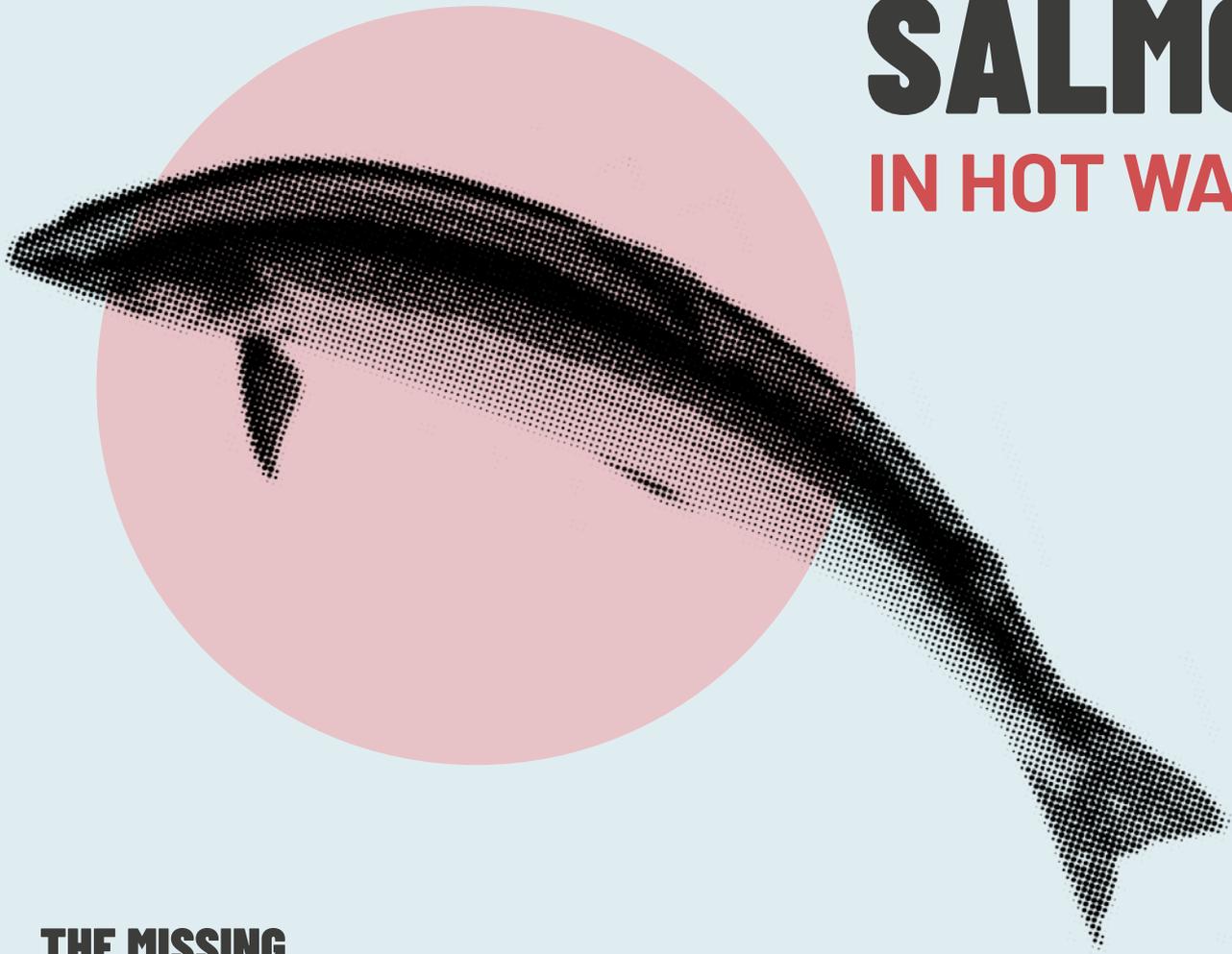


# WILD ATLANTIC SALMON

IN HOT WATER



**THE MISSING  
SALMON ALLIANCE**

Saving wild Atlantic salmon through  
evidence, analysis and action

2021



## THE ALLIANCE

### Atlantic Salmon Trust

Through stimulating research and sound science, the Atlantic Salmon Trust is the foremost evidence-based salmon conservation charity in the UK.



### Fisheries Management Scotland

The representative body for Scotland's District Salmon Fishery Boards, Rivers and Fisheries Trusts and the River Tweed Commission.

Promoting and ensuring the best evidence-based fisheries management for the conservation of Scotland's wild salmon and native freshwater fish.



### The Angling Trust

Is a representative body for all anglers in England and Wales. They lobby government, campaign on environmental and angling issues including many of the factors which are affecting Salmon.



### Game & Wildlife Conservation Trust

A leading UK charity conducting conservation science to enhance the British countryside for public benefit. Their Salmon and Trout Research Centre, East Stoke, is at the forefront of NGO salmon research in England and Wales.



### The Rivers Trust

Is the umbrella body for more than 60 member Rivers Trust charities in the UK and Ireland working to restore rivers and their catchments by implementing collaborative, nature-based solutions.

## THE OBJECTIVE

Saving the wild Atlantic salmon will take hard work over a sustained period and, most importantly, will take coordinated effort. There is no silver bullet. By coordinating expertise, pooling resources and working together The Missing Salmon Alliance objective is to increase the number of adult salmon returning to the UK.



### Booklet 3 in The Missing Salmon Series

The purpose of WILD ATLANTIC SALMON IN HOT WATER (Booklet 3) is to report on projects the Alliance partners have been engaged with over the last year, describing projects that have been committed to and giving our stakeholders an overview of possible future conservation work.

**GROWING  
THE  
MISSING SALMON  
ALLIANCE**

"We are delighted to welcome Fisheries Management Scotland and the Rivers Trust to The Missing Salmon Alliance.

The Rivers, Fisheries Boards and Trusts they represent are key to our collective effort to increase the number of adult salmon returning."

