Inventory of Research Relating to Salmon Mortality in the Sea
(Summary only)
SAG(17)2  
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1. The International Atlantic Salmon Research Board’s inventory of research relating to salmon mortality in the sea was established in 2002 and has been updated annually since then. It is a valuable tool in the development of research priorities for potential funding and in better coordinating existing research efforts. It had previously been noted that greater use could be made of the inventory and in both 2009 (SAG(09)10) and 2013 (SAG(13)2) a Sub-Group established by the Board’s Scientific Advisory Group (SAG) had reviewed the inventory. The Board had agreed that the inventory should continue to be reviewed every 3 or 4 years. If this schedule continues to be followed then the next review of the inventory would be due in 2017. The SAG will be asked to consider appropriate timing and make its recommendation to the IASRB. Given the appointment of a new Secretary in the fourth quarter of 2017 the SAG may feel that updating the review in 2018 will be more appropriate. 

2. The updated inventory for 2017 is attached. The Board had agreed that the summary table of ongoing and completed projects should be made available in Excel format and the 2017 inventory has again been presented in this way. Table 1 provides details of expenditure on ongoing research by topic area for each Party. The total annual expenditure on the 53 ongoing projects (3 of which are uncosted) is approximately £6.9 million. Approximately 40% of the expenditure is associated with long-term monitoring programmes. 

3. In Table 2, ongoing and completed projects are listed accordingly to the five research topic areas agreed by the Board on the basis of the main focus of the research, although some projects could have been allocated to a number of these research areas. 

4. In Table 3 the projects have been allocated to the relevant work package in the SALSEA Programme. The SAG may wish to consider if listing the inventory projects in the format of Table 3 is still informative. Table 4 provides summary information on both the ongoing (53) and completed (86) projects. 

5. In 2014, the Board adopted a Resolution, ICR(14)6 encouraging collaborative telemetry projects in order to partition marine mortality of Atlantic salmon along their migration routes. The current inventory includes 21 ongoing, and 20 completed projects related to the migratory behaviour of individual fish and these are listed under section 2(b) of Table 2. Twelve new projects have been included in the inventory since its last update, some of which have been ongoing for some time and one of which is completed. Seven of these new projects involve acoustic telemetry. The new projects are as follows: 

**Canada** 

C27: Tracking the migration behaviour of Atlantic salmon kelts (Middle and Baddeck rivers), through a unique inland brackish sea of Cape Breton, Canada.
Objectives: Study life history variation, habitat use patterns and underlying physiology of Atlantic salmon kelts from Middle and Baddeck rivers as well as evaluating management practices associated with broodstock collection program on these rivers.

C28: Evaluating the role of bottom-up effects of prey availability on the survival or local abundance of repeat spawning Atlantic salmon between two ecosystems

Objectives: Contrary to the overall pattern of declining survival of maiden Atlantic salmon, survival of Miramichi River (Gulf of St. Lawrence, GSL) consecutive MSWS has increased and appears to be linked with local forage fish abundance (Chaput and Benoît, 2012). This project contrast the links with forage fish abundance and environmental factors in the GSL, to the patterns observed in the Bay of Fundy ecosystem where the survival of repeat spawning salmon is considerably lower. The project aims to provide evidence of the importance of forage fish in affecting population dynamics of these highly migratory species by confirming their likely prey using stable isotopes and by contrasting responses among multiple ecosystems and for two salmon spawner groups (local reconditioning vs high seas reconditioning).

C29: Movements and survival rates of acoustic tagged smolts from Campbellton River, Newfoundland.

Objectives: Study migration rates, habitat use and early phase marine survival of salmon smolts from a northeast coast Newfoundland river.

C30: Research into factors of early marine phase postsmolt mortality using acoustic predator-detection tags.

Objectives: Assess the extent to which predation by native fishes explains the loss of acoustically tagged Atlantic salmon smolts during the early phase of migration; assess how run timing modifies predation and loss rates. (Northwest Miramichi River, New Brunswick, Canada).

C31: Research into factors of early marine phase postsmolt mortality using acoustic predator-detection tags.

Objectives: Assess the extent to which predation explains the loss of acoustically tagged Atlantic salmon smolts during the early phase of migration; assess how run timing modifies predation and loss rates. (Stewiacke River, Inner Bay of Fundy, Nova Scotia, Canada).

C32: Migration, distribution, survival of smolts from Nashwaak River.

Objectives: Assess riverine, estuarine, near and distant marine migration and survival of Nashwaak River smolts; assess the survival of pre-smolts tagged and released in river and in laboratory; compare the migration and survival of smolts tagged the preceding fall as pre-smolts and recently tagged smolts.
C33: Early marine phase migration, and survival of Atlantic post-smolts from multi-sea-winter salmon populations of Quebec.

Objectives: Study migrations, distribution and post-smolt survival of Atlantic salmon smolts into and to exit from the Gulf of St. Lawrence.

C34: West River Acid Rain Mitigation Project.

Objectives: Evaluate the efficacy of acid rain mitigation techniques, including lime dosing, catchment liming and additional supporting restoration techniques (e.g. physical habitat restoration, the creation of artificial spring habitats) with regard to marine mortality. Smolt production in the limed WRSH and the Little River tributary (unlimed) was estimated between 2007-2014 using a ‘smolt wheel’ and fyke nets. Beginning in 2015, returning adult salmon have been counted in both the limed WRSH and Little River using a novel resistance board weir and a traditional ‘picket-style’ weir.

European Union – Ireland

Ir16: Sea lice model for the sustainable development of Atlantic salmon fisheries and aquaculture.

Objectives: Support the development of a sea lice integrative model that will take into account relevant parameters, including biological, environmental, oceanographic, anthropogenic etc, with the aim of predicting the potential for the sea lice to occur at different locations at different times of the year and under different environmental conditions. The project will contribute to developing best management practice for sea lice control.

Ir17: Unlocking the archive: using scale and otolith chronologies to resolve climate impacts.

Objectives: Improvements in the availability and accessibility of environmental monitoring data allows researchers to more accurately describe the external conditions that contribute to changes in growth, phenology, migration and survival. Exceptionally detailed records of individual responses to these conditions can be gleaned from hard tissues (scales and otoliths) of teleost fish. Visible periodic increments provide an internal chronological record of life history traits such as age, growth and migration timing. Recent analytical advances also allow the reconstruction of temperature and feeding histories and migration pathways. Archived collections of scales and otoliths can generate incredibly detailed longterm biological time-series. Coupling this information with measurements of external conditions can yield powerful insight into how populations respond to environmental change and can perform predictions of likely future responses.
European Union – UK (Northern Ireland)

Ni4: COMPASS (Collaborative Oceanography & Monitoring for Protected Areas and Species)

Objective: Tracking of sea-trout and salmon movement in the near-shore marine environment.

United States of America

U17: Effects of climate-driven ecosystem change on Atlantic salmon growth and survival at sea; analyses of West Greenland salmon.

Objectives: Understand Atlantic salmon growth as a mechanism linking ecosystem conditions to population outcomes.

Secretary
Edinburgh
23 May 2017
Table 1: Approximate Annual Expenditure on Ongoing Research Projects in Relation to Salmon Mortality at Sea by Topic Area and Party

<table>
<thead>
<tr>
<th></th>
<th>Canada (Faroe Islands and Greenland)</th>
<th>Denmark</th>
<th>European Union</th>
<th>Norway</th>
<th>Russian Federation</th>
<th>United States of America</th>
<th>France (in respect of St Pierre and Miquelon)</th>
<th>Totals by Topic Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term monitoring</td>
<td>£613,000</td>
<td>2</td>
<td>£2,016,800</td>
<td>12</td>
<td>£134,000</td>
<td>£60,000</td>
<td>-</td>
<td>£2,823,800</td>
</tr>
<tr>
<td>Distribution/Migration in the sea</td>
<td>£941,500</td>
<td>10(2)</td>
<td>£1,130,000</td>
<td>6</td>
<td>£218,000</td>
<td>-</td>
<td>£108,000</td>
<td>£2,515,500</td>
</tr>
<tr>
<td>Life history/biological processes</td>
<td>-</td>
<td>-</td>
<td>£80,000</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>£115,000</td>
<td>£195,000</td>
</tr>
<tr>
<td>Development of methods</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific natural and anthropogenic factors</td>
<td>£590,000</td>
<td>1</td>
<td>£617,000</td>
<td>4</td>
<td>£75,000</td>
<td>-</td>
<td>£50,000</td>
<td>£1,332,000</td>
</tr>
<tr>
<td>Totals by Party</td>
<td>£2,144,500</td>
<td>13(2)</td>
<td>£3,843,800</td>
<td>24</td>
<td>£427,000</td>
<td>£60,000</td>
<td>£273,000</td>
<td>£6,866,300</td>
</tr>
</tbody>
</table>

The figures shown are in pounds sterling. The number of ongoing projects is shown below the expenditure figure, with the number of uncosted projects shown in parentheses. The costs have been allocated on the basis of the NASCO Party coordinating the research project. However, in many cases the projects involve collaboration with other Parties or with NGO partners who may have made financial contributions to the projects (some details of these contributions have been provided and are given in Annex 1).
### Table 2: Allocation of ongoing and completed projects by topic area

