



# WHAT IS HAPPENING TO OUR MISSING SALMON?

The magnificent Atlantic Salmon running the Falls of Shin (page 5) could well be a thing of the past if salmon numbers continue to decline at current levels.

Launched in the Spring of 2018, The Missing Salmon Project, is the clarion call that salmon conservation organisations are rallying round to try and halt, and then reverse, further decline. It is an ambitious and collaborative plan which, through the exemplar of The Moray Firth Tracking Project, aims to piece together the mystery of what happens to our smolts as they migrate downstream and out to sea.

The first Missing Salmon booklet was produced in March 2018, and since then a great deal has happened in the planning, fundraising and project design of The Moray Firth Tracking project which is due to start in early 2019.

In this second booklet the Atlantic Salmon Trust and Partners spell out in much more detail the project plan for The Moray Firth Tracking Project giving you a detailed breakdown of the aims and objectives, geography, timings, equipment, finances and likely outcomes.

So many individuals and organisations have rallied round to enable this hugely valuable and important piece of work to progress and I am also delighted to announce that it has become the central work stream for the 2019 International Year of the Salmon.

The next booklet will be published in Spring 2019 to update everyone with our progress but please contact our executive team on 0131 221 6550 / info@atlanticsalmontrust.org if you have any further questions.

Thank you for your continued support.



George Percy

President - The Atlantic Salmon Trust



## WHAT WE ARE DOING

The objective of The Missing Salmon Project is to reverse the ongoing decline in wild Atlantic salmon. This booklet is the second in a series and seeks to update you on the progress to deliver this ambitious target.

At the centre of The Missing Salmon Project is "The Likely Suspects Framework", which is a way of collecting information on the lifecycle of salmon, working out where and why the fish are dying so that the causes can be prioritised, and where possible, pragmatic management solutions put in place. These techniques are well proven as they have been used with great success to start the process of turning around the viability of cod stocks in the Irish Sea.

The Likely Suspects Framework depends on bringing together the information relevant to Atlantic salmon. This is where The Moray Firth Tracking Project comes into its' own, as over the course of three years it will firstly identify where the salmon are dying as they migrate downstream from the headwaters and start their early ocean migrations. From there the project will evolve into finding out what is killing the salmon – the "likely suspects" – and their relative contribution to the mortality of salmon.

The last piece of the jigsaw will be to use this information to improve our management of salmon so that more smolts survive the early stages of migration.

The task at hand is momentous but the action required is perfectly clear. We urgently need to know:

- What are the migration pathways used by smolts?
- How do we quantify the major impacts on their mortality during this journey?
- How to improve their survival rate so more fish return?

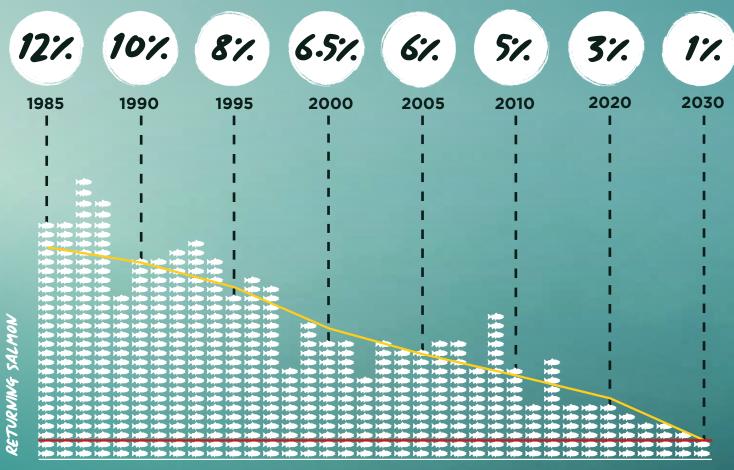


Mark Bilsby
Chief Executive Officer - The Atlantic Salmon Trust



# CURRENT DECLINE IN WILD ATLANTIC SALMON

Is this Salmon's future?



