practical, river based, conservation activities linked to MulkearLIFE.
- Established an Environmental Education Programme and have undertaken over 50 classroom engagements and separate half-day river based field trips with over 1,200 schoolchildren and conducted field-trips and training for over 170 adults (& children).
- Worked directly with farmers to address local water quality concerns by restricting livestock from watercourses and installing alternative watering solutions and established 'pilot sites' or 'learning sites' on farms with extensive river frontage

<b>Project Manager:</b>	Mr. Ruairí Ó Conchúir
<b>Project Budget:</b>	Total budget is €1,740,818
<b>Funding Source:</b>	Inland Fisheries Ireland, NPWS and EU LIFE+ and (Associate Beneficiaries)
<b>Resource Utilises:</b>	Staff and resources from IFI, Limerick County Council, North & South Tipperary Councils & the Office of Public Works





**Plate 11 and Plate 11.1 Constructed of rubble mat on Mulkear River (August, 2012)**

## **Atlantic Aquatic Resource Conservation (AARC) Project**

### **Remit of the Project**

The Atlantic Aquatic Resource Conservation (AARC) Project was funded through the 2007-2013 Atlantic Area Programme. It was an association between 13 international partners in a three year project (2010-2012). The broad aim of AARC was to 'cooperate intensively to deliver a strategy for Integrated Water Resource Management (IWRM). A central focus was culturally and economically important migratory fish species which link water marine, coastal and freshwater resources'. From the Irish perspective, we dealt with Restorative initiatives for Atlantic Salmon in the Shannon System. This included 1. determining the genetic composition of contemporary and historical populations of salmon in the Shannon and 2. comparing the relative performance in the wild of the progeny Feale, Mulkear and Shannon wild and hatchery salmon populations.

### **Progress to date**

The objectives set out in the project application in 2010 were completed by the end of 2012. There were a number of significant achievements in the project including the sourcing of broodstock salmon and the hatchery rearing of experimental eggs for the relative survival studies for a number of Shannon salmon populations. Experimental eggs were transferred from ESB's Parteen Hatchery to experimental sites on the River Suck. Quantitative electro-fishings were carried out to establish densities of salmon fry at the respective sites. The genetic origins of all sampled fish were recorded through fin clips. Important morphometric information was recorded throughout the project, from broodstock fish through electrofishing surveys, right through to smolt capture. These results showed significant growth rates and the migration of a number of smolts as S1 (one year) old fish.

The migrating fish were trapped using two different methods. The fish were trapped provisionally using rotary screw traps. By early 2012 another significant milestone in the project was the installation of a Passive Integrated Transponder (PIT) tag array in the River Bunowen at Clonbrock Demesne, County Galway. This provides a further tool to analyse the relative proportions of smolts migrating from the River Bunowen.

The compilation of a specific Shannon AARC GIS was completed in 2012. This database will include all AARC project survey data including: potential spawning habitats; electrofishing survey results (ESB, IFI and UCC surveys); water quality layers; preliminary barriers data; restocking sites. This mapping tool will help maximise the presentation of relevant survey data and will help inform management decisions relating to Shannon salmon conservation. Other milestones in the project include:

- Consultation and information dissemination to all stakeholders (seminars, newsletters)
- Complete salmonid spawning habitat surveys for the River Suck catchment (kayaks and on foot)

- Morphometric analysis for all salmon sampled during electrofishing and trapping programmes on the Bunowen and Tirur
- Provisional DNA abstraction from historical scale samples from the Shannon (UCC)
- Hosting of the final AARC project conference in Limerick, Ireland in November 2012.



**Plates 12 and 12.1. Electro-fishing surveys on the River Suck as part of the analysis of survival to year two of experimental AARC fish. PIT tags were inserted into experimental fish under anaesthetic with a handheld injector (right photo).**



**Plates 12.2 and 12.3. A Passive Integrated Transponder (PIT) tag array was installed in the River Bunowen to monitor PIT tagged pre-smolts and smolts migrating through the River Bunowen. The array was installed by Biomark, an American firm specialising in fish tracking and monitoring. The array consists of two lines of three 10ft antennae across the river bed. Tagged fish are recorded by a reader mounted on a hut on the river bank and data can be retrieved remotely via a dial-up modem.**