**David Mayhew CBE - Chairman of the Missing Salmon Alliance.**





**HOW DO WE  
INCREASE  
the number of  
adult salmon  
RETURNING  
to UK rivers?**

In booklet 3 of The Missing Salmon Series we will explore how we can increase the number of returning adults to UK Rivers . To do this we will discuss:

Photo: Linda Pitkin/scotlandbigpicture.com

**1 EVIDENCE**  
How we are gathering evidence.

**2 ANALYSIS**  
Understand where and why salmon are going missing.

**3 ACTION**  
Detail the actions taking place today and how we will approach the future.



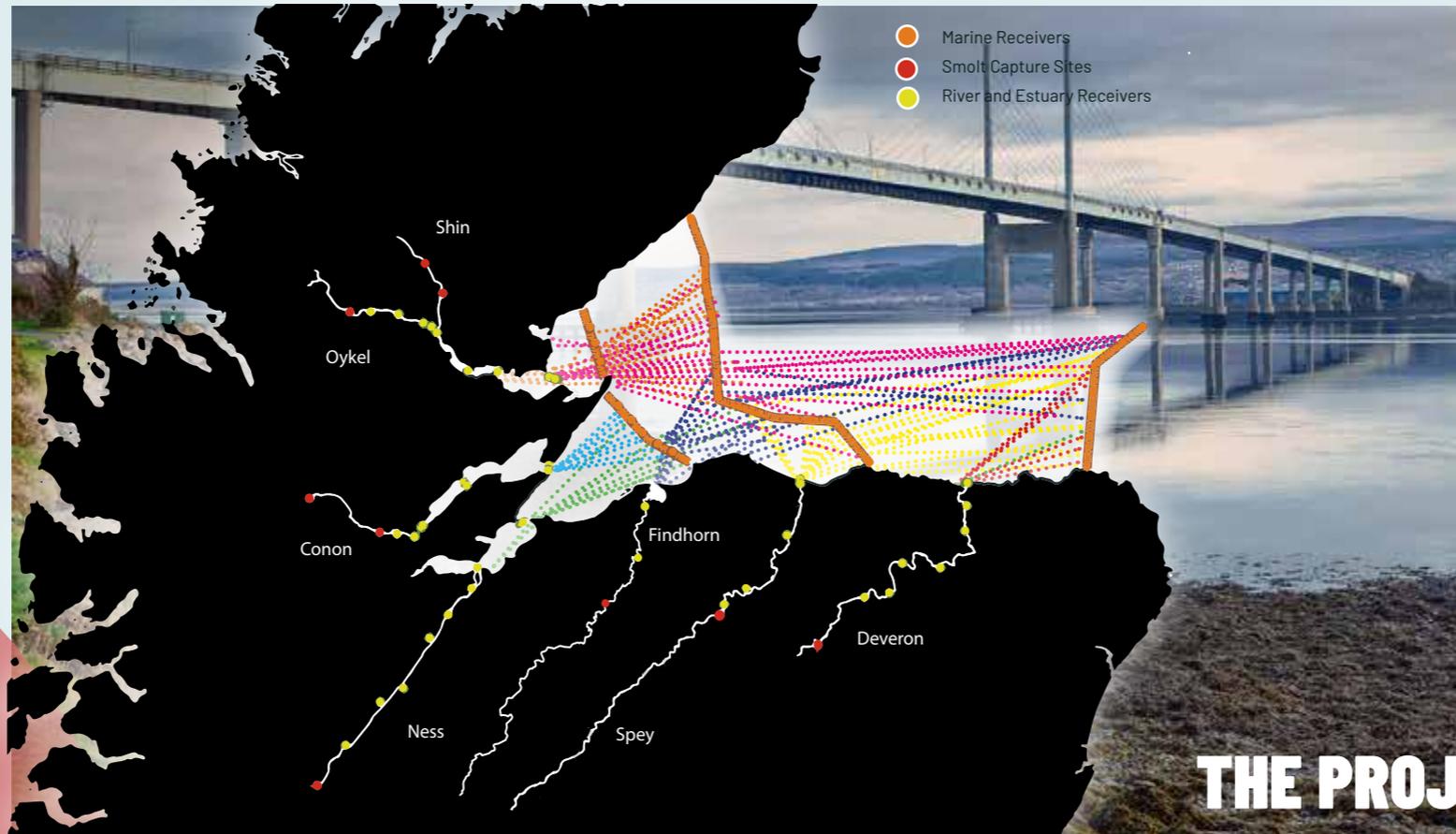
“It will be action, rather than rhetoric, that restores healthy wild salmon populations. The Missing Salmon Alliance’s collaborative approach will increase the scope, scale and pace of action and I urge you to support its important work.” **Robbie Douglas Miller, Chairman of the Atlantic Salmon Trust.**

**THE OBJECTIVE**

To take a whole region of salmon rivers, around the Moray Firth, and study the smolt migration to understand reasons for salmon mortality, from the headwaters through the main stem, the estuary and up to 120km out to sea, and to understand what we can do to mitigate mortality. This includes understanding the smolts dispersal patterns in the coastal zone of their migration.

**50% OF SMOLTS WENT MISSING BEFORE THEY LEFT THE RIVER**

In years 2 & 3 we intend to find out why fish are going missing and prescribe actions to increase the number of adults returning.



**The Year 1 Results**

River	Salmon Smolts Tagged	Confirmed Survival to Rivermouth	Detected on Spey Bay Array
Deveron	100	38%	N/A
Spey	149	59%	46%
Findhorn	101	53%	40%
Ness	100	9%	8%
Conon	99	46%	19%
Oykel	153	70%	34%
Shin	100	89%	58%

**THE PROJECT TIMELINE**

**THE METHODOLOGY**

Using acoustic tracking technology we have tracked 800 smolts over 7 river systems and they have been recorded on the receivers over 15 million times. This has provided a valuable resource to understand where the smolts went missing. From there, we focus on the 'why' and identify how we better look after them.

**Year 1 – 2019**

Evidence gathering on a macro scale across the region and in the coastal zone. To understand the dispersal pattern of the smolts with reference to the Moray East Wind Farm.