<table>
<thead>
<tr>
<th>Topic Area</th>
<th>Objective/Issue</th>
<th>Comments/examples</th>
<th>Ongoing Projects</th>
<th>Completed Projects</th>
<th>Potential for cooperation among Parties</th>
<th>Priority for access to ‘Fund’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Long-term monitoring</td>
<td>a. Time-series of marine survival/growth estimates</td>
<td>Essential on-going tagging/monitoring programmes; require long-term national funding.</td>
<td>C17, C26, D3, F1, Fr2, Ir8, Ir15, Ir17, Sw1, Ew11, N12, Sc3, N14, R2</td>
<td>U6</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>b. Time series of marine survival in relation to environmental parameters (e.g. SST)</td>
<td>Desk studies on time series.</td>
<td>Fi3, Sc4</td>
<td>E1, E3, Ir2, N1, N6, U11</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>2. Distribution/migration in the sea</td>
<td>a. Distribution of salmon in the sea</td>
<td>Marine surveys of post-smolt distributions in NEAC and NAC areas; identification of fish caught (e.g. tagging, genetics).</td>
<td>C16, C18, C25, C27, C29, C30, C31, C32, C33, C4, C5, C10, C11, C12, C20, C22, C23, C4, C5, C10, C11, C12, C20, C22, C23, D1, E2, E3, Ir2, N1, N6, N8, U7</td>
<td>C2, C5, C15, E2, N8, U7</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>b. Migratory behaviour of individual fish</td>
<td>Active smolt tracking; automated data collection by DSTs.</td>
<td>C16, C18, C25, C27, C29, C30, C31, C32, C33, C4, C5, C10, C11, C12, C20, C22, C23, D1, E2, E3, Ir2, N1, N6, N8, U7</td>
<td>C1, C3, C4, C5, C10, C11, C12, C20, C22, C23, D1, E2, E3, Ir2, N1, N6, N8, U7</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>c. Origin of catches in directed fisheries</td>
<td>Catch sampling in distant water fisheries; genetic analysis and scale analysis, etc; changes over time.</td>
<td>C24, D1, N21, U9, F1</td>
<td>C9, C13, C14, C21, C4, C5, C6, Ew6, Ew10, Ew18, Sc5, Sc7, Sc8, N11, N17, N19, R3</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Migration and bioenergetic models</td>
<td>Desk studies based on data obtained from other studies.</td>
<td>N3, R1</td>
<td>N3, R1</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>e. By-catches in pelagic fisheries</td>
<td>Can be conducted as part of marine surveys of post-smolt distributions; sample commercial pelagic catches.</td>
<td>C8, C19, C28, Ew12, N1, U2</td>
<td>C8, C19, C28, Ew12, N1, U2</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>3. Life history/biologic al processes</td>
<td>a. Freshwater factors</td>
<td>Age, growth, migration timing, etc.</td>
<td>Fr1, Ew8, Ew13, Ew15</td>
<td>Fr1, Ew8, Ew13, Ew15</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>b. Pre-fishery recruitment marine factors</td>
<td>Environment, food, predation, growth, parasites and diseases, etc.</td>
<td>Ir10, U14</td>
<td>Ir10, U14</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>c. Post-fishery recruitment marine factors</td>
<td>Environment, food, predation, maturation processes, growth, etc.</td>
<td>Sc6, U17</td>
<td>Sc6, U17</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>4. Development of methods</td>
<td>a. Post-smolt survey methods</td>
<td>Development of trawls with cameras, tag detection, etc.</td>
<td>Ir4, Sc1</td>
<td>Ir4, Sc1</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>b. Electronic tag technology</td>
<td>Development of smaller/smarter/cheaper tags.</td>
<td>C7, C8, D3, D4, Ew14, F1, Fr2, Ir8, Sw1, Ew11, N12, Sc3, N14, R2</td>
<td>C7, C8, D3, D4, Ew14, F1, Fr2, Ir8, Sw1, Ew11, N12, Sc3, N14, R2</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>b. Predation</td>
<td>Predation by seals, birds, fish, etc. in estuaries/coastal areas.</td>
<td>U15</td>
<td>U15</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>c. Obstructions to fish movements</td>
<td>Barrages, etc.</td>
<td>Ew16</td>
<td>Ew16</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>d. Pollutants</td>
<td>Acidification; freshwater contaminants.</td>
<td>C34, Ew17</td>
<td>C34, Ew17</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Note: The priorities of low, medium and high assigned to the topic areas in this table are those currently considered appropriate for international cooperation and funding. The Board will keep them under review. They are not intended to reflect overall importance of these topics.
Table 3: Ongoing and completed projects in the inventory of research allocated to SALSEA programme work packages

<table>
<thead>
<tr>
<th>Work Package 1: Supporting Technologies</th>
<th>Ongoing Projects</th>
<th>Completed Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1: Genetic tagging to determine stock origin</td>
<td>C24, D1, Fi3, N21, U9, F1</td>
<td>C9, C13, C14, C21, Fi2, Fr3, Ir6, Ew6, Ew10, Ew18, Sc5, Sc7, Sc8, N11, N17, N19, R3</td>
</tr>
<tr>
<td>Task 2: Sampling equipment evolution</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Task 3: Signals from scales</td>
<td>Ir17, Sc4, U17</td>
<td>C8, C19, C28, Ew12, N1, U2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Package 2: Early Migration through the Inshore Zone: fresh waters, estuaries and coastal waters</th>
<th>Ongoing Projects</th>
<th>Completed Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1: Investigate the influence of biological characteristics of Atlantic salmon smolts on their marine mortality</td>
<td>C17, C26, De3, Fi1, Fr2, Ir8, Ir15, Sw1, Ew11, Ni2, Sc3, N14, R2</td>
<td>Ir2, U6</td>
</tr>
<tr>
<td>Task 3: The impacts of physical factors in fresh water on marine mortality of Atlantic salmon</td>
<td>Ew16</td>
<td>Fr1, Ew5, Ew8, Ew9, Ew13, Ew15</td>
</tr>
<tr>
<td>Task 3: Preparing to migrate – investigate the influence of freshwater contaminants on the marine survival of Atlantic salmon</td>
<td>C34, Ew17</td>
<td>C7, Ew2, Ew7, Ew14</td>
</tr>
<tr>
<td>Task 4: The part played by key predators</td>
<td>U15</td>
<td>Sc2, U8, U12</td>
</tr>
<tr>
<td>Task 5: The impact of aquaculture on mortality of salmon</td>
<td>Ir11, Ir16, N13</td>
<td>Ir1, Ir3, Ir7, Ew3, N4, N9, N10, N16, N20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Package 3: Investigating the distribution and migration of salmon at sea</th>
<th>Ongoing Projects</th>
<th>Completed Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1: Distribution and migration mechanisms – develop theoretical migration models</td>
<td>-</td>
<td>Ew4, N2, U1</td>
</tr>
<tr>
<td>Task 2: A common approach – refine the plans for a large-scale marine survey</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Task 3: Salmon at sea – carry out a comprehensive survey</td>
<td>-</td>
<td>C2, C6, C15, E2, N7, N8, U7</td>
</tr>
<tr>
<td>- acoustic tagging surveys</td>
<td>C16, C18, C25, C27, C29, C30, C31, C32, C33, De4, De5, Ir12, Ir13, Ir14, Ni4, N18, U4, U5, U13, U16</td>
<td>C1, C3, C4, C5, C10, C11, C12, C20, C22, C23, De1, De2, Ir5, Ir9, Ew1, Ni3, N5, N12, N15, U3</td>
</tr>
<tr>
<td>- data storage tags</td>
<td>U10</td>
<td>-</td>
</tr>
<tr>
<td>- others</td>
<td>Ir10, Sc6, U14</td>
<td>N3, N6, R1, U11</td>
</tr>
</tbody>
</table>

Appendix 1: Supporting technologies, further development of which will support the SALSEA programme

