

Integrated Aquatic Resources Management for Scotland, ROI & NI

IBIS

Research Overview Colin Adams

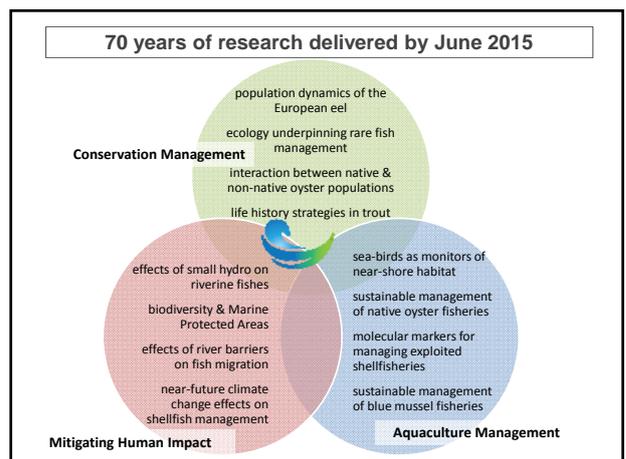
University of Glasgow
 Queen's University Belfast
 European Union
 Special EU Programmes Body
 Northern Ireland Executive

A project supported by the European Union's INTERREG IVA Programme managed by the Special EU Programmes Body



34 completed or current research projects

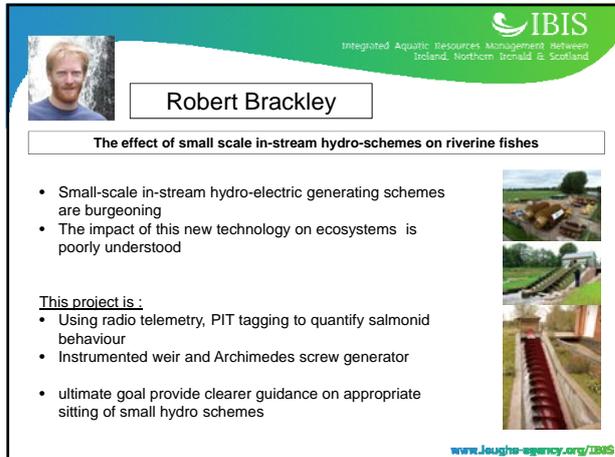
Heaton	Effect of stream barriers on the migration of Atlantic salmon	McKeown	The use of the River Inverclyde Classification (RICC) in the Foyle and Carrigford Catchments, its application in management and the link between basic index scores and fish density grades
Stary	The population dynamics and migration of the European eel	McKeown	Impact of multiple barriers on salmon catchment penetration
van Leeuwen	Life history strategies in the sea loch Salmon trout	McKeown	Impact of predation on Atlantic Salmon (Salmo salar) and Brown Trout (Salmo trutta) (Stirling of the Lough Foyle Catchment) - a Bioenergetics Modelling Application
Brinkley	Impacts of small scale hydro-power schemes upon aquatic communities	McKeown	Anguillidiosis disease infections in eels in Scotland and Ireland
Heaton	The ecology underpinning conservation management of rare headwater fishes	McKeown	Factors influencing fecundity in the European Eel, Anguilla anguilla
McKeown	Science based management strategies for environmental & commercial sustainability of native systems	McKeown	Operating costs in the Lough Foyle oyster fishery
McKeown	Developing molecular markers for application in the management of exploited stocks of the European eel	Stirling	The importance of size-frequency relationships in the management of the European Lobster, Homarus gammarus
McKeown	Predicting impacts of near future climate change on shellfish stock management	Heaton	The effect of infection with the sea louse parasite, Anguillidiosis, on the lipid content of the European eel, Anguilla anguilla
Devinck	Impacts of natural spread of non-native systems & interactions with native systems	Craven	Apiculture vs. other anthropogenic disturbances: The effects on water birds in Carrigford Lough
Chick	Effects of Marine Protected Areas on several populations, biodiversity and fisheries	McKeown	Conservation limits & Atlantic Salmon (Salmo salar)
		Craven	Interactions between shorebirds and aquaculture in Carrigford Lough
		Craven	Developing best practices for C. rotundifolius in Loch Ryan
		Craven	Developing best practices for C. gigas production
		McKeown	Interactions between shellfish fisheries and wildfish on Lough Foyle
		McKeown	Assessment of current predation on Atlantic salmon smolts on Foyle catchment
		Craven	Conservation ecology of freshwater pearl mussel, Margaritana margaritifera
		Craven	Phenotypic and genetic structuring in Brown trout populations
		Craven	Testing habitat based production models for juvenile Atlantic salmon
		Craven	Phycology in Netco trout
		Craven	Practical control methods for aquatic invasive species
		Craven	Pench aquaculture





Project Partners :

- Loughs Agency
- Scottish Centre for Ecology & the Natural Environment – University of Glasgow
- Marine Lab. - Queens University Belfast

Robert Brackley

The effect of small scale in-stream hydro-schemes on riverine fishes

- Small-scale in-stream hydro-electric generating schemes are burgeoning
- The impact of this new technology on ecosystems is poorly understood

This project is :

- Using radio telemetry, PIT tagging to quantify salmonid behaviour
- Instrumented weir and Archimedes screw generator
- ultimate goal provide clearer guidance on appropriate siting of small hydro schemes