**Year 2 – 2021**

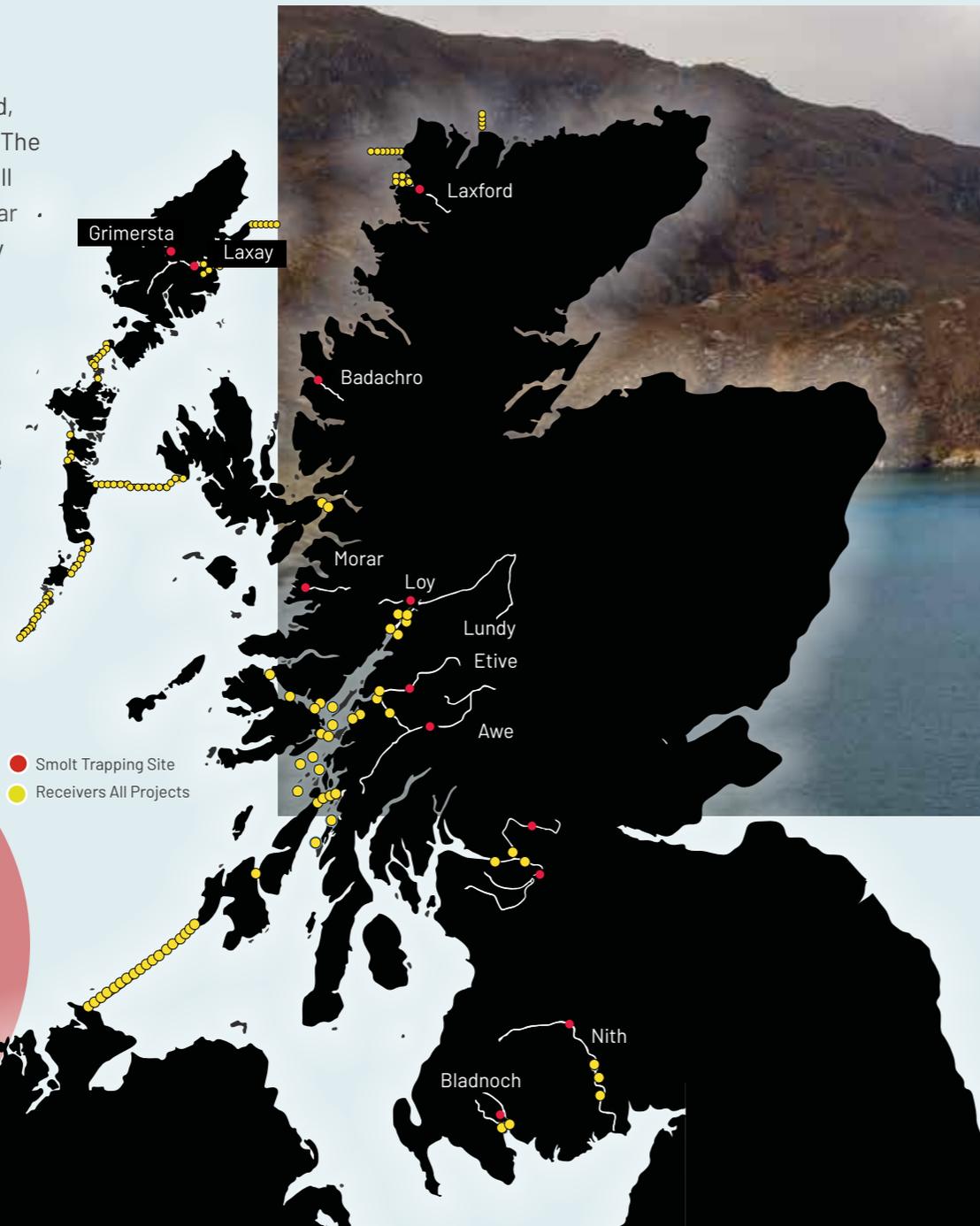
In year 2 we wish to ensure that the results from 2019 were not unusual due to either conditions or other factors. We will also be focusing on why the smolts are going missing and deploying an acoustic tracking project which builds on the year 1 results.

**Year 3 – 2022**

With the evidence from years 1 & 2 to work with policy makers to trial and then establish management practices to make a difference.

### THE OBJECTIVE

The West Coast Tracking project is a partnership between Marine Scotland, Fisheries Management Scotland and The Atlantic Salmon Trust. The project will track Atlantic salmon over a three year period to better understand how they migrate through coastal waters and to inform policy. This will assist the forthcoming wild/farmed regulatory regime which is designed to protect wild Atlantic salmon and sea trout. As not all rivers can be monitored the results will be used to ground truth a smolt dispersal model, developed by Marine Scotland, so that migration paths can be worked out for all west coast Scottish rivers.



● Smolt Trapping Site  
● Receivers All Projects

**WHERE SHOULD WE FOCUS OUR EFFORTS TO BETTER PROTECT WILD SALMON FROM AQUACULTURE IMPACTS ?**



Photo: Richard Davies

To protect the fish we need to know how they migrate through coastal waters.

### THE PROJECT TIMELINE

#### Year 1 – 2021

We will strategically deploy receivers across the west coast of Scotland to listen for up to 1,000 tagged salmon smolts from 10 rivers, ranging from the Solway to Sutherland and across to the Hebrides. The first results will be available in late autumn 2021.

#### Year 2 & 3 – 2022/23

Refine our understanding of smolt dispersal patterns across the west coast of Scotland and ensure that evidence collected on fish migrations is used to protect wild salmon smolts.

# EVIDENCE GATHERING

SAMARCH - TRACKING IN THE ENGLISH CHANNEL

The English Channel is one of the busiest stretches of water in the world, for shipping, inshore and offshore commercial fishing and human activity. SAMARCH (SALmonid MAnagement Round the CHannel) will provide evidence to better protect salmon and sea trout from these activities. This project is being delivered by a number of different partners and led by the Game and Wildlife Conservation Trust.

## THE OBJECTIVE

Understand how salmon and sea trout use the coastal environment and to quantify how many smolts are lost during their estuarine migration.

What marine habitats do the adults utilise when at sea, and where, and does this present a risk of accidental capture by commercial fisheries?

To understand how the freshwater phase impacts the ability to survive at sea, and how this has changed over the years.

We will develop new policies and improve current ones to better protect these fish at sea.