- ENDANGERED SPECIES
\*illustrative only

2018 CATCH RETURNS ARE FURTHER PROOF OF THIS DECLINE

## THE PLAN TO REVERSE THIS TREND

IDENTIFY KEY AREAS OF MORTALITY

The Likely Suspects Framework will gather and analyse evidence to determine areas where mortality is occurring

PRIORITISE THE CAUSES
OF MORTALITY

Evaluate the evidence in The Likely Suspects Framework and define the most likely causes, then focus actions on the priority suspects.

CREATE AND IMPLEMENT
PLANS TO REVERSE THE TREND

With a defined list of likely causes of mortality, we can influence policy and develop measures to reduce the decline.

Wild Atlantic Salmon running the Falls of Shin on The River Shin.

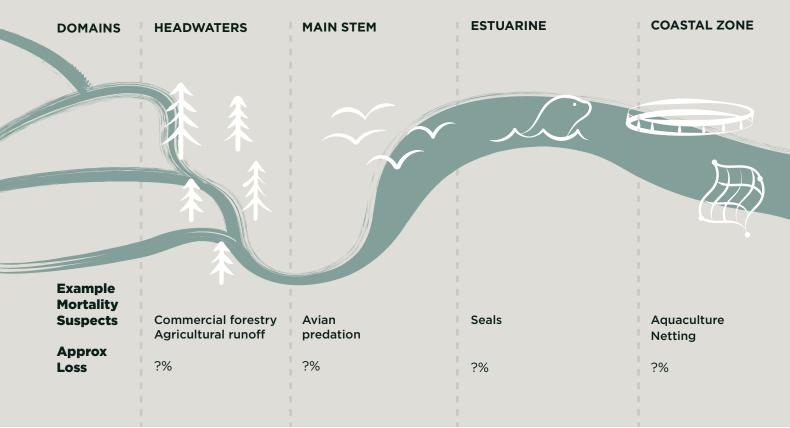
## THE LIKELY SUSPECTS FRAMEWORK

The Likely Suspects Framework was used with success to help reverse the decline of cod stocks in the Irish Sea. The migration of wild salmon has been broken down into domains as shown in the diagram below. The first step is to identify how many fish are dying within each domain. Subsequent work will then apportion the causes of mortality within each domain.

The design of The Likely Suspects Framework enables scientists and researchers to publish their work within the framework and this in turn enables policy makers and river managers to access the information to create evidence based recovery plans.

#### ANNUAL SALMON MIGRATION





## WHERE & WHY ARE THEY DYING?

THE MORAY FIRTH TRACKING PROJECT
WILL USE THE LATEST ACOUSTIC TRACKING
TECHNOLOGY TO HELP ANSWER THIS QUESTION FROM
THE HEADWATERS UP TO 100KM OUT INTO THE
MORAY FIRTH.

**OPEN OCEAN** 



Climate Change Pelagic by-catch ?%





THE TRACKING PROJECT

In order to identify the main reasons for mortality in smolts (juvenile salmon) and as a key part of The Missing Salmon Project, a co-ordinated UK wide acoustic tracking strategy is being developed.

This strategy will track wild salmon to help understand what is preventing them from returning to UK rivers.

The tracking project will build on existing research but will commence in the Moray Firth, where 20% of all UK salmon begin their migration. This project will be the largest of its kind to take place in Europe and will tag and track smolts further than ever before.

The lessons learned will provide valuable insights, transferable to other populations of salmon around the UK.







## THE MORAY FIRTH EXPLAINED

#### **Key objectives**

Using The Likely Suspects Framework and acoustic tracking technology to understand "where smolts are dying" and deliver a plan -

- To maximise the number of smolts leaving fresh water in the Moray Firth
- To protect smolts during the estuarine and inshore coastal phase of the migration

#### **Freshwater**

The core aim will be to determine how successfully smolts move down the main stem and into the transitional waters of the estuary and start to identify factors that may be influencing the survival of these fish. This will then be used to feed information into local fishery organisations to help improve survival of smolts.