1. Novel trawl sampling technologies - Ir4, Sc1
2. Data storage tags - -
3. Coded wire tagging - -
4. Sonic tags and sonic detector arrays - -
<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Project No</th>
<th>Title</th>
<th>Status</th>
<th>Summary of Objectives</th>
<th>Research Dates</th>
<th>Topic Area</th>
<th>Objective/Issue</th>
<th>Area of Research</th>
<th>Collaborating Countries</th>
<th>Coordinating Scientist</th>
<th>Annual Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>C1</td>
<td>Marine migration and survival of post-smolt Atlantic salmon from Bay of Fundy rivers</td>
<td>Completed</td>
<td>Provide knowledge about marine habitat (migration routes and feeding grounds) used by salmon post-smolts from Bay of Fundy rivers. Determine the location, timing and extent of salmon post-smolt mortality at sea. Investigate the causes and mechanisms of marine mortality of salmon post-smolts. Provide information to fuel the recovery programme for inner Bay of Fundy salmon stocks.</td>
<td>2001 - 2003</td>
<td>Distribution/ migration in the sea</td>
<td>Mortality behaviour of individual fish</td>
<td>Bay of Fundy and Gulf of Maine</td>
<td>USA</td>
<td>Gilles L. Lacroix</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>C2</td>
<td>Distribution, health and condition of Atlantic salmon from Bay of Fundy rivers while at sea</td>
<td>Completed</td>
<td>Provide knowledge about marine habitat and health of salmon post-smolts from Bay of Fundy rivers. Investigate the causes and mechanisms of marine mortality of salmon post-smolts. Provide information to fuel the recovery programme for inner Bay of Fundy salmon stocks.</td>
<td>2002 - 2004</td>
<td>Distribution/ migration in the sea</td>
<td>Distribution of salmon in the sea</td>
<td>Bay of Fundy and Gulf of Maine</td>
<td>USA and Norway</td>
<td>Gilles L. Lacroix</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>C3</td>
<td>Marine migration and survival of post-smolt Atlantic salmon from the Saint-Jean River (Gaspé)</td>
<td>Completed</td>
<td>Provide knowledge of the marine habitat (migration routes and feeding grounds) used by salmon post-smolts from Bay of Gaspe® rivers. Determine the location, timing and extent of salmon post-smolt mortality at sea. Investigate the causes and mechanisms of marine mortality of salmon post-smolts.</td>
<td>2005 - 2006</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Saint-Jean River, Gaspé Peninsula, Quebec</td>
<td></td>
<td>Julian Dodson, François Caron</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>C4</td>
<td>Marine migration and survival of kelt Atlantic salmon from the Saint-Jean River (Gaspé)</td>
<td>Completed</td>
<td>Provide knowledge of the marine habitat (migration routes and feeding grounds) used by salmon kelts from Bay of Gaspé® rivers. Determine the location, timing and extent of kelt mortality at sea. Investigate the causes and mechanisms of marine mortality of salmon kelts.</td>
<td>2006 - 2007</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Saint-Jean River, Gaspé Peninsula, Quebec</td>
<td></td>
<td>Julian Dodson, François Caron</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>C5</td>
<td>Tracking experimentally ‘escaped’ farmed salmon</td>
<td>Completed</td>
<td>Determine the course tracks and fates of sonically tagged farmed salmon released in winter and spring.</td>
<td>2005</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td></td>
<td></td>
<td>Fred Whoriskey</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>C6</td>
<td>Atlantic salmon distribution and abundance at sea</td>
<td>Completed</td>
<td>Determine salmon distribution and abundance at sea, particularly post-smolts in the Labrador Sea and Northern Grand Banks; collect biological and other data; investigate the relationship between salmon and their prey; investigate the relationship between oceanographic parameters and salmon abundance; tag and release salmon.</td>
<td>2001 - 2005</td>
<td>Distribution/ migration in the sea</td>
<td>Distribution of salmon in the sea</td>
<td>Labrador Sea and Northern Grand Banks</td>
<td></td>
<td>David Reddin</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>C7</td>
<td>Integrated field and laboratory assessment of the effects of endocrine–disrupting substances on Atlantic salmon smolts</td>
<td>Completed</td>
<td>Laboratory tests of the effects of endocrine-active substances in municipal, and industrial effluents; field tests of the effects of endocrine-active substances in municipal and industrial effluents; field tests on caged smolts near sites with potential for significant agriculture run-off; ocean field tests of link between exposure of smolts to endocrine-disrupting substances and subsequent lower adult returns.</td>
<td>2003 - 2007</td>
<td>Specifics: natural and anthropogenic factors</td>
<td>Pollutants</td>
<td>Atlantic Canada and Co. Mayo, Ireland</td>
<td>Ireland</td>
<td>Wayne Fauschild</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>C8</td>
<td>Use of stable isotopes to assess long-term changes in marine trophic ecology of Atlantic salmon (Salmo salar)</td>
<td>Completed</td>
<td>Assess trophic and dietary information through analysis of stable isotope signatures of carbon and nitrogen from previously compiled scale samples from various salmon stocks; compare isotope signatures within and among stocks to infer differences in feeding ecology in time and space; examine evidence of environmental influences on trends in isotope signatures; examine linkages of stable isotope signatures with trends in abundance.</td>
<td>2006 – 2007</td>
<td>Life history/ biological processes</td>
<td>Post-fishery recruitment marine factors</td>
<td>Desk study examining archived material and samples from Newfoundland, the Maritime Provinces, the Quebec North Shore, and the Barents Sea (Tana River, Finland)</td>
<td>Finland</td>
<td>J Brian Dempson</td>
<td></td>
</tr>
<tr>
<td>Jurisdiction</td>
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<tr>
<td>Canada</td>
<td>C10</td>
<td>River and extended-estuary acoustic tracking of Atlantic salmon (Salmo salar) kelts and bright salmon</td>
<td>Completed</td>
<td>Track and document migratory behaviour of Atlantic salmon kelts as they leave the river for the open ocean and bright salmon as they return to rivers; identify possible critical habitat sites utilized by kelts and bright salmon during their migration; examine the mortality rates of kelts and bright salmon during migration.</td>
<td>2006 - 2008</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>LaHave River and estuary, Nova Scotia</td>
<td>Peter G. Amiro, A. Jamie F. Gibson</td>
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<tr>
<td>Canada</td>
<td>C11</td>
<td>Integrated modelling of juvenile Atlantic salmon movement and physical habitat in fluvial and estuarine environments</td>
<td>Completed</td>
<td>Develop an innovative geostatistical approach capable of relating the behaviour of smolts during their migration to the characteristics of the physical habitat in rivers and estuaries; apply this approach to the analysis of the migration of smolts through the estuaries of the St. Jean, Dartmouth and York rivers and down the Baie de Gaspé; detect possible change in migration pattern of smolts in response to the presence of sea cages.</td>
<td>2005 - 2008</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>York River and Baie de Gaspé, Quebec</td>
<td>UK, Julian Dodson</td>
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<tr>
<td>Canada</td>
<td>C12</td>
<td>Estuary acoustic tracking of Atlantic salmon (Salmo salar) smolts and kelts – Conne River, Little River, and Bay d’Espoir, Newfoundland</td>
<td>Completed</td>
<td>Tag and track migratory behaviour of Atlantic salmon smolts and kelts as they leave the Conne River, Newfoundland; determine the movements and migration patterns throughout the Bay d’Espoir fjord; provide insight into the initial survival and residency of smolts and kelts migrating through the fjord.</td>
<td>2006 - 2008</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Conne River, Little River and Bay d’Espoir fjord, Newfoundland</td>
<td>J. Brian Dempson, Keith Clarke</td>
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<tr>
<td>Canada</td>
<td>C13</td>
<td>Spatio-temporal distribution of Atlantic salmon stocks and the impact of the West Greenland fishery</td>
<td>Completed</td>
<td>Provide knowledge about the river origin of the salmon catch in the commercial fishery at West Greenland.</td>
<td>2006 - 2008</td>
<td>Distribution/migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Samples from West Greenland</td>
<td>Louis Bernatchez, Tim King</td>
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<tr>
<td>Canada</td>
<td>C14</td>
<td>Geometric population structure of Atlantic salmon in Eastern Canada and its implication for conservation</td>
<td>Completed</td>
<td>Elucidate the genetic population structure of Atlantic salmon from a small (river) to a large (Eastern Atlantic coast) spatial scale and propose conservation units for the Canadian distribution range.</td>
<td>2004 - 2008</td>
<td>Distribution/migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Rivers in Quebec, Canada</td>
<td>Louis Bernatchez, Mélanie Dionne</td>
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<tr>
<td>Canada</td>
<td>C15</td>
<td>Pelagic ecosystem survey of the Northwest Atlantic</td>
<td>Completed</td>
<td>Sample the upper pelagic ecosystem during the period corresponding to the early post-smolt phase. Determine distribution and relative abundance of post-smolts at selected locations and times along hypothesised ocean migration route. Obtain data on relative abundance of other species including macroplankton aggregations to provide information on the role of salmon in the pelagic ecosystem. Obtain oceanographic information.</td>
<td>2008 - 2011</td>
<td>Distribution/migration in the sea</td>
<td>Distribution of salmon in the sea</td>
<td>North West Atlantic (stations 49-58°N)</td>
<td>USA</td>
<td>Gerald Chaput, Dave Reddin, Tim Sherban</td>
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<tr>
<td>Canada</td>
<td>C16</td>
<td>Miramichi River and Restigouche River kelts movements and survival</td>
<td>Ongoing</td>
<td>Document the spring movements and survival of kelts from the Miramichi River and Restigouche River as they return to the sea and on their subsequent return as repeat spawners. Determine the locations and causes of kelt mortalities in the marine environment.</td>
<td>2008 – 2016</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Miramichi River and estuary Restigouche River and estuary and Gulf of St Lawrence, Atlantic Ocean</td>
<td>Jon Carr</td>
<td>£108,000</td>
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<tr>
<td>Canada</td>
<td>C17</td>
<td>Marine survival of Canadian Atlantic salmon stocks; long-term monitoring</td>
<td>Ongoing</td>
<td>Long-term assessments of smolt production and adult return estimates from a number of rivers in Newfoundland region, Maritimes region, Gulf region and Quebec.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>Canadian rivers in Newfoundland region, Maritimes region, Gulf region and Quebec</td>
<td>Caroline Grant</td>
<td>£600,000</td>
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<tr>
<td>Canada</td>
<td>C18</td>
<td>Atlantic salmon smolt migration and survival within Canadian rivers, estuaries and during the marine life stage</td>
<td>Ongoing</td>
<td>Provide a time-series of stage-specific estimates of mortality rates for smolts and post-smolts at various points of their at-sea migration, including for their transitions through freshwater, the estuary and to various points in the ocean; examine the relation between biological characteristics of the fish and survival rates to attempt to isolate mortality causes; document the migration pathways and speeds of smolts from different rivers.</td>
<td>2003 -</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Miramichi River and estuary Restigouche River and Baie des Chaleurs, Cascapedia River and estuary, St-Jean (Côte-Nord) River and estuary, Strait of Belle Isle, Cabot Strait, Labrador</td>
<td>USA</td>
<td>Jon Carr, Fred Whoriskey</td>
<td>£435,000</td>
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<tr>
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<tr>
<td>Canada</td>
<td>C19</td>
<td>Stable isotopes ratios to infer trophic structure and condition of Atlantic salmon during their life at sea</td>
<td>Completed</td>
<td>Improve understanding of marine ecology of salmon through studies of trophic state and condition. Questions to be addressed include: are trophic states of 1SW non-maturing fish similar between NAC and NEAC origin salmon? Are trophic states of 1SW non-maturing fish different from those of maturing 1SW fish of the same cohort? Can this tell us anything about when these different maturity groups separate in the North Atlantic? Has there been a trophic state change between West Greenland and return to home rivers as 2SW salmon? How do current measures of trophic status compare with measures from archival scales and do differences indicate significant changes?</td>
<td>2008 – 2014</td>
<td>Life history/ biological processes</td>
<td>Post-fishery recruitment models</td>
<td>West Greenland and from salmon returning to the index rivers of Eastern Canada.</td>