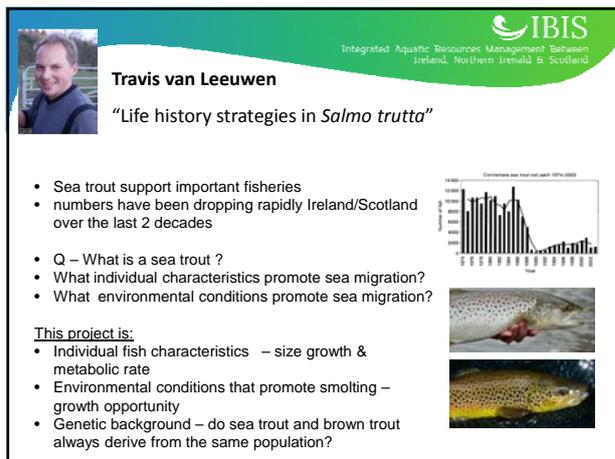
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2013 Fieldwork

Field site in NE Scotland
River Don





Travis van Leeuwen

“Life history strategies in *Salmo trutta*”

- Sea trout support important fisheries
- numbers have been dropping rapidly Ireland/Scotland over the last 2 decades
- Q – What is a sea trout ?
- What individual characteristics promote sea migration?
- What environmental conditions promote sea migration?

This project is:

- Individual fish characteristics – size growth & metabolic rate
- Environmental conditions that promote smolting – growth opportunity
- Genetic background – do sea trout and brown trout always derive from the same population?




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Disentangling Genetics from Environment



Resident family



Migratory family



Mixed family



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Abundant food



Scarce food



Growth, Metabolic effects & Smolting



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James Barry

“Population dynamics of the European eel”



Eel larvae



Glass eel



Elver



Yellow eel



Silver eel

Population size and supported biomass in contrasting freshwater habitats in a single catchment

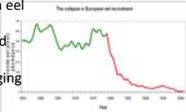
Freshwater lake movement patterns in eel

Silver eel – migration pattern and speed

Fitness consequences of different foraging strategies in eel



Study sites: Ireland and Scotland



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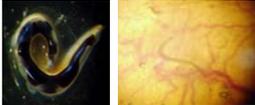
Jenny McLeish

The effects of *Anguillicola crassus*, the invasive swimbladder parasite on swimbladder function”



Using ultrasound to detect parasite infection

Non-destructive technique



Physical effects of infection on swimbladder function

Journal of Fish Diseases (In Press)

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Oliver Hooker

The evolutionary ecology underpinning biodiversity in freshwater fishes

- There is significant phenotypic and genetic variation within a species rarely recognised by conservation strategies
- How does this variation manifest?

This project is:

- Focussed on brown trout and Arctic charr
- Demonstrating the complexity of sympatric intra-species evolutionary divergence
- Using laboratory experiments to identify the evolutionary mechanisms promoting diversity
- Using field studies to determine phenotypic and genetic structuring patterns in the wild



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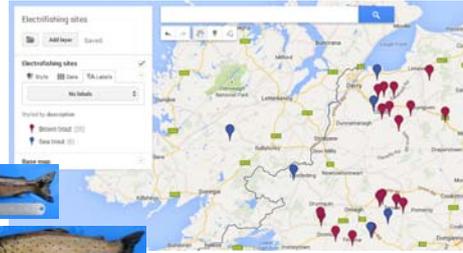
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Jessica Fordyce

“Phenotypic and genetic structuring in trout populations”

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Martin Hughes

“What is a ferox trout?”

Acoustic tracking in Lough Finn (Donegal)

Collecting broodstock from “ferox” trout in Wester Ross – common garden experiment




Social media to collect phenotype data and scales over 4,000 www hits

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Millie Piggot

“Sympatric phenotypic polymorphism in *Salmo trutta*”

Some anecdotal evidence of sympatric polymorphism in resident brown trout – Loch Laidon, Perthshire

Project will:

- Use geometric shape analysis 2D and 3D,
- classical stomach contents analysis
- To look for trophic polymorphism in trout

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Joanne Clarke

The effects of Marine Protected Areas on animal populations, biodiversity & fisheries

- MPAs promoted as a method for protecting biodiversity, providing natural population structures and managing exploited fish populations
- No-take zone around off-shore structures may act in part like MPAs
- The positive effects of MPAs have been only partly quantified
- We know very little about the negative effects

This project is quantifying the effect of MPAs:

- as a source of juveniles to fisheries
- the effect of predator "spill-over"
- Connectivity between MPAs and fishing areas



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Nina O'Hanlon

Sea birds as monitors of the near shore habitat

- Intertidal habitats are under significant pressure
- The EU Directives place statutory burdens of monitoring & habitat improvement
- Intertidal seabirds have the potential to provide effective but rapid assessment of such habitats

This project is :

- existing data to test the ability of top predators to assess habitat functioning
- field trails to relate intertidal habitat quality with patterns of seabird colony "health"
- Foraging movement and community structure
- Develop effective and rapid monitoring tools to determine intertidal "health"



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Much, much more information about the project on our website ...

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Life history strategies & population structure in trout



Travis van Leeuwen
 "Life history strategies in *Salmo trutta*"



Jessica Fordyce
 "Phenotypic and genetic structuring in trout populations"



Martin Hughes
 "Movement, growth and resource use in lake dwelling trout "



Milly Piggot
 "Sympatric phenotypic polymorphism in *Salmo trutta*"

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 **Travis van Leeuwen**
"Life history strategies in *Salmo trutta*"





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