Work is ongoing to develop flexible models to make the best use of information, collected over the last 30 years at East Stoke, to estimate salmonid abundances and changes in their migration behaviour. This information will help understand the future behaviour of salmon populations to the north of the English Channel as climate change moves north.

Photo: MISTER DIN/Shutterstock.com



**The key findings to date**  
 Too often, migratory fish are in the wrong place at the wrong time, making them susceptible to becoming a by-catch in coastal nets.  
 This project, along with other research projects in the UK, has shown that larger wild smolts are more than three times as likely to survive the perils at sea.

**EVIDENCE FROM ACROSS THE UK SHOWS MORE SALMON RETURN WHEN THE SMOLTS ARE LARGER WHEN THEY LEAVE**

# SAMARCH - TRACKING IN THE ENGLISH CHANNEL

## THE PROJECT TIMELINE

2017 - 2021

900 smolts were tagged with acoustic tags and 300 adults were tagged with both an acoustic and a data storage tag in four rivers discharging into the English Channel.

2021-2023

Data will be interrogated to understand in greater depth what is causing smolts to go missing in these key coastal and transitional waters.

For more information visit [www.missingsalmonalliance.org](http://www.missingsalmonalliance.org)

All this data feeds  
**THE LIKELY  
SUSPECTS  
FRAMEWORK**

and increases the scrutiny  
of particular suspects.

Photo: jack perks/Shutterstock.com



**TECHNOLOGY**  
HELPS SHINE A LIGHT  
ON UNDERSTANDING WHY  
**SALMON**  
ARE GOING  
MISSING

To find out where migrating  
salmon and smolts are  
dying we need to use the  
latest technology to help  
identify the suspects.

## THE DEPLOYMENT OF TECHNOLOGY TO HELP FIND THE SUSPECTS

Below are some of the technologies being used to understand where and why salmon are going missing.

### Where salmon are going missing

#### Acoustic Tracking

Salmon smolts are implanted with uniquely coded tags, that are picked up on strategically placed receivers in rivers and seas, to help establish where fish go missing.



### Why Salmon are going missing

#### Radio Tracking

Not all predators are easy to spot, and by miniaturising radio tags we can start to understand the relative impacts of both fish and avian predators on young salmon.



#### Environmental DNA (eDNA)

All animals leave their signature DNA in the environment. By examining the DNA in scats from riverbanks we can establish the diet of various predators, estimate their population size and impact on wild salmon.



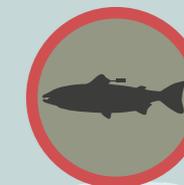
#### Drone Technology

Drones have the potential to allow us to rapidly and accurately identify and count the number of potential predators along a section of river.



#### Data Storage Tags

Record temperature to model the movements of fish at sea and pressure to assess their swimming depths.



As technologies are developed we are assessing them to understand which ones we can utilise to further our work in understanding the reasons behind the decline in salmon and what we can do about them.

# EVIDENCE GATHERING | THE PRESSURES MAPPING TOOLS

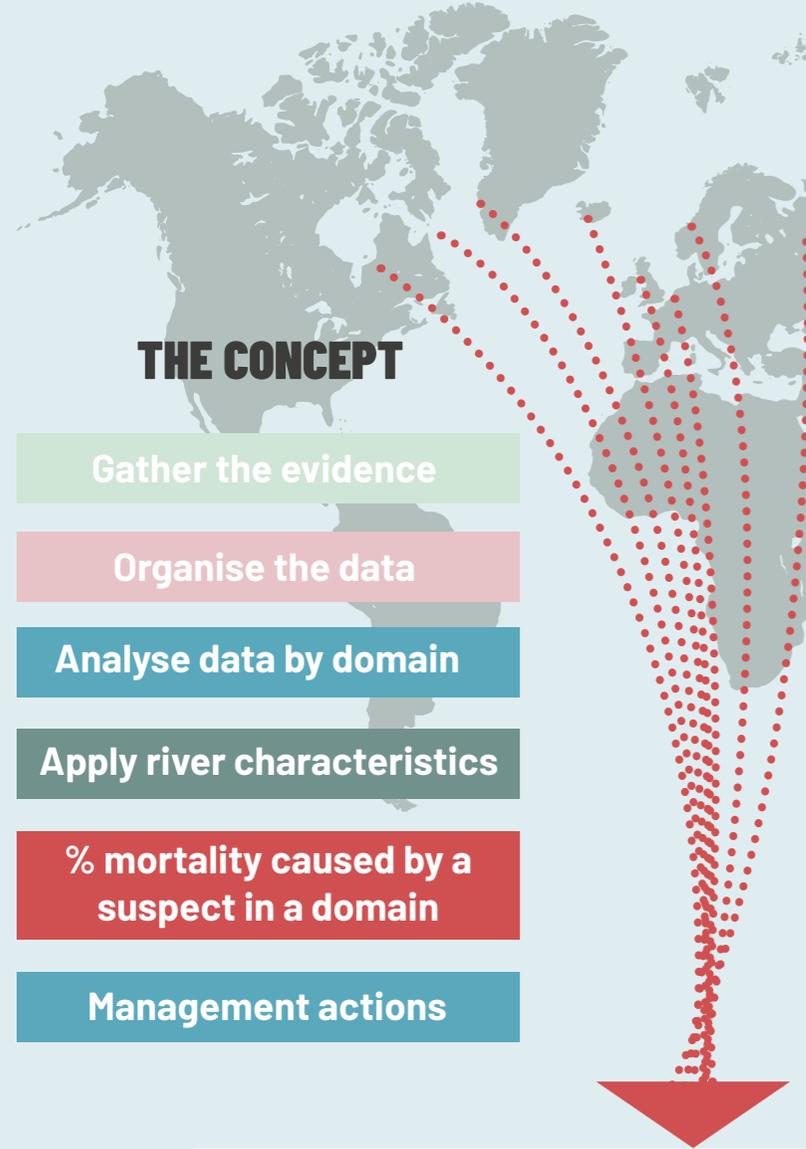
Pressures mapping tools have been developed by CEFAS in England and by Marine Scotland and Fisheries Management Scotland in Scotland. These are national efforts to determine priorities for action and measure progress. They enable local fishery managers to quantify and illustrate the severity and status of each of the different

pressures that salmon face in their catchment areas. For the first time the tools establish a consistent approach to illustrate the nature and intensity of the challenges faced by salmon at local, regional and national levels.