<td>Greenland</td>
<td>Heather Dixon, Mike Power, J. Brian Dempson, Gerald Chaput, Tom Sheehan</td>
<td>£13,000</td>
</tr>
<tr>
<td>Canada</td>
<td>C20</td>
<td>Identification of essential habitat for repeat spawning Atlantic salmon of Inner Bay of Fundy origin</td>
<td>Completed</td>
<td>Identify the freshwater and marine habitats used by post-spawning Atlantic salmon of inner Bay of Fundy (IBoF) origin for reconditioning and identify the sites and times of mortality.</td>
<td>2008 - 2013</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Big Salmon, Gaspe and Hammond Rivers</td>
<td>Gilles L. Lacours, Ross Jones</td>
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<tr>
<td>Canada</td>
<td>C21</td>
<td>Genomic basis of adaptive divergence and marine survival among Atlantic salmon populations</td>
<td>Completed</td>
<td>Elucidate the genetic basis of adaptive divergence and marine survival in Atlantic salmon populations from eastern Canada. Contribute to the identification of management units.</td>
<td>2010 - 2014</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Newfoundland and Labrador</td>
<td>Norway, USA</td>
<td>Lea Bernatchez, Melanie Dionne, Patrick O’Reilly, Vincent Bourbon</td>
<td></td>
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<tr>
<td>Canada</td>
<td>C22</td>
<td>River and extended estuary acoustic tracking of Atlantic salmon (Salmo salar) smolts in Southern Uplands rivers</td>
<td>Completed</td>
<td>Estimate mortality rates, assess the spatio-temporal dynamics of natural mortality and examine migratory behaviour during the fresh to saltwater transition of wild Atlantic salmon Salmo salar smolts from four river systems in an area of Nova Scotia, Canada known as the Southern Upland</td>
<td>2008 - 2010</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>LaHave River, St. Mary’s River, Gold River, and West River (Sheer Harbour)</td>
<td>E Halfyard, A Jamie F Gibson</td>
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<tr>
<td>Canada</td>
<td>C23</td>
<td>Effects of early captive exposure on measures of fitness later in life for Inner Bay of Fundy (IBoF) Atlantic Salmon</td>
<td>Completed</td>
<td>Assess the effects of standard and novel conservation rearing strategies on measures of fitness for the recovery of IBoF salmon. Part of the research involved acoustic tagging to assess return migration ability.</td>
<td>2010 - 2015</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Upper Salmon River</td>
<td>Corey Clarke</td>
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<tr>
<td>Canada</td>
<td>C24</td>
<td>Genomic stock identification techniques provide distribution information of regional groups of Atlantic salmon from eastern North America and estimates of exploitation in mixed stock marine fisheries</td>
<td>Ongoing</td>
<td>Identify to regional groups the origin of salmon from mixed stock fisheries of Labrador (Canada), Saint-Pierre &amp; Miquelon, and at West Greenland; estimate total catch by regional group and examine region specific variations in distribution at sea and availability of Atlantic salmon in marine fisheries.</td>
<td>2013 - 2017</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Eastern North America, West Greenland</td>
<td>France, NASCO West Greenland sampling Programme (see D1)</td>
<td>Ian Bradbury</td>
<td></td>
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<tr>
<td>Canada</td>
<td>C25</td>
<td>Rearing wild-origin BIoF salmon smolts in marine netpens for release as adults to supplement stocking of Fundy National Park (FNP) Rivers</td>
<td>Ongoing</td>
<td>Experimentally supplement FNP spawning adult salmon populations to effective population size for one salmon generation (4-5years) and producecohorts of naturally spawned and captive-free migrating smolts.</td>
<td>2014 – 2019</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Upper Salmon River, Point Wolfe River (Fundo National Park) *Pentricodac</td>
<td>Carey Clarke</td>
<td></td>
<td>£100,000</td>
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<tr>
<td>Canada</td>
<td>C26</td>
<td>Smolt monitoring on Middle River, Cape Breton, Nova Scotia, Canada</td>
<td>Ongoing</td>
<td>The objectives are to: estimate run size, age structure and phenology of Atlantic Salmon smolts from the Middle River, Nova Scotia; allow estimation of survival in the marine environment from smolt to adult life phases; allow collection of smolts for other research projects and collaborations (e.g. behavioural tagging studies); and contribute information to inform recovery planning and traditional ecological knowledge.</td>
<td>2011 - 2016</td>
<td>Long-term monitoring</td>
<td>Time-series of marine survival/growth estimates</td>
<td>Middle River, Cape Breton, Nova Scotia</td>
<td>Shelley Denny</td>
<td></td>
<td>£13,000</td>
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<tr>
<td>Canada</td>
<td>C27</td>
<td>Tracking the migration behaviour of Atlantic salmon kelts (Middle and Baddeck rivers), through a unique inland brackish sea of Cape Brenton, Canada</td>
<td>New Entry</td>
<td>Study life history variation, habitat use patterns and underlying physiology of Atlantic salmon kelts from Middle and Baddeck rivers as well as evaluating management practices associated with broodstock collection program on these rivers.</td>
<td>Kept Acoustic Tagging: 2014 &amp; 2015, November – December. Kept Fishing: 2012 - 2017</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Middle &amp; Baddeck rivers, Cape Breton, Nova Scotia, Bras d’Or Lakes, Cabot Strait, Strait of Belle Isle</td>
<td>Glenn Crossin, Xavier Bozdech, Bruce Hatcher, Fred Whoriskey, Shelly Deny</td>
<td>£19,400</td>
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<tr>
<td>Canada</td>
<td>C28</td>
<td>Evaluating the role of bottom-up effects of prey availability on the survival or local abundance of repeat spawning Atlantic salmon between two ecosystems</td>
<td>New Entry Completed</td>
<td>Contrary to the overall pattern of declining survival of maiden Atlantic salmon, survival of Miramichi River (Gulf of St. Lawrence, GSL) consecutive MSWS has increased and appears to be linked with local forage fish abundance (Chaput and Bensol, 2012). This project contrast the links with forage fish abundance and environmental factors in the GSL, to the patterns observed in the Bay of Fundy ecosystem where the survival of repeat spawning salmon is considerably lower. The project aims to provide evidence of the importance of forage fish in affecting population dynamics of these highly migratory species by confirming their likely prey using stable isotopes and by contrasting responses among multiple ecosystems and for two salmon spawner groups (local reconditioning vs high seas reconditioning).</td>
<td>2014 - 2017</td>
<td>Life history/ biological processes</td>
<td>Post-fishery recruitment marine factors</td>
<td>Nashwaak River (Bay of Fundy), Miramichi River (Gulf of St Lawrence), Bay of Fundy, Scotian Shelf, Gulf of St Lawrence, Labrador Sea</td>
<td>Hugues Bensol</td>
<td>-</td>
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<tr>
<td>Canada</td>
<td>C29</td>
<td>Movements and survival rates of acoustic tagged smolts from Campbellton River, Newfoundland</td>
<td>New Entry</td>
<td>Study migration rates, habitat use and early phase marine survival of salmon smolts from a northeast coast Newfoundland river.</td>
<td>2014 - 2017</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Campbellton River, Newfoundland</td>
<td>Kristin Boee</td>
<td>-</td>
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<tr>
<td>Canada</td>
<td>C30</td>
<td>Research into factors of early marine phase postsmolt mortality using acoustic predator-detection tags</td>
<td>New Entry</td>
<td>Assess the extent to which predation by native fish explains the loss of acoustically tagged Atlantic salmon smolts during the early phase of migration; assess how run timing modifies predation and loss rates.</td>
<td>2017 - 2019</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Northwest Miramichi River, New Brunswick, Canada</td>
<td>Jon Carr</td>
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<tr>
<td>Canada</td>
<td>C31</td>
<td>Research into factors of early marine phase postsmolt mortality using acoustic predator-detection tags</td>
<td>New Entry</td>
<td>Assess the extent to which predation explains the loss of acoustically tagged Atlantic salmon smolts during the early phase of migration; assess how run timing modifies predation and loss rates.</td>
<td>2017 - 2019</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Stewiacke River, Inner Bay of Fundy, Nova Scotia, Canada</td>
<td>David Hardie</td>
<td>£73,000</td>
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<tr>
<td>Canada</td>
<td>C32</td>
<td>Migration, distribution, survival of smolts from Nashwaak River</td>
<td>New Entry</td>
<td>Assess riverine, estuarine, near and distant marine migration and survival of Nashwaak River smolts; assess the survival of pre-smolts tagged and released in river and in laboratory; compare the migration and survival of smolts tagged the preceding fall as pre-smolts and recently tagged smolts.</td>
<td>2017 – 2018</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Nashwaak River, Saint John River</td>
<td>David Hardie</td>
<td>£76,000</td>
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<tr>
<td>Canada</td>
<td>C33</td>
<td>Early marine phase migration, and survival of Atlantic post-smolts from multi-sea-winter salmon populations of Quebec</td>
<td>New Entry</td>
<td>Study migrations, distribution and post-smolt survival of Atlantic salmon smolts into and to exit from the Gulf of St. Lawrence.</td>
<td>2017</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Gulf of St. Lawrence, eastern Canada</td>
<td>Martin Castonguay, Julien April</td>
<td>-</td>
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<tr>
<td>Canada</td>
<td>C34</td>
<td>West River Acid Rain Migration Project</td>
<td>New Entry</td>
<td>Evaluate the efficacy of acid rain mitigation techniques, including lime dosing, catchment liming and additional supporting restoration techniques (e.g. physical habitat restoration, the creation of artificial spawning habitats) with regard to mainine mortality. Smolt production in the limed WRSH and the Little River tributary (unlimed) was estimated between 2007-2014 using a ‘smolt wheel’ and 5km nets. Beginning in 2015, returning adult salmon have been counted in both the limed WRSH and Little River using a novel resistance board weir and a traditional ‘picket-style’ weir.</td>
<td>2016 - 2019</td>
<td>Specific natural and anthropogenic factors</td>
<td>Pollutants</td>
<td>Nova Scotia Southern Upland</td>
<td>Eddie Hallyard</td>
<td>£590,000</td>
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<td>Denmark - Greenland</td>
<td>D3</td>
<td>West Greenland Salmon Fishery Sampling Programme</td>
<td>Ongoing</td>
<td>Continue time series of data on the continent of origin and biological characteristics of salmon in the fishery; provide data on mean weight and length and continent of origin for input in models; collect information on the recovery of internal and external tags; collect other additional biological samples as required.</td>
<td>Annually</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Suzumit, Maniitsoq, Paamiut and Qaasuitsup, Greenland</td>
<td>USA, UK, Ireland, Canada</td>
<td>Helle Siesstad</td>
<td>£118,000</td>
</tr>
<tr>
<td>European Union</td>
<td>E1</td>
<td>SALMODEL Concerted Action – A co-ordinated approach towards the development of a scientific basis for management of wild Atlantic salmon in the North-East Atlantic</td>
<td>Completed</td>
<td>Improve ability to set conservation limits and examine methods of estimating pre-fishery abundance (PPA) and determine how these PPA estimates can be used to provide catch advice.</td>
<td>2000 - 2002</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival in relation to environmental parameters</td>
<td>Desk study</td>
<td>France, Ireland, Finland, Norway, Iceland, Sweden, Canada, UK</td>
<td>Walter Crozier</td>
<td></td>
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<tr>
<td>European Union</td>
<td>E2</td>
<td>SALSEA-Merge: Advancing understanding of Atlantic salmon at sea: Merging genetics and ecology to resolve stock – specific migration and distribution patterns</td>
<td>Completed</td>
<td>Merge genetic and ecological investigations to advance understanding of stock specific migration and distribution patterns and overall ecology of the marine life of Atlantic salmon and gain an insight into the factors resulting in recent significant increases in marine mortality.</td>
<td>2008 - 2011</td>
<td>Distribution/ migration in the sea</td>
<td>Distribution of salmon in the sea</td>
<td>North-East Atlantic with marine surveys off coast of Ireland and UK, around the Faroes and in the Northern Norwegian Sea and Barents Sea</td>
<td>Denmark, Finland, France, Faroes, Iceland, Ireland, Norway, Spain, UK</td>
<td>Jens Christian Holst</td>
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<tr>
<td>European Union</td>
<td>E3</td>
<td>ECOKNOWS (Effective Use of Ecosystem and Biological Knowledge in Fisheries): Improving fisheries assessment methods by integrating new sources of biological knowledge</td>
<td>Completed</td>