#### Marine

The marine element will explore how the smolts from seven rivers move through the Moray Firth, their survival, and trends between fish from the different rivers. The marine tracking project aims to answer the following questions:

- The movement and loss rate of smolts between the estuary and survival to Outer Moray Firth
- Identify, where possible, losses of smolts in the Moray Firth are occurring
- The migration routes used by smolts from each river system within the study
- The shoaling behaviour, if any, of smolts from different rivers
- Examine whether salmon across different river systems have different survival rates

#### **Facts and Figures**

River	Length (km)	Catchment Area (km2)	Number of release points	Likely Number of Receivers in River	Total Number of salmon to be tagged
Deveron	62	1260	1	9	100
Nairn	54	313	1	3	50
Spey	170	3000	1	10	150
Ness	68	2103	1	11	100
Connon	70	1100	1	4	100
Shin	11	583	1	5	100
Oykel	73	355	1	10	150
Total			7	52	750

Number of rivers in the Project

7

Number of receivers at Sea **260** 

Total KM of receivers at Sea

Furthest theoretical distance a Smolt can travel from headwater to receiver at sea

202KM (FROM THE MESS)

Total Cost of Project in Year 1 **£1,300,000** 

Approximate % of UK wild Atlantic salmon that migrate from Moray Firth rivers

20%-30%

# THE SEVEN PROJECT RIVERS







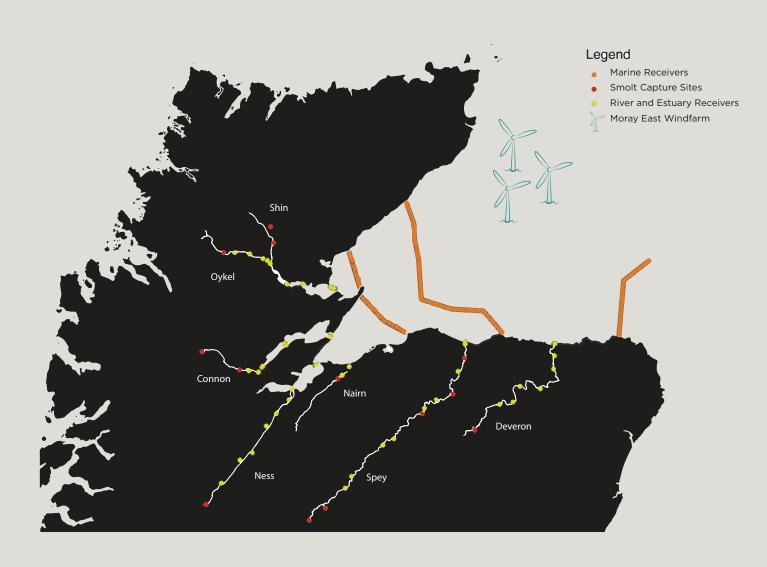








## MORAY FIRTH TRACKING PROJECT MAP



## MORAY FIRTH TRACKING PROJECT DESIGN

This Atlantic Salmon smolt tracking study will monitor the seaward migration of salmon smolts as they leave seven rivers flowing into the Moray Firth. Fish will be tracked through freshwater, estuaries, sea lochs, near shore and open marine environments.

This is a three-year programme, with the first year described here in this booklet. Years two and three will develop once the results of the first year are known. It is essential that the findings from year one are thoroughly explored to allow refinements to the study in future years.

We do not anticipate that all of the acoustic arrays will remain in place for years two and three, and a review of the initial findings may result in an alternative study design taken forward in subsequent years.

Wild, naturally migrating salmon smolts will be captured, tagged with acoustic transmitters and released. The tagging operation will be performed under surgical conditions by a Home Office licenced member of staff, trained in implanting acoustic tags and who has demonstrated post-training competence. The core project will comprise of 50 salmon smolts being tagged on each of the seven rivers, plus 50 sea trout will be tagged on two rivers.

In addition kelts will be tagged and their migration monitored. Where pike are perceived to cause mortality in salmon through predation, they will also be tagged. The District Salmon Fishery Boards have indicated a wish to tag additional fish. The combined objective will be to tag over 800 fish.

Four marine arrays of acoustic receivers will be installed in the Moray Firth and their location is shown on the map opposite.