**CLIMATE CHANGE**  
**INTENSIFIES**  
**THE PRESSURE**  
**OF OTHER FACTORS**  
**ON SALMON**

"The use of mapping tools to quantify the pressures faced by Atlantic salmon will allow these to be better understood at local, regional and national scales and will inform and focus essential management actions." **Dr Alan Wells - CEO Fisheries Management Scotland**



**THE CONCEPT**

Gather the evidence

Organise the data

Analyse data by domain

Apply river characteristics

% mortality caused by a suspect in a domain

Management actions

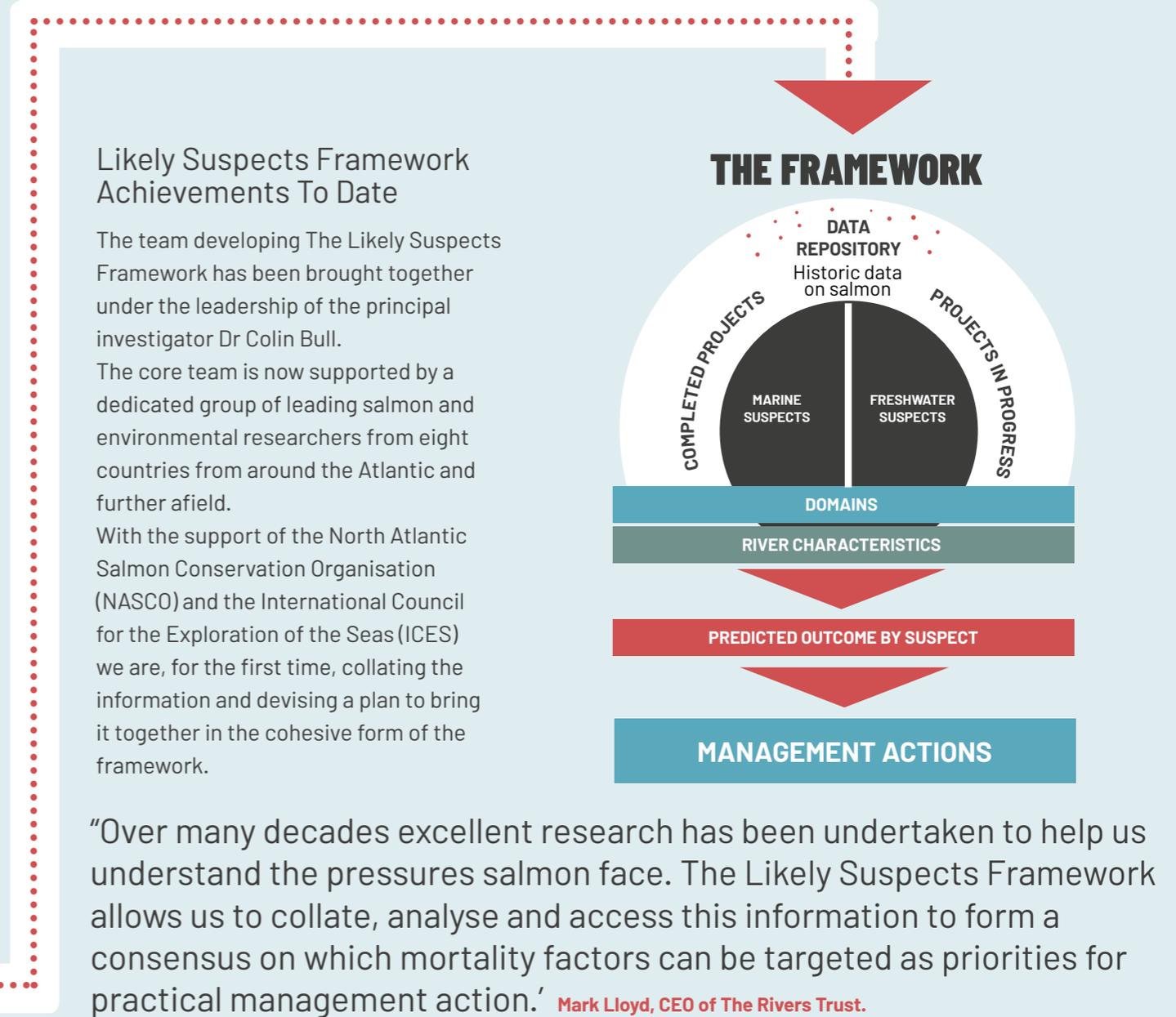
**Creating The Framework**

In the previous pages we have outlined projects focussed on gathering evidence as to what is causing salmon mortality, whether in freshwater or at sea. Many of these projects have been prioritised by The Likely Suspects Framework and commissioned to form an accurate picture of actions we can take to increase the number of adult salmon returning to the UK.

**Just what is The Likely Suspects Framework?**

There is a vast resource of information available out there on salmon, but it has never been pulled together to understand the big picture. The Framework seeks to bring this information together so that we can locate, quantify and understand the cause of salmon mortality through each stage of its lifecycle, with a view to promoting appropriate management solutions. This is done by breaking the lifecycle down into domains and using the wealth of information about salmon and their environment to establish the scale, location and likely loss in each of these domains. By making the best use of this information we can target the most appropriate management actions to help rebuild stocks of salmon.

**The Likely Suspects Framework**



**Likely Suspects Framework Achievements To Date**

The team developing The Likely Suspects Framework has been brought together under the leadership of the principal investigator Dr Colin Bull. The core team is now supported by a dedicated group of leading salmon and environmental researchers from eight countries from around the Atlantic and further afield. With the support of the North Atlantic Salmon Conservation Organisation (NASCO) and the International Council for the Exploration of the Seas (ICES) we are, for the first time, collating the information and devising a plan to bring it together in the cohesive form of the framework.