<td>The objectives include improving ways to find generic and understandable biological reference points. An age and stage-based life-cycle population dynamic model which explicitly separates the freshwater and marine phases and incorporates the variability of life histories (river and sea ages) is one output from the project.</td>
<td>2010 - 2014</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival in relation to environmental parameters</td>
<td>North Atlantic</td>
<td>ECOKNOWS Consortium: Finland, Denmark, Philippines, Greece, Spain, Ireland, UK, Canada, Sweden, France</td>
<td>One Coordinating Scientist for each of the Seven Work Packages</td>
<td></td>
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<tr>
<td>European Union - Denmark</td>
<td>Dc1</td>
<td>Estuarine migration of smolts in the River Skjern Å (North Sea) and River Guden Å</td>
<td>Completed</td>
<td>Assess the effect of restoration of habitat in the River Skjern Å on the smolt runs of salmon and sea trout, in particular with regard to predation by piscivorous birds. To investigate the migration of salmon smolts in the River Guden Å.</td>
<td>2002 - 2003</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td></td>
<td>Germ Rasmussen</td>
<td></td>
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<tr>
<td>European Union - Denmark</td>
<td>Dc2</td>
<td>Mortality of Atlantic salmon smolts during estuary migration</td>
<td>Completed</td>
<td>Estimate mortality of salmon smolts during migration through estuaries and compare the return ratio of wild, stocked 5+ and one-yearlings.</td>
<td>2000 - 2008</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>River Skjern Â and River Stor â (North Sea) and River Guden Â (Kattegat) and their estuaries</td>
<td>Anders Koed, Hans Aarestup</td>
<td></td>
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</tr>
<tr>
<td>European Union - Denmark</td>
<td>Dc3</td>
<td>Salmon Rehabilitation Plan: monitoring numbers of spawners, spawning and nursery areas in four Atlantic salmon rivers and the achievement of the objective of self-reproduction</td>
<td>Ongoing</td>
<td>The Danish national salmon rehabilitation plan describes four rivers with natural wild salmon populations. This project monitors the effect of the rehabilitation plan and the development of the populations (the goal is at least 1,000 spawners in each river to fulfil the plan). This study will allow estimates of marine mortality of salmon to be made.</td>
<td>Annually</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>River Skjern, River Ribe, River Storâ, River Varde and River Sneum. The rivers flow into the North Sea</td>
<td>Anders Koed, Einar Eg Nielsen, Niels Jespersen</td>
<td>£110,300</td>
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</tr>
<tr>
<td>European Union - Denmark</td>
<td>Dc4</td>
<td>Marine behaviour of Atlantic salmon</td>
<td>Ongoing</td>
<td>Obtain more knowledge about the salmon's distribution and migration at sea using DSTs and PSAT tags and isotopes.</td>
<td>2010 - 2017</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>River Skjern Â and River Storâ</td>
<td>Hans Aarestup</td>
<td>£35,000</td>
<td></td>
</tr>
<tr>
<td>European Union - Denmark</td>
<td>Dc5</td>
<td>Strengthen the Danish Atlantic Salmon Populations (SDPAS)</td>
<td>Ongoing</td>
<td>The vision of the project is to strengthen Danish Atlantic salmon populations towards a state where the populations are completely self-sustainable and can be exploited under a dynamic catch quota approach. The project comprises six work packages including limiting factors for smolt and pre-smolt run and survival, limiting factors for kelt survival and improving quality and post-release survival of stocked salmon.</td>
<td>2016 – 2020</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>River Skjern</td>
<td>Anders Koed</td>
<td>£630,000</td>
<td></td>
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<tr>
<td>Jurisdiction</td>
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<td>Collaborating Countries</td>
<td>Coordinating Scientist</td>
<td>Expenditure</td>
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<tr>
<td>European Union - Finland</td>
<td>F11</td>
<td>Long-term variation in population dynamics, life history characteristics, sea growth and origin (wild/cultured) of salmon in the rivers Teno (Tana) and Naáamájoki (Neidenelva)</td>
<td>Ongoing</td>
<td>Collect long-term data on variation in the stock components, life histories, sea growth and abundance of escaped farmed salmon in the salmon stocks of the rivers Teno and Naáamájoki. Relate the population dynamics of the juvenile salmon and returning adult salmon in preceding and subsequent generations.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>Northern Finland and Norway</td>
<td>Norway</td>
<td>Jaakko Erikarntoni</td>
<td>£275,000</td>
</tr>
<tr>
<td>European Union - Finland</td>
<td>F12</td>
<td>Joint use of high-throughput SNP assay infrastructure in Atlantic salmon</td>
<td>Completed</td>
<td>The key aims of the project include: 1) A concerted effort to identify genomic regions that affect ecologically and economically important phenotypic traits in domesticated and wild Atlantic salmon; 2) efficient joint utilization of a state-of-the-art Nordic genomics infrastructure to generate large-scale salmon SNP datasets;</td>
<td>2009 - 2010</td>
<td>Distribution/migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Norway and Finland</td>
<td>Norway</td>
<td>Craig Frimmer</td>
<td>£400,000</td>
</tr>
<tr>
<td>European Union - Finland</td>
<td>F13</td>
<td>Integrative science for adaptive co-management in the Arctic Tenor Atlantic salmon as a model system (ISAMA)</td>
<td>Ongoing</td>
<td>The aims of the project are to: 1) characterise the ecological and genetic changes in the Teno salmon stock over the past 40 years; 2) identify the key human-mediated/climatic factors that have contributed to these changes; 3) determine the relationships between these changes and the co-occurring societal and political changes; 4) better understand the genetic basis of life-history traits important for maintaining stock diversity and stability and thus salmon-related livelihoods; 5) use local knowledge and management of Teno salmon as a case study to examine the links between scientific research, local resource users, and adaptive co-management and policy.</td>
<td>2015 - 2018</td>
<td>Long-term monitoring</td>
<td>Desk studies on time series</td>
<td>Finland and Norway</td>
<td>Norway</td>
<td>Craig Frimmer, Jaakko Erikarntoni</td>
<td>£400,000</td>
</tr>
<tr>
<td>European Union - France</td>
<td>F11</td>
<td>Evolution of biological characteristics in Atlantic salmon from all the Armorican massif rivers (Brittany and Low-Normandy, France)</td>
<td>Completed</td>
<td>Examine relationships between the cumulative effects of climate warming and other anthropogenic stresses and changes in biological features in populations in the southern part of the European distribution range of the species.</td>
<td>1972 - 2005</td>
<td>Life history/ biological processes</td>
<td>Freshwater factors</td>
<td>Salmon rivers in the Armorican Massif (about 25 – 30 rivers)</td>
<td>Jean-Luc Baglanitre</td>
<td></td>
<td>£143,000</td>
</tr>
<tr>
<td>European Union - France</td>
<td>F12</td>
<td>The sea survival of Atlantic salmon from the River Scorff, Brittany</td>
<td>Ongoing</td>
<td>Estimation and long-term monitoring of survival at sea in the southern part of the European distribution range of the species.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>River Scorff (Southern Brittany)</td>
<td>Etienne Prévost</td>
<td></td>
<td>£143,000</td>
</tr>
<tr>
<td>European Union – France</td>
<td>F13</td>
<td>Atlantic salmon metapopulation investigation in Normandy rivers</td>
<td>Completed</td>
<td>Estimate exchanges between rivers flowing into the Mont Saint-Michel Bay and the impact on management of salmon populations.</td>
<td>2007 - 2010</td>
<td>Distribution/migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Rivers flowing into Mont Saint-Michel Bay, Normandy</td>
<td>Jean-Luc Baglanitre</td>
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<tr>
<td>European Union - Ireland</td>
<td>F11</td>
<td>Assessment of the levels of the parasite Lepidophtheirus salmonis on Atlantic salmon post-smolts in salmon aquaculture bays along Ireland’s western seaboard</td>
<td>Completed</td>
<td>Determine whether sea lice from marine salmon farms are a contributory factor in increased marine mortality of salmon post-smolts migrating from bays with salmon aquaculture. Gather information on salmon post-smolt migration patterns.</td>
<td>2002</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>South-West Coast (Kemnager Bay), West Coast (Killary Harbour, Berraghboy Bay, Chlew Bay), North-West Coast (Inver Bay).</td>
<td>Paddy Gargan</td>
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<tr>
<td>European Union - Ireland</td>
<td>F12</td>
<td>Oceanic factors influencing marine survival of Irish salmon stocks</td>
<td>Completed</td>
<td>Provide information on marine survival at various stages of ocean migration.</td>
<td>2001 - 2005</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival in relation to environmental parameters</td>
<td>Desk study utilising oceanic data from around North Atlantic</td>
<td>USA</td>
<td>Neil O. Maatfleidigh, Kevin Friedland</td>
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<tr>
<td>European Union - Ireland</td>
<td>F13</td>
<td>Sustainable management of interactions between aquaculture and wild salmon post-smolts</td>
<td>Completed</td>
<td>Assess efficacy of prophylactic treatments for salmon smolts migrating through aquaculture bays.</td>
<td>2003 – 2006</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>Kilkerin Bay, Berraghboy Bay, Connemara</td>
<td>UK, Norway</td>
<td>Paddy Gargan,</td>
<td></td>
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<tr>
<td>European Union - Ireland</td>
<td>F14</td>
<td>Early distribution and migration of Atlantic salmon smolts off the west of Ireland</td>
<td>Completed</td>
<td>Test new pelagic trawl in open waters off Irish coast; train and familiarise staff on the operation and development of the trawl for further surveys in 2008 and 2009; obtain samples of post-smolts for biological and genetic analyses; relate run-timing, timing of migration, swimming speed, growth, etc to oceanographic parameters.</td>
<td>2007</td>
<td>Development of methods</td>
<td>Post-smolt survey methods</td>
<td>North-west coast of Ireland</td>
<td>UK</td>
<td>Neil O. Maatfleidigh</td>
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<tr>
<td>European Union - Ireland</td>
<td>I5</td>
<td>Migration of salmon in estuarine and coastal waters</td>
<td>Completed</td>
<td>Investigate the timing, route of migration and aspects of the biology of migrating ranched salmon smolts in comparison to the native wild smolt migration.</td>
<td>2005 - 2008</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Burrishoole catchment, Newport and Clew Bay, Co. Mayo</td>
<td>UK</td>
<td>Russell Poole, Desirée Cotter, Niall Ó Maoléidigh</td>
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<tr>
<td>European Union - Ireland</td>
<td>I6</td>
<td>National Development Plan - National Genetic Stock Identification Project</td>
<td>Completed</td>
<td>Identify and map discrete spawning areas within tributaries of Irish salmon rivers and collect juveniles for establishment of genetic baseline for mixed sample analysis. Undertake molecular genetic analysis of juvenile salmon tissue and adult scales to determine relative contributions of different baseline river populations within mixed samples.</td>
<td>2006 - 2008</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>All Irish rivers</td>
<td>UK, Spain</td>
<td>Tom Cross, Paddy Gargan, Philip McGinnity</td>
<td></td>
</tr>
<tr>
<td>European Union - Ireland</td>
<td>I7</td>
<td>Interactions between aquaculture and wild salmonid fish</td>
<td>Completed</td>
<td>Assess efficacy of prophylactic treatments for salmon smolts migrating through aquaculture bays.</td>
<td>2003 - 2009</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>Burrishoole, Shannon, Lee and Screeve rivers, and drift net fisheries around Irish coast</td>
<td>D Jackson</td>
<td></td>
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<tr>
<td>European Union - Ireland</td>
<td>I8</td>
<td>Marine survival of wild and hatchery reared salmon: National coded wire tagging and tag recovery programme and Burrishoole wild salmon census</td>
<td>Ongoing</td>
<td>Provide information on marine survival and exploitation rates by commercial fisheries; estimate the contribution of individual river stocks to catches; examine the performance of selected experimental groups; and evaluate potential for salmon ranching.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>Tag recovery from around North Atlantic. Salmon census facility, Newport, Co Mayo</td>
<td>Norway, UK, Faroes, France, Spain, Germany, Denmark</td>
<td>Niall Ó Maoléidigh, Russell Poole</td>
<td>€472,000</td>
</tr>
<tr>
<td>European Union - Ireland</td>
<td>I9</td>
<td>Kelt survival</td>
<td>Completed</td>
<td>Tag salmon kelts from four rivers in southern Ireland and monitor marine migration, depth and temperature preferences.</td>