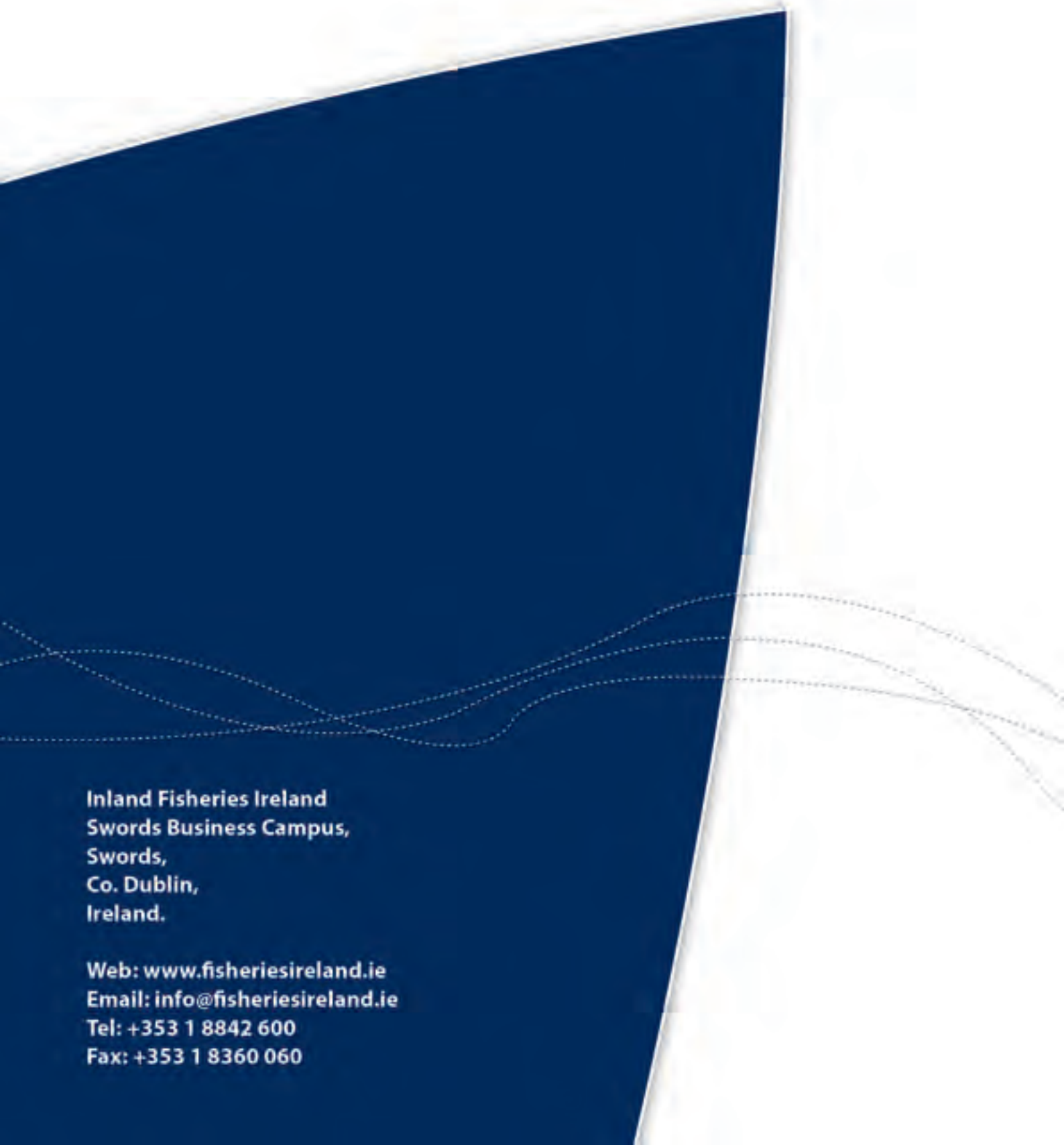




**Plates 12.4 and 12.5. Assessments of spawning habitats were carried out on the entire River Suck catchment as part of the AARC project. These surveys covered all areas by foot and by kayak and used geo-location techniques for mapping the potential spawning areas throughout the catchment. Above, spawning areas on the Springfield River, Williamstown, County Galway.**



**Plate 12.6. The final AARC project international conference was held in the Strand Hotel, Limerick in November 2012. Pictured are representatives from the various international partner institutions, keynote speaker and facilitators at the conference.**



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