“Over many decades excellent research has been undertaken to help us understand the pressures salmon face. The Likely Suspects Framework allows us to collate, analyse and access this information to form a consensus on which mortality factors can be targeted as priorities for practical management action.” **Mark Lloyd, CEO of The Rivers Trust.**

**The Moray Firth Tracking Project**  
**An example of The Likely Suspects Framework in practice**

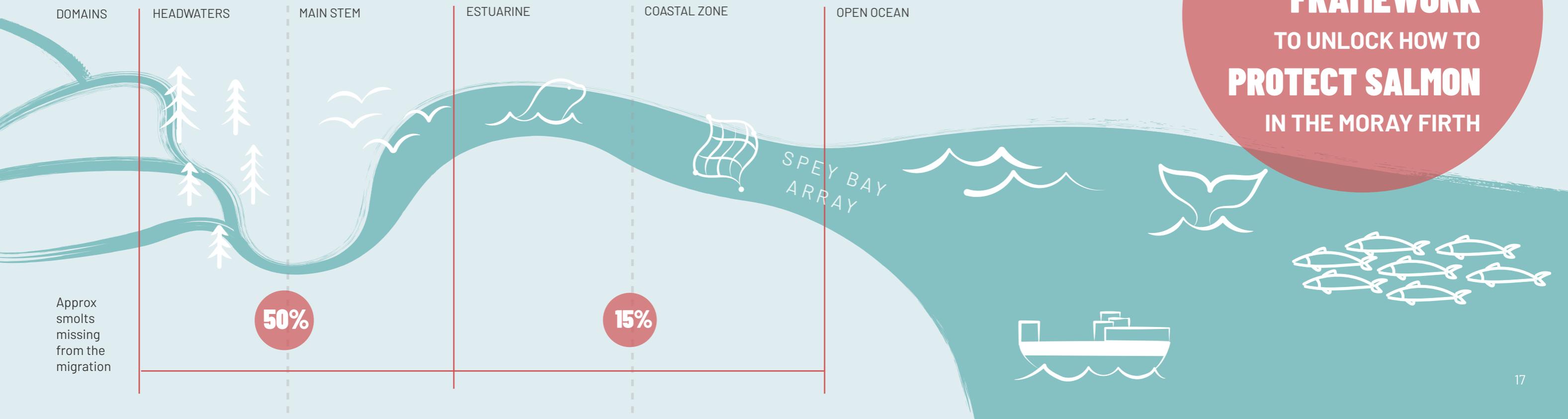
The Atlantic Salmon Trust, Marine Scotland and the six boards of the Moray Firth Rivers are currently preparing for year 2 of the Moray Firth Tracking project. The preliminary results across all seven rivers indicate that approximately 50% of migrating smolts went missing before they reached the estuary. A further 15% went missing between the estuary and the Spey Bay Array. Of the smolts which make it to the estuary we believe less than 5% are returning as adults. In year 2 of the project we are investigating the

freshwater phase further and starting the process of understanding the contribution to salmon mortality from each of the potential suspects. This includes understanding if this was down to particular conditions in 2019 or other factors. By assessing these suspects through the framework we will be able to advocate the most effective management to protect young salmon and increase the number of returning adults.

“The development of The Likely Suspects Framework enables us to prioritise actions that can be taken in the freshwater environment while we further understand the complexities of the marine world”

**Dr Colin Bull - Principal Investigator for The Likely Suspects Framework**

**USING THE  
 LIKELY SUSPECTS  
 FRAMEWORK  
 TO UNLOCK HOW TO  
 PROTECT SALMON  
 IN THE MORAY FIRTH**



## PRODUCING ACTIONS TO INCREASE THE NUMBER OF ADULT SALMON RETURNING TO THE UK

Salmon populations in the UK are declining. In January 2020 the Scottish Government recognized that salmon “were in crisis.” Fisheries Management Scotland and The Angling Trust are well positioned to make things happen. They are:

- 1.** **Influence Policy**  
Fisheries Management Scotland and the Atlantic Salmon Trust sit on Scotland’s national wild salmon strategy advisory group, facilitating our ongoing advocacy for policies and outcomes which we believe are key for the recovery of populations.
- 2.** **Working with Industry**  
Through connections into industries which impact salmon populations, actions are being taken to mitigate loss of salmon through improving management practice.
- 3.** **Promoting Action**  
It is local managers that will deliver real change. Through the fundraising success of The Missing Salmon Alliance resources can be provided to River Managers to take real action which will result in more adult salmon returning.

THERE IS NO  
REASON TO DELAY,  
**“ACTION”**  
CAN BE TAKEN  
TODAY

“The key to the future is to use our resources in the most efficient way by taking the right management actions. There are things we can do now and we just need to get on with it.” **Jamie Cook - CEO The Angling Trust**

**RESTORING A  
SALMON  
POPULATION  
TO TURN THEORY  
INTO PRACTICE**  
TO CREATE A BLUEPRINT  
FOR OTHER RIVERS

## A RIVER RESTORATION PROJECT

Fisheries managers and researchers across the UK have developed a suite of management approaches which can improve habitat and increase production of salmon. The Missing Salmon Alliance is discussing, with its partners, the opportunity to take this knowledge and apply it at a catchment scale to a west coast river, to assess how big a difference we can make. The outputs from this work will give us crucial information on how we can support fisheries managers to deliver this vital work at scale. We need to measure the effect of each management action we take in order to evaluate its success and then understand if this can be replicated with other river systems.

“It is essential that we turn theory into practice. By taking a river and deploying these tools to devise and, crucially, deliver, a plan to restore a healthy number of salmon into a catchment, it will provide a beacon of hope for salmon stocks.”

**Professor Ken Whelan – Research Director  
Atlantic Salmon Trust**

WHERE  
**HABITAT IS GOOD**  
**SALMON THRIVE**  
AND WE NEED TO  
**PROTECT THEM**

## WHAT IS BEING DONE

Many salmon restoration actions are being conducted locally by fisheries managers, such as the easing of barriers to migration. Marine Scotland has identified three further priority areas for potential future large scale action that can be started now.