<td>2010 - 2012</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Southern Ireland</td>
<td>Audun H. Rikardsen</td>
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<tr>
<td>European Union - Ireland</td>
<td>I10</td>
<td>The ecology of salmon (Salmo salar L.) at sea – environmental factors affecting marine growth, survival and migration of Atlantic salmon</td>
<td>Ongoing</td>
<td>Investigate the decline in North Atlantic salmon stocks in the past two decades in an ecosystem context and provide new information for use in forecast models of abundance and size of current stocks.</td>
<td>2012 - 2016</td>
<td>Life history/ biological processes</td>
<td>Pre-fishery recruitment marine factors</td>
<td>Ireland, Norway</td>
<td>Norway, UK</td>
<td>Dr. D. Brophy</td>
<td>£50,000</td>
</tr>
<tr>
<td>European Union - Ireland</td>
<td>I11</td>
<td>Experiment to determine the potential impact of sea lice from marine salmon farms on out-migrating salmon smolts in western Ireland</td>
<td>Ongoing</td>
<td>Assess the efficacy of prophylactic treatments for salmon smolts migrating through aquaculture bays.</td>
<td>2014 - 2017</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>River Erriff and Killary Harbour, River Corrib and Galway Bay</td>
<td>Paddy Gargan</td>
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<tr>
<td>European Union - Ireland</td>
<td>I13</td>
<td>Investigation of the early migration of salmon and brown trout from the Burrishoole National Index River using telemetry technology in freshwater, brackish and inshore marine areas</td>
<td>Ongoing</td>
<td>Apply tracking technology to track early migration of salmon and trout through the Burrishoole system and assess mortality on entry to marine milieu; experimentally compare early migration and migratory behaviours of local versus foreign Atlantic salmon smolts ranched from the Burrishoole system; and link long-term biological data on Atlantic salmon and sea trout with climate time series to assess the effect of potential thermal mismatch between freshwater and marine environments on post-smolt survival.</td>
<td>2016 - 2019</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Burrishoole and environs, Newport, Co. Mayo</td>
<td>Niall Ó Maoléidigh, T Reed</td>
<td></td>
<td>£119,500</td>
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<tr>
<td>European Union –</td>
<td>Ei14</td>
<td>Investigation of the causes of early migration mortality in salmon and sea trout from the Burrishoole National Index River using acoustic telemetry in estuarine, marine and coastal areas</td>
<td>Ongoing</td>
<td>Objectives include: building national capacity in the use of telemetry to monitor movements of migratory fish species; evaluating and optimising methods for the tagging of wild and reared post-smolts; describing and mapping the migration routes taken by post-smolts of Atlantic salmon and sea trout during their seaward migration from the Burrishoole catchment; and estimating survival of tagged post-smolts during their seaward migration from the Burrishoole catchment.</td>
<td>2016 - 2019</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Burrisheoole River, Clew Bay and environs, Co. Mayo</td>
<td>-</td>
<td>Niall O Muasóidigh, Deirdre Brophy</td>
<td>£119,500</td>
</tr>
<tr>
<td>Ireland</td>
<td>Ei15</td>
<td>Estimate marine survival of wild Atlantic salmon in the North-East Atlantic from the National Salmonid Index Catchment in the west of Ireland</td>
<td>Ongoing</td>
<td>Estimate pre-adult to adult marine survival rates in the National Salmonid Index Catchment and the Corrib system in the west of Ireland.</td>
<td>2015 – 2021</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>River Ervill, West of Ireland</td>
<td>Faddy Gargan</td>
<td>£36,000</td>
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<tr>
<td>European Union –</td>
<td>Ei16</td>
<td>Sea lice model for the sustainable development of Atlantic salmon fisheries and aquaculture</td>
<td>New Entry</td>
<td>Support the development of a sea lice integrative model that will take into account relevant parameters, including biological, environmental, oceanographic, anthropogenic etc, with the aim of predicting the potential for the sea lice to occur at different locations at different times of the year and under different environmental conditions. The project will contribute to developing best management practice for sea lice control.</td>
<td>January 2017 - December 2018</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>Ireland (National Salmonid Index Catchment), Norway and Scotland</td>
<td>Norway and Scotland</td>
<td>Faddy Gargan</td>
<td>£280,000</td>
</tr>
<tr>
<td>Ireland</td>
<td>Ei17</td>
<td>Unlocking the archive: using scale and otolith chronologies to resolve climate impacts</td>
<td>New Entry</td>
<td>Improvements in the availability and accessibility of environmental monitoring data allows researchers to more accurately describe the external conditions that contribute to changes in growth, phenology, migration and survival. Exceptionally detailed records of individual responses to these conditions can be gleaned from hard tissues (scales and otoliths) of teleost fish. Visible periodic increments provide an internal chronological record of life history traits such as age, growth and migration timing. Recent analytical advances also allow the reconstruction of temperature and feeding histories and migration pathways. Archived collections of scales and otoliths can generate incredibly detailed long-term biological time-series. Coupling this information with measurements of external conditions can yield powerful insight into how populations respond to environmental change and can perform predictions of likely future responses.</td>
<td>2017 - 2021</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>Marine Institute, Newport Research Facility, Co Mayo and Galway/Mayo Institute of Technology</td>
<td>-</td>
<td>Deirdre Brophy, Deirdre Cotter, Niall O Muasóidigh, Russell Poole</td>
<td>£67,500</td>
</tr>
<tr>
<td>European Union –</td>
<td>Sw1</td>
<td>Long-term variation in population dynamics, life-history and exploitation of salmon stock in the index River Åtran</td>
<td>Ongoing</td>
<td>Estimate long-term variation of survival in different life-stages, life-history characteristics, stock recruitment and growth of wild salmon in the River Åtran and its major tributary Högvadsån.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>Sweden (west coast; Kattegatt)</td>
<td>Erik Degelman</td>
<td>£43,000</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>Ew1</td>
<td>Salmonid migration and climate change</td>
<td>Completed</td>
<td>Describe and model the environmental factors affecting the migration of salmonids and predict the effects of climate change on salmonid migration and survival in the sea.</td>
<td>1999 - 2004</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Coastal waters around the UK and extending to salmon feeding grounds in Faroes and Greenland Seas</td>
<td>Andy Moore</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew2</td>
<td>Impacts of agricultural contaminants on wild salmonids</td>
<td>Completed</td>
<td>Describe the nature and extent of the impacts of aquatic contaminants derived from agriculture on migration and marine survival of salmonid smolts and post-smolts.</td>
<td>1999 - 2004</td>
<td>Specific natural and anthropogenic factors</td>
<td>Pollutants</td>
<td>England and Wales</td>
<td>Sweden and Canada</td>
<td>Andy Moore</td>
<td></td>
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<tr>
<td>European Union –</td>
<td>Ew3</td>
<td>Impact of intensive in-river aquaculture on wild salmonids</td>
<td>Completed</td>
<td>Describe the nature and extent of the impact of aquatic contaminants derived from intensive freshwater aquaculture (effluents, pesticides, antibiotics and hormones) on reproduction and migration of wild salmonids.</td>
<td>2001 - 2005</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>England and Wales</td>
<td>Andy Moore</td>
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<tr>
<td>European Union</td>
<td>Ew4</td>
<td>Modelling the bioenergetics of salmon migration</td>
<td>Completed</td>
<td>Model the energetic requirements of salmon during their marine migrations and predict the effects of environmental and oceanographic changes on smolt growth and survival.</td>
<td>2002 - 2005</td>
<td>Distribution/ migration in the sea</td>
<td>Migration and bioenergetic models</td>
<td>England and Wales</td>
<td></td>
<td>Andy Moore</td>
<td></td>
</tr>
<tr>
<td>UK (England and Wales)</td>
<td>Ew5</td>
<td>Cardiff Bay Fisheries Monitoring Programme</td>
<td>Completed</td>
<td>Assess the impact of Cardiff Bay barrage on salmon stocks of the rivers Taff and Ely.</td>
<td>1990 - 2006</td>
<td>Specific natural and anthropogenic factors</td>
<td>Obstructions to fish movements</td>
<td>Cardiff Bay at mouth of rivers Taff and Ely, South Wales, UK</td>
<td></td>
<td>Peter Gough</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew6</td>
<td>Atlantic Salmon Arc Project, ASAP</td>
<td>Completed</td>
<td>Define exploitation at sea on a regional basis using genetic tools. Create a long-term database for these studies and create an international management tool to inform decision-making.</td>
<td>2004 - 2008</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Europe, North Atlantic</td>
<td>Spain, France, Ireland, Scotland, USA, Iceland</td>
<td>Lynyan Bright</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew7</td>
<td>Diffuse pollution and freshwater fish populations</td>
<td>Completed</td>
<td>Investigate the role of diffuse aquatic contaminants in regulating populations of freshwater fish with particular reference to salmonid stocks and fisheries.</td>
<td>2005 - 2010</td>
<td>Specific natural and anthropogenic factors</td>
<td>Pollutants</td>
<td>England and Wales</td>
<td></td>
<td>Andy Moore</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew8</td>
<td>The influence of the freshwater environment on salmonid populations</td>
<td>Completed</td>
<td>Examine the impact of environment change on juvenile salmon production and ecology. One aspect of the research directly related to marine survival is the potential role of assessment techniques (trapping, anaesthesia tagging) in influencing marine survival.</td>
<td>2005 - 2010</td>
<td>Life history/ biological processes</td>
<td>Freshwater factors</td>
<td>England and Wales</td>
<td></td>
<td>Andy Moore</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew9</td>
<td>Factors affecting the distribution and behaviour of salmonid populations</td>
<td>Completed</td>
<td>Investigate the habitat requirements of adult salmonids within the estuarine and freshwater environments. One key element of the research is to investigate how changes in prey availability within the marine environment may influence recruitment of stocks between years.</td>
<td>2005 - 2010</td>
<td>Life history/ biological processes</td>
<td>Pre-fishery recruitment marine factors</td>
<td>England and Wales</td>
<td></td>
<td>Andy Moore</td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew10</td>
<td>Genetic sampling to type British salmon stocks</td>
<td>Completed</td>
<td>Coordinate and support the establishment of baseline information on the genetic character of breeding populations within and among rivers in Britain.</td>
<td>2008 – 2010</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>England, Wales, Northern Ireland and Scotland, Northern Ireland and Scotland</td>
<td></td>
<td>Mintan Aprahamian</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew11</td>
<td>Deriving estimates of marine survival for monitored river stocks in England and Wales</td>
<td>Ongoing</td>
<td>Establish ‘monitored’ rivers where estimates of marine survival can be derived and compared with other North Atlantic stocks.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>River Dee (North Wales), River Tamar (SW England), River Frome (S England)</td>
<td>Ian Davison, Rob Hillman, Ian Russell, Rasmus Lauridsen</td>
<td>£150,000</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew12</td>
<td>The marine life of Atlantic salmon: evidence from the microchemistry of scales</td>
<td>Completed</td>
<td>Measure the stable isotope and trace element compositions from salmon scales in relation to variations in the marine environment and develop a model to predict impacts of changes in the marine environment on return rates of salmon.</td>
<td>2007 – 2010</td>
<td>Life history/ biological processes</td>
<td>Post-fishery recruitment marine factors</td>
<td>England and Wales</td>
<td></td>
<td>Clive Trueman</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew13</td>
<td>Development and application of salmonid life cycle models</td>
<td>Completed</td>
<td>Review available models to assess suitability and build on existing models or develop new models to inter alia compare marine and freshwater factors affecting stocks.</td>
<td>2009 – 2013</td>
<td>Life history/ biological processes</td>
<td>Freshwater factors</td>
<td>England and Wales</td>
<td></td>
<td>Ted Potter</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew14</td>
<td>The impacts of contaminants and temperature on freshwater fish populations</td>
<td>Completed</td>