These arrays will be arranged so:

- 15km long across the inner Moray Firth
- · 24km long across the Dornoch Firth
- 78km long across the middle of the Moray Firth to the east of Spey Bay
- And a partial array extending north for 35km north from Fraserburgh

## THE MORAY FIRTH TRACKING PROJECT TIMELINE

2019 - YEAR 1 IDENTIFY

#### January

Procurement of equipment

#### March

Deployment of equipment

#### April

Tagging

#### July

Recovery of acoustic buoys

#### August

Analysis of data from acoustic buoys

#### November

3 day workshop and conference in London

#### 2020 - YEAR 2 PRIORITISE

#### Spring

Based on Year 1 results define a project plan for year 2

#### Summer

Implement plan to define % allocated against each suspect

#### **Autumn**

Collect data throughout the Moray Firth.

#### Winter

Analyse the data and communicate results

#### 2021 - YEAR 3 PLAN

#### **Moray Firth**

Refine information to engage policy makers at local, national and international levels.

#### The Missing Salmon Project

Review project in light of culprits from The Likely Suspects Framework.



## PREDICTED OUTCOMES

Predicted outcome of The Moray Firth Tracking Project using The Likely Suspects Framework

YEAR 1 2019 - IDENTIFY

YEAR 2 2020 - PRIORITISE

DOMAINS

%
OF SALMON
DYING HERE
&
identify range of

potential suspects

Main stem

OF SALMON
DYING HERE
&
identify range of
potential suspects

**Estuarine** 

%
OF SALMON
DYING HERE
&
identify range of
potential suspects

**Coastal Zone** 

OF SALMON
DYING HERE
&
identify range of

potential suspects

DOMAINS

**Headwaters** 

DEFINE IMPACT

of each potential likely suspect Main stem

**DEFINE IMPACT** 

of each potential likely suspect **Estuarine** 

DEFINE IMPACT

of each potential likely suspect **Coastal Zone** 

DEFINE IMPACT

of each potential likely suspect

YEAR 3 2020 - PLAN

refine impacts of each likely suspect to improve evidence base of management plans

#### **Open Ocean**

% OF SALMON DYING HERE

identify range of potential suspects

Acoustic tracking will show what proportion of fish are dying in each domain - from headwater to outer Moray Firth.

#### **Open Ocean**

DEFINE IMPACT

of each potential likely suspect Once losses have been defined in each domain in year 1 more focused research can be commissioned to ascertain the value of mortality caused by suspects in each domain.

Management solutions at River, Regional, National & International levels to reverse the decline based on evidence.



## WORKING TOGETHER ...

The various Non-Governmental
Organisations working for Atlantic salmon
have agreed to form an alliance to deliver
The Missing Salmon Project for the
benefit of all.





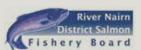






The Fishery Boards and Trusts for the seven rivers in The Moray Firth Tracking Project are working with the alliance of NGOs to collect the evidence, define their policies and create management plans.













## THE MISSING SALMON PROJECT KEY DEVELOPMENTS SO FAR...

- The International Council for the Exploration of the Sea (ICES), North Atlantic Salmon Conservation Organization (NASCO), North Pacific Anadromous Fish Commission (NPAFC), and The International Year of the Salmon (IYS), have all adopted The Likely Suspects Framework as a process for defining mortality in salmon in the marine environment. This demonstrates large organisations coming together to discover the reason for mortality at sea.
- Both NASCO and NPAFC have adopted The Likely Suspects Framework as a key project for their Joint International Year of the Salmon. This helps to bring the scale and resources needed to deliver results on this challenging and innovative framework.
- The key NGO's from around the United Kingdom have agreed to form an alliance to deliver The Missing Salmon Project and work collectively to halt the decline in salmon stocks. They are supported by over 50 organisations.
- Since the spring of 2018 approximately £1 million has been raised to deliver The Missing Salmon Project from a mixture of industrial, public and private donations, without which the Moray Firth Project could not be delivered.
- The team and the detailed implementation plan are in place to begin the work of The Moray Firth Project in Spring 2019.

There are many ways in which organisations or individuals can support The Missing Salmon Project. Time is short but with focussed effort we can make a difference. To support the project please visit:

www.atlanticsalmontrust.org/donate



#### ORGANISATIONS SUPPORTING THE MISSING SALMON PROJECT









































TheFISHMONGERS'









ICELAND





















Glasgow



Angling Centre



















Nith District

Salmon Fishery Board