- 1. Increase resilience** and restore over-heated uplands. The science is already in place to identify where planting of trees and fencing to encourage bankside vegetation can restore salmon and protect against climate change. This is a process that has started but must be accelerated and scaled up, with the right tree species- such as aspen, willow and alder- in the right places.
- 2. Feed the streams** to feed the salmon. Adding nutrients to impoverished upland streams has been shown to increase the length and condition of juvenile salmon. We should now investigate if this exercise can be carried out on a larger scale to increase numbers and quality of salmon smolts.
- 3. Reduce losses** to predators, parasites and pollution. Better solutions are needed to alleviate predation. From goosanders to seals - all take their toll on a beleaguered wild salmon population. Close working with the aquaculture industry is required to reduce impacts of sea lice and broad scale action by regulators is needed to tackle pollution.

WORKING TO  
ADDRESS THE  
**IMPACTS**  
OF  
**AQUACULTURE**  
ON WILD SALMON  
POPULATIONS

“We now have a unique opportunity to work together in a positive and collaborative manner to make meaningful change for the benefit of our precious wild salmon.”

Richard Sankey – Chairman of Fisheries Management Scotland

Photo: Richard Davies

## AQUACULTURE

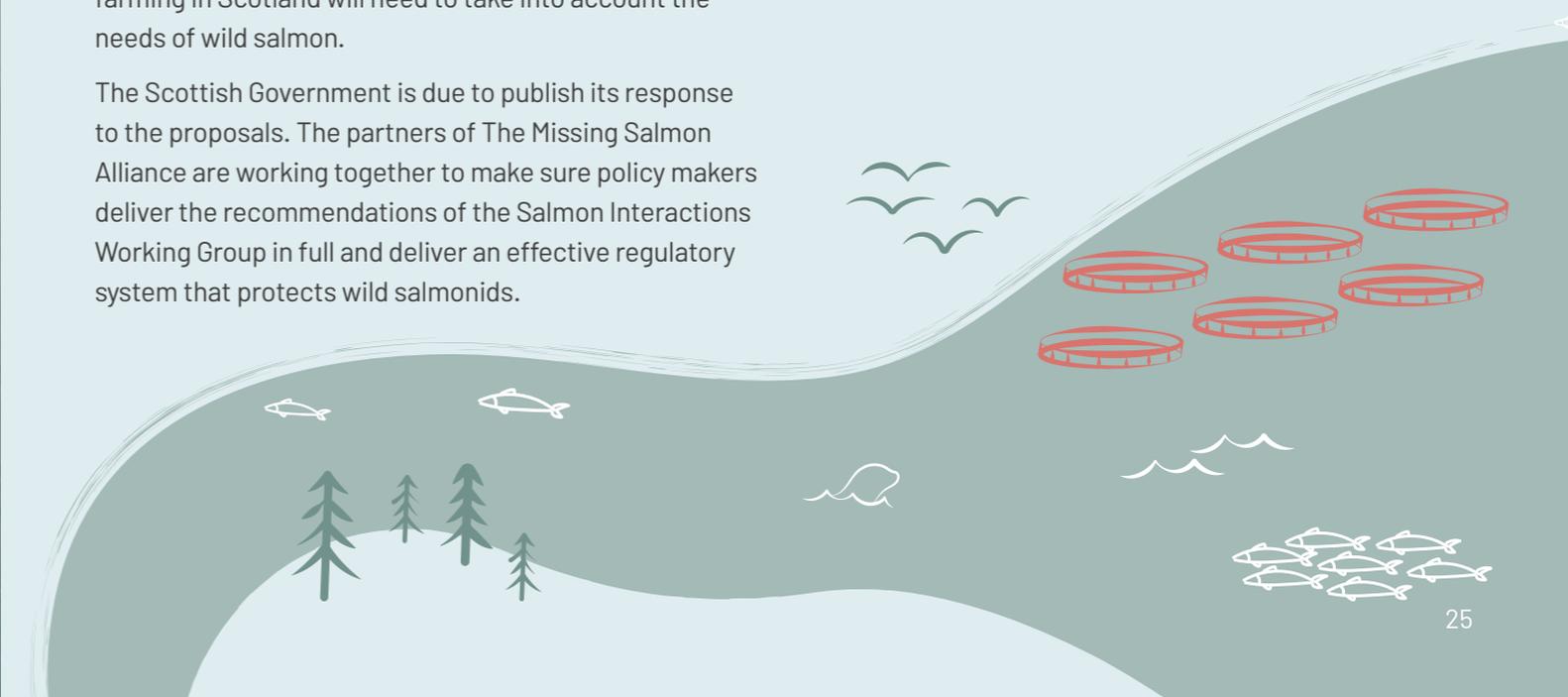
There is a long history of debate about salmon farming on the west coast of Scotland and significant concerns about the impact of this activity on our wild salmon. Fisheries managers have worked hard to demonstrate and address these impacts, but this has been challenging due to the size and economic importance of the industry. In 2018, following two inquiries in the Scottish Parliament, the Salmon Interactions Working Group was established, and industry, regulators and the wild fish sector, led by Fisheries Management Scotland, came together to develop positive solutions.

The group recognised the hazard that salmon farming can present to wild salmon and sea trout and concluded that the regulatory regime should be reformed to ensure that it is fit for purpose. They agreed 42 recommendations that will be used to inform and shape this new regulatory regime. For the first time, the regulation of salmon farming in Scotland will need to take into account the needs of wild salmon.

The Scottish Government is due to publish its response to the proposals. The partners of The Missing Salmon Alliance are working together to make sure policy makers deliver the recommendations of the Salmon Interactions Working Group in full and deliver an effective regulatory system that protects wild salmonids.

Actions we are currently taking include:

- Working with all of the stakeholders involved in salmon aquaculture, its regulation and the wild fish sector to ensure that the essential changes to regulation are delivered in order to have thriving salmon and sea trout populations without negative impacts arising from salmon farming.
- Fisheries Management Scotland have employed an Aquaculture Interactions Officer to support the management and monitoring of interactions between wild and farmed fish and develop a more positive working relationship between the sectors.
- Understanding the dispersal patterns of salmon on The West Coast – The West Coast Tracking Project.