<td>Study the impacts of contaminants derived from intensive agriculture and aquaculture facilities on wild salmonids and investigate the implications of predicted climate change scenarios on the impacts of different sources of diffuse and point source pollution on wild fish populations.</td>
<td>2009 – 2014</td>
<td>Specific natural and anthropogenic factors</td>
<td>Pollutants</td>
<td>England and Wales</td>
<td></td>
<td>Andy Moore</td>
<td></td>
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<tr>
<td>UK (England and Wales)</td>
<td>Ew15</td>
<td>Impacts on juvenile salmonid populations from a changing freshwater environment</td>
<td>Completed</td>
<td>Investigate how predicted changes in the freshwater environment might impact on juvenile salmonid populations and how changing conditions during the early life history stages may influence their behaviour and subsequent survival within the marine environment.</td>
<td>2009 – 2015</td>
<td>Life history/ biological processes</td>
<td>Freshwater factors</td>
<td>England and Wales</td>
<td></td>
<td>Bill Riley</td>
<td></td>
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<tr>
<td>Jurisdiction – UK (England and Wales)</td>
<td>Project No</td>
<td>Title</td>
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<td>Summary of Objectives</td>
<td>Research Dates</td>
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<td>Area of Research</td>
<td>Collaborating Countries</td>
<td>Coordinating Scientist</td>
<td>Annual Expenditure</td>
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<tr>
<td>European Union – UK (England and Wales)</td>
<td>Ew16</td>
<td>Impacts of in-river hydropower production on migratory fish</td>
<td>Ongoing</td>
<td>Examine the cumulative effects of freshwater hydropower schemes on habitat connectivity within river basins and on the migratory behavior and survival of Atlantic salmon and European eels, and assess potential effects at the fish population level. Examine how delays to seaward migration of smolts as a result of in-river renewable energy schemes may compromise the fish once they enter the sea.</td>
<td>2012 - 2017</td>
<td>Specific natural and anthropogenic factors</td>
<td>Obstructions to fish movements</td>
<td>Rivers in Southern England (e.g. Fowey and Rurble)</td>
<td>Andy Moore</td>
<td>£168,000</td>
<td></td>
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<tr>
<td>European Union – UK (England and Wales)</td>
<td>Ew17</td>
<td>Estuarine habitat requirements and distribution of diadromous fish</td>
<td>Ongoing</td>
<td>Examine the residency and habitat preferences of migratory fish within estuaries and assess the impact of construction and operation of man-made structures on the migratory behavior and survival of key diadromous fish species as they move between the marine and freshwater environments.</td>
<td>2012 - 2016</td>
<td>Specific natural and anthropogenic factors</td>
<td>Pollutants</td>
<td>Estuaries and coastal waters in England and Wales</td>
<td>Andy Moore</td>
<td>£100,000</td>
<td></td>
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<tr>
<td>European Union – UK (England and Wales)</td>
<td>Ew18</td>
<td>Genetic stock identification of salmon caught in the Faroes fishery</td>
<td>Completed</td>
<td>Catalogue scale samples collected from 1984 to 2000; identify a selection of scales that will best represent the stock composition during a baseline period(s); use GRAASP to provide country/region of origin assignments; report on how the results can be used in the provision of catch advice.</td>
<td>2012 - 2015</td>
<td>Distribution/migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Laboratory based study in Norway and UK; samples from Faroese fishery</td>
<td>UK, Norway, Faroes</td>
<td>Ted Potter</td>
<td></td>
</tr>
<tr>
<td>European Union – UK (Northern Ireland)</td>
<td>NI1</td>
<td>Development of conservation limits, pre-fishery abundance and management of the Foyle salmon fishery</td>
<td>Completed</td>
<td>Build upon the existing Foyle salmon management system, develop it into a precautionary catch advice framework that fully takes account of biological data on stock abundance and which fulfils all the main requirements of the Precautionary Approach.</td>
<td>2005 - 2008</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival in relation to environmental parameters</td>
<td>Foyle area, Ireland</td>
<td>Ireland, France, Scotland</td>
<td>Patrick Boylan</td>
<td></td>
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<tr>
<td>European Union – UK (Northern Ireland)</td>
<td>NI2</td>
<td>The marine survival of Atlantic salmon from the River Bush, Northern Ireland</td>
<td>Ongoing</td>
<td>Investigate factors influencing the survival at sea of smolts migrating from the River Bush until their return as adults.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>River Bush, N. Irish/Irish coastal waters and distant-water fisheries</td>
<td>Ireland (tag recovery programme)</td>
<td>Dennis Ensing</td>
<td>£260,000</td>
</tr>
<tr>
<td>European Union – UK (Northern Ireland)</td>
<td>NI3</td>
<td>Investigating the movement and mortality of Atlantic salmon in the Foyle from river to sea</td>
<td>Completed</td>
<td>To establish movement and potential for loss of smolts in their riverine migration and early marine phase</td>
<td>2013 - 2016</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Foyle catchment and L.Foyle to where it entered the North Atlantic</td>
<td>Scotland</td>
<td>Patrick Boylan</td>
<td></td>
</tr>
<tr>
<td>European Union – UK (Northern Ireland)</td>
<td>NI4</td>
<td>COMPASS (Collaborative Oceanography &amp; Monitoring for Protected Areas and Species)</td>
<td>New Entry</td>
<td>Tracking sea-trout and salmon movement in the near-shore marine environment</td>
<td>2017 - 2022</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Island of Ireland; coast Belfast to Dublin</td>
<td>UK (Northern Ireland, Scotland), Ireland</td>
<td>Dr Robert Russell</td>
<td>£162,000</td>
</tr>
<tr>
<td>European Union – UK (Scotland)</td>
<td>Sc1</td>
<td>Testing and development of Institute of Marine Research (IMR), Bergen, Norway, salmon trawl gear</td>
<td>Completed</td>
<td>Test a prototype trawl developed by IMR, Bergen, Norway, which, rather than capturing post-smolts, records, by use of CCTV, their passage as they pass through an open-ended trawl net. A supplementary objective, dependent on the success of the gear trials, was to conduct a post-smolt survey at the shelf edge.</td>
<td>2006</td>
<td>Development of methods</td>
<td>Post-smolt survey methods</td>
<td>Scalloway Deeps (Shetland), the Minches</td>
<td>Norway</td>
<td>Julian MacLean, Jens Christian Holst, Dick Shelton</td>
<td></td>
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<tr>
<td>European Union – UK (Scotland)</td>
<td>Sc2</td>
<td>Protecting salmonid fisheries from seal damage</td>
<td>Completed</td>
<td>Develop and apply new molecular tools for discriminating among species of fish in the diets of seals from their remains in scats. Test the possibility of using molecular tools to quantify the occurrence of diet components. Develop and deploy cetacean-friendly seal-scarr. Identify factors influencing in-shore migration routes of salmon. Characterise behavioural interactions between salmon and their predators and seals and their prey. Investigate the digestion of otoliths during passage through a seal’s gut.</td>
<td>2003 - 2008</td>
<td>Specific natural and anthropogenic factors</td>
<td>Predation</td>
<td>Principally North West (Shetland), North-East Scotland (Cromarty Firth). Possible work in other estuaries as required.</td>
<td></td>
<td>John Armstrong</td>
<td></td>
</tr>
<tr>
<td>European Union – UK (Scotland)</td>
<td>Sc3</td>
<td>Post-smolt mortality of Atlantic salmon</td>
<td>Ongoing</td>
<td>Assess post-smolt mortality rates of Atlantic salmon from three Scottish rivers, and the contribution of these salmon to fisheries that exploit them.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>North Esk, Aberdeenshire Dee (two tributaries), River Conon</td>
<td>Gordon Smith, Ian Malcolm, John Armstrong</td>
<td>£50,000</td>
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<tr>
<td>Jurisdiction</td>
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<tr>
<td>European Union – UK (Scotland)</td>
<td>Sc4</td>
<td>Analysis of post-smolt life history by scale reading</td>
<td>Ongoing</td>
<td>Investigate the relationship between growth and mortality, particularly during the marine phase, by analysis of scale growth patterns. Identify periods crucial to survival.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival in relation to environmental parameters</td>
<td>Samples from around Scotland and from North Esk and Glimnack Burn in particular</td>
<td>USA and Canada</td>
<td>Gordon Smith</td>
<td>£10,000</td>
</tr>
<tr>
<td>European Union – UK (Scotland)</td>
<td>Sc5</td>
<td>Fisheries-induced evolution</td>
<td>Completed</td>
<td>Analyse the prevalence and consequence of fisheries-induced adaptive changes in exploited salmon stocks.</td>
<td>2007 - 2010</td>
<td>Distribution/migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Scotland and Ireland and across European species' distribution, including marine migration routes.</td>
<td>Austria, Norway, France, Denmark, Belgium, UK, Netherlands, Finland, Germany, Spain</td>
<td>Ulf Dredzein, John Gibey, Philip McGinity</td>
<td></td>
</tr>
<tr>
<td>European Union – UK (Scotland)</td>
<td>Sc6</td>
<td>Size and condition of returning grilse (ESW) and MSW salmon</td>
<td>Ongoing</td>
<td>Investigate decadal trends in the size and condition of adult salmon returning to Scotland.</td>
<td>Annual</td>
<td>Life history/ biological processes</td>
<td>Post-fishery recruitment marine factors</td>
<td>Six locations in Scotland, in particular North Esk.</td>
<td>Philip Bacon</td>
<td></td>
<td>£30,000</td>
</tr>
<tr>
<td>European Union – UK (Scotland)</td>
<td>Sc7</td>
<td>Development of a General Spatial Model of within river population structuring in Scottish Atlantic salmon (POPMOD)</td>
<td>Completed</td>
<td>Improve the scientific basis for inter alia setting biologically appropriate conservation limits, providing advice on conservation and restoration initiatives, accurately and cost-effectively monitoring the status of salmon stocks.</td>
<td>2008 - 2013</td>
<td>Distribution/migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>River systems across Scotland</td>
<td>Eric Verspoor</td>
<td></td>
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<tr>
<td>European Union – UK (Scotland)</td>
<td>Sc8</td>
<td>Focusing Atlantic salmon management on Atlantic salmon (FASMOP)</td>
<td>Completed</td>
<td>Establish the number and spatial boundaries of breeding populations of salmon within any Scottish river system; establish the ancestral relationships and functional biological differences between wild salmon stock components across Scottish rivers; improve local management practice and increase the focus of management on local breeding populations.</td>
<td>2009 – 2013</td>
<td>Distribution/migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>River systems across Scotland</td>
<td>Stuart Middelham, Calum Sinclair</td>
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<tr>
<td>Norway</td>
<td>N1</td>
<td>Identification of salmon by geochemical signatures; further development and testing of methods</td>
<td>Completed</td>
<td>Test if geochemical signatures are stable from year to year; test if geochemical signatures of salmon scale samples can be used to discriminate among fish from different rivers; develop analytical procedures (otolith core sampling, chemical and statistical analyses) for application of this method in ecological studies on Atlantic salmon.</td>
<td>2002</td>
<td>Life history/ biological processes</td>
<td>Post-fishery recruitment marine factors</td>
<td>Laboratory study</td>
<td>Peder Fixe</td>
<td></td>
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<tr>
<td>Norway</td>
<td>N2</td>
<td>Development of models to predict marine survival and return of salmon to Norway</td>
<td>Completed</td>
<td>Identify and examine the feasibility of applying time series of marine environmental data, zooplankton productivity, productivity of pelagic fish and salmon life-history information for model development. Develop appropriate models.</td>
<td>2002 - 2005</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival in relation to environmental parameters</td>
<td>Desk study of existing data</td>
<td>USA, Canada, EU</td>
<td>Lars Petter Hansen</td>
<td></td>
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<tr>
<td>Norway</td>
<td>N3</td>
<td>By-catch in pelagic fisheries as a population-regulating factor in wild salmon stocks</td>
<td>Completed</td>
<td>Investigate the extent of by-catch of salmon post-smolts and develop management advice to reduce by-catch while maintaining catch rates in the mackerel fishery.</td>
<td>2001 - 2005</td>
<td>Distribution/migration in the sea</td>
<td>By-catches in pelagic fisheries</td>
<td>Norwegian Sea and Russia, Scotland</td>
<td>Jens Christian Holst</td>
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<tr>
<td>Norway</td>
<td>N4</td>
<td>Sea lice as a population-regulating factor in Norwegian salmon: status, effects of measures taken and future management</td>
<td>Completed</td>