We can do things TODAY to make a difference

Build on the  
**MORAY FIRTH  
TRACKING PROJECT**  
to understand further why  
**SMOLTS ARE GOING  
MISSING**

Use the  
**PRESSURES  
MANAGEMENT  
TOOL**  
to drive actions

Work with  
**INDUSTRIES**  
TO  
**PROTECT  
SALMON**

Work with  
**GOVERNMENTS  
ON WILD SALMON  
STRATEGIES**

Support  
salmon in the  
**ABILITY  
TO ADAPT**  
to climate  
change

Improve  
river habitats to  
**HELP SMOLTS**  
become  
**STRONGER**

Restore  
**A SALMON  
POPULATION**  
on a west coast  
river

Establish the  
**MIGRATION  
PATTERNS**  
of west coast  
salmon

Use the  
Likely Suspects  
Framework  
to understand why  
**FEWER ADULT  
SALMON RETURN**  
from the marine  
enviroment

Use the  
**LIKELY  
SUSPECTS  
FRAMEWORK**  
to drive management  
action

For More Information  
[www.missingsalmonalliance.org](http://www.missingsalmonalliance.org)

## RAISING THE PROFILE OF WILD SALMON IN THE CLIMATE CHANGE DEBATE

The members of The Missing Salmon Alliance have worked tirelessly to successfully raise the profile of salmon with policy makers. In January 2020, for example, Fisheries Management Scotland and Scottish Land & Estates hosted a multi-stakeholder event at which there was a commitment by Roseanna Cunningham, Cabinet Secretary for Environment, Climate Change and Land Reform, to do everything possible to safeguard the future of Scotland's wild salmon. Fisheries Management Scotland and the Atlantic Salmon Trust were subsequently invited to sit on Scotland's wild salmon strategy advisory group, facilitating our on-going advocacy for policies and outcomes which we believe are key for the recovery of populations. Wild salmon is Scotland's most iconic species which is under significant threat from the consequences of climate change related impacts, such as warming sea surface temperatures, changing ocean currents and more frequent extreme weather events. The Missing Salmon Alliance therefore views wild salmon as the ideal Climate Change Adaptation Focus Species. In addition to the wider biodiversity benefits that stem from the management interventions required to recover wild salmon, the Alliance believes that this work has the potential to send out ripples far beyond our primary focus.



**SALMON IN HOT WATER**

“The majestic, wild Atlantic salmon is a powerful symbol of the health of our rivers and ocean, and of our relationship with the natural environment that sustains all human activity.....When all is well with the salmon, all is well with the world!”

HRH The Prince of Wales at a speech to commemorate the 50th anniversary of the Atlantic Salmon Trust in 2017



**WE INFLUENCE  
POLICY MAKERS  
BY RAISING THE  
PROFILE  
OF SALMON**

# THE MISSING SALMON ALLIANCE



## PROJECT FUNDING

The Missing Salmon Alliance was created to co-ordinate fund-raising for a variety of NGOs actively involved in wild Atlantic salmon conservation in the UK. The partners forming the Alliance help to ensure that money raised goes to where it does the most good for salmon. Launched in 2019 the Alliance, to date, has raised and allocated more than £1.5 million to the projects outlined in this booklet. Over the next 3 years the MSA needs to raise a further £3 million in order to fund projects which are vital to achieve our common goal: to reverse wild salmon's decline and safeguard its future across Britain. This co-operative model works because:

- Funders can have confidence that their money is being well-spent on the right projects;
- Projects between the different NGOs are co-ordinated which avoids duplication and fosters the exchange of knowledge and expertise;
- It enables transparency of funding and allows for other agencies to become involved in projects;
- It has created an unprecedented level of collaboration between NGOs and government, something the MSA strongly believes is to the salmon's benefit.

“The projects in this booklet have benefited from funds from The Missing Salmon Alliance. However the real beneficiary has been the wild Atlantic salmon”

**Teresa Dent CBE, Chief Executive, the Game and Wildlife Conservation Trust.**

## GOVERNMENT AGENCIES



## OUR SUPPORTERS



## INTERNATIONAL ORGANISATIONS



## THE PRINCE OF WALES'S CHARITABLE FUND



## RIVER BOARDS/TRUSTS



Please help by supporting the MSA  
[www.missingsalmonalliance.org](http://www.missingsalmonalliance.org)

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Start helping our salmon today.

For further information on our work or if you wish to make a donation, please contact:

**The Missing Salmon Alliance**  
[contact@missingsalmonalliance.org](mailto:contact@missingsalmonalliance.org)

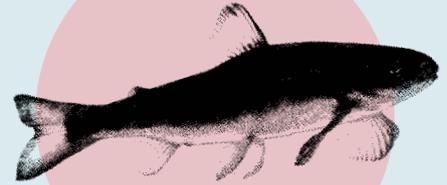
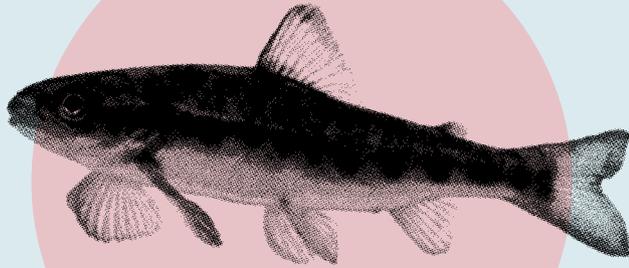
## THE TIME TO ACT IS NOW

As Chairman of The Missing Salmon Alliance the question I always ask is, "Will this project help wild Atlantic salmon?" If it will, then we will see how the MSA can fund it.

So, my question to you is this: "Do you think the projects here, funded by The Missing Salmon Alliance, can help to get salmon out of hot water?" We believe they will help and if you share our belief, you can show your support - for the fish - by donating to The Missing Salmon Alliance. Thank you for your contribution.

**David Mayhew CBE - Chairman of the Missing Salmon Alliance.**

**WILD ATLANTIC SALMON  
ARE IN CRISIS  
HELP US MAKE  
THE DIFFERENCE**



Booklet 3 in The Missing Salmon Series

## **THE MISSING SALMON ALLIANCE**

**SAVING WILD ATLANTIC SALMON THROUGH  
EVIDENCE, ANALYSIS AND ACTION.**



[www.missingsalmonalliance.org](http://www.missingsalmonalliance.org)