<td>Further clarify the effects of sea lice on wild salmon populations and propose measures to reduce sea lice infections in wild salmon and develop alternative measures in critically affected stocks.</td>
<td>2002 - 2005</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>Sognefjord and Aladjord</td>
<td>Jens Christian Holst</td>
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<tr>
<td>Norway</td>
<td>N5</td>
<td>Distribution of salmon in relation to environmental parameters and origin in the North Atlantic – capture, tagging and release of salmon with data storage tags (DSTs)</td>
<td>Completed</td>
<td>Investigate the temporal and spatial distribution of DST-tagged salmon in the Norwegian Sea and adjacent areas, with emphasis on spatial distribution and temperature preferences; growth in relation to environmental parameters; and diurnal vertical distribution.</td>
<td>2003 - 2006</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Northern North Sea, Norwegian Sea, Iceland Sea, Greenland Sea</td>
<td>Faroe Islands, Iceland, Marianne Holm</td>
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<tr>
<td>Norway</td>
<td>N6</td>
<td>Temporal variation in abundance of the northern-most populations of Atlantic salmon with emphasis on the River Tana</td>
<td>Completed</td>
<td>Examine the influence of ocean climate, predation, marine fisheries and smolt production on the abundance of salmon with emphasis on the River Tana.</td>
<td>2002 - 2006</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival in relation to environmental parameters</td>
<td>River Tana</td>
<td>Finland, Russia, Canada, Martin Svenning</td>
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<tr>
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<tr>
<td>Norway</td>
<td>N7</td>
<td>The importance of early marine feeding on distribution of Atlantic salmon post-smolts in Norwegian fjords</td>
<td>Completed</td>
<td>Analyse spatial variation in early marine post-smolt feeding and growth along a north-south geographical scale; investigate how post-smolt feeding and growth is associated with timing of smolt descent, marine prey availability, parasite infection, fjord migration, and abiotic factors.</td>
<td>2002 - 2007</td>
<td>Life history/ biological processes</td>
<td>Pre-fishery recruitment marine factors</td>
<td>Central and Northern Norway</td>
<td>Canada</td>
<td>Bengt Finstad</td>
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<tr>
<td>Norway</td>
<td>N8</td>
<td>Distribution and ecology of post-smolts and salmon at sea</td>
<td>Completed</td>
<td>Analyse age, growth and migratory paths in relation to environmental conditions and competitors so as to expand understanding of salmon marine life-history in order to explain observed variations in salmon survival.</td>
<td>2002 - 2007</td>
<td>Distribution/ migration in the sea</td>
<td>Distribution of salmon in the sea</td>
<td>West of Ireland – Faroes, northern North Sea, Norwegian Sea</td>
<td>Faroe Islands</td>
<td>Micahel Holm</td>
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<tr>
<td>Norway</td>
<td>N9</td>
<td>Dispersal of salmon lice in Norwegian fjords</td>
<td>Completed</td>
<td>Estimate and describe to what extent free-living salmon lice larvae disperse from wild and farmed sources within and between areas.</td>
<td>2007</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>Hardangerfjord, Norway</td>
<td>Karin Kroon</td>
<td>Boitaspen</td>
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<tr>
<td>Norway</td>
<td>N10</td>
<td>Experimental tagging programme for investigating the behaviour of escaped farmed salmon: pilot study</td>
<td>Completed</td>
<td>Examine the migration of escaped large farmed salmon and test if they are transported with the currents and appear in Norwegian waters.</td>
<td>2006 - 2007</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td></td>
<td>Lars Peter Hansen</td>
<td></td>
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<tr>
<td>Norway</td>
<td>N11</td>
<td>Individual assignment of salmon caught in the ocean to region of origin</td>
<td>Completed</td>
<td>Investigate genetic variation in Norwegian Atlantic salmon populations on different spatial scales. Provide calibrated data from micro-satellite markers for a database. Analyse samples caught in the ocean and assign to country/region of origin.</td>
<td>2006 - 2009</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Norway</td>
<td>Finland</td>
<td>Oystein Skaala, Vidar Wennevik</td>
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<tr>
<td>Norway</td>
<td>N12</td>
<td>Migratory behaviour of smolts and post-smolts of cultured Atlantic salmon</td>
<td>Completed</td>
<td>Study the change in migratory behaviour from smolts during the post-smolt stages in cultured Atlantic salmon.</td>
<td>2008 - 2009</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Masfjorden, western Norway</td>
<td>Ove Skilbrei</td>
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<tr>
<td>Norway</td>
<td>N13</td>
<td>Significance of salmon lice for growth and survival of salmon in the sea</td>
<td>Ongoing</td>
<td>Estimate the effects of salmon lice on post-smolt growth and survival, dependent on release site and time and year of release.</td>
<td>2006 -</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>Western Norway - River Dale and nearby coast</td>
<td>Vidar Wennevik</td>
<td></td>
<td>£175,000</td>
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<tr>
<td>Norway</td>
<td>N15</td>
<td>Population-limiting mechanisms for Atlantic salmon during early saline and coastal migration (SALPoP)</td>
<td>Completed</td>
<td>Map migratory behaviour and quantity where, when and why mortalities occur; correlate data on migration and mortalities with health status and major population-limiting factors; develop improved mitigating actions and management strategies to contribute to sustainability of salmon populations.</td>
<td>2008 - 2012</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Kragerød, Møre and Romsdal, mid Norway</td>
<td>Sweden, UK, Canada</td>
<td>Bengt Finstad</td>
<td>£134,000</td>
</tr>
<tr>
<td>Norway</td>
<td>N16</td>
<td>The Hardangerfjord salmon lice project</td>
<td>Completed</td>
<td>Improve sea lice monitoring and management; evaluate success of sea lice management strategies; quantify the abundance and distribution of salmon lice in the Hardangerfjord area; analyse data sets for possible risk factors associated with varying lice infection pressure.</td>
<td>2007 - 2010</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>Hardangerfjord on the Norwegian west coast</td>
<td>Canada, UK</td>
<td>Bengt Finstad</td>
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<tr>
<td>Norway</td>
<td>N17</td>
<td>Origin of Atlantic salmon off Svalbard</td>
<td>Completed</td>
<td>Identify the origin of Atlantic salmon occurring in gill net fisheries at Lofoten, Spitsbergen; by life history (age, growth) and genetic analyses.</td>
<td>2008 - 2012</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Lofoten, Spitsbergen</td>
<td>Arne Johan Jensen</td>
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<tr>
<td>Norway</td>
<td>N18</td>
<td>Salmotrack - Electronic tracking of northern anadromous salmonoids</td>
<td>Ongoing</td>
<td>Track different life-stages of northern Atlantic salmon and other anadromous species in river, fjord and open ocean.</td>
<td>2006 – 2012</td>
<td>Distribution/ migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Northern Norway (Alta, Nord, Tana, Saltfjord); Mid Norway (Okkal); Western Norway (Hardangerfjord)</td>
<td>Denmark, UK, Finland, USA, Japan, Canada</td>
<td>Aundun H. Rikardsen</td>
<td>£0</td>
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<tr>
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<tr>
<td>Norway</td>
<td>N19</td>
<td>Trilateral cooperation on our common resource; the Atlantic salmon in the Barents region (Kolahartic salmon 2011 - 2013)</td>
<td>Completed</td>
<td>Develop an integrated, long-term management of Atlantic salmon in the sea and in rivers in the northernmost distribution areas of the Atlantic salmon; provide data to implement customized, sustainable, knowledge-based harvesting regimes, and to preserve the rich traditions of fishing and coastal culture; unite empirical knowledge (local and traditional) with scientific knowledge; provide synthesized and new knowledge about Atlantic salmon, its adaptation to climate change and its migration along the coast.</td>
<td>2011 - 2013</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Barents region; Northern Norway, Finland and Russia</td>
<td>Finland, Russian Federation</td>
<td>Tiiu Kalske</td>
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<tr>
<td>Norway</td>
<td>N20</td>
<td>Effects of salmon lice on wild salmonid populations; filling in knowledge gaps (LicePop)</td>
<td>Completed</td>
<td>To assess: to what extent lice from farms occur on wild fish; how many lice a wild fish can tolerate under natural conditions before its viability is compromised; to what extent wild fish are able to combat lice infection through adaptations aimed at reducing infestations; and to what extent sea lice can reduce or regulate wild populations of salmonids.</td>
<td>2013 – 2015</td>
<td>Specific natural and anthropogenic factors</td>
<td>Fish farms</td>
<td>Hardangerfjord, Norway</td>
<td>New Zealand, UK (Scotland)</td>
<td>Bengt Finstad</td>
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<tr>
<td>Norway</td>
<td>N21</td>
<td>Salmon migrating through a maze in a changing world; building a dynamic management regime for a multi-stock system affected by extensive mixed-stock fisheries</td>
<td>Ongoing</td>
<td>Analyze and explain the historical variation and recent decline in the abundance of Atlantic salmon from different sub-populations of the Tana complex.</td>
<td>2015 - 2017</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Barents Sea and Tana river</td>
<td>Norway, Finland</td>
<td>Martin A.Svending</td>
<td>£218,000</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>R1</td>
<td>Assessment of by-catch of post-smolts of Atlantic salmon in pelagic fisheries in the Norwegian Sea</td>
<td>Completed</td>
<td>Assess the occurrence of post-smolts in catches by Russian vessels engaged in the pelagic fisheries for mackerel, blue whiting and herring.</td>
<td>2002 - 2007</td>
<td>Distribution/ migration in the sea</td>
<td>By-catches in pelagic fisheries</td>
<td>Norwegian Sea</td>
<td>Boero Prischepa, Alexander Zubchenko</td>
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<tr>
<td>Russian Federation</td>
<td>R2</td>
<td>Monitoring of the stock status, abundance assessment and provision of advice on the allowable level of harvest of Atlantic salmon</td>
<td>Ongoing</td>
<td>Estimate survival of juveniles and adult return rates; estimate natural and fishing mortality; study population dynamics; assess population sizes and spawning escapement; and estimate allowable catch.</td>
<td>Annual</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival/growth estimates</td>
<td>Atlantic salmon rivers of the Murmanik Region, Archangel Region, Nenets Autonomous Okrug, Republic of Komi, and Karelian Republic</td>
<td>Sergey Prusov, Igor Studenov</td>
<td></td>
<td>£60,000</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>R3</td>
<td>Establishing a genetic baseline of northern salmon populations across the Russian – Norwegian border for management planning</td>
<td>Completed</td>
<td>Establish a genetic baseline of sufficient resolution for the purposes of partitioning bag net catches between Russian and Norwegian regions.</td>
<td>2009 - 2010</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Northern Norway, North West of the Russian Federation</td>
<td>Norway, Vidar Wennevik (IMR), Sergey Prusov (PINRO)</td>
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<tr>
<td>United States of America</td>
<td>U1</td>
<td>Forecasts of Atlantic salmon transoceanic migration: climate change scenarios and anatomy in the North Atlantic</td>
<td>Completed</td>
<td>Develop and evaluate marine migration models for Atlantic salmon from North America and Europe; evaluate the potential effects of climate change on migration patterns of Atlantic salmon.</td>
<td>2002 - 2004</td>
<td>Distribution/ migration in the sea</td>
<td>Migration and bioenergetic models</td>
<td>Desk study</td>
<td>Canada, Kevin Friedland</td>
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<tr>
<td>United States of America</td>
<td>U2</td>
<td>Stable isotope composition of Atlantic salmon scales</td>
<td>Completed</td>
<td>Develop a retrospective time series of stable isotope ratios for the DPP in Maine and the mixed-stock samples from the continental stock complex to evaluate feeding patterns of the stocks over time.</td>
<td>2001 - 2002</td>
<td>Life history/ biological processes</td>
<td>Post-fishery recruitment marine factors</td>
<td>Desk study. Analysis of scale samples collected at West Greenland and from US returns.</td>
<td>International collaboration in obtaining samples, Kevin Friedland</td>
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<tr>
<td>United States of America</td>
<td>U3</td>
<td>Ultrastructure telemetry of smolts and post-smolts in the Narragansett River and Narragansett Bay</td>
<td>Completed</td>
<td>Evaluate migration timing and pathways in the lower Narragansett River and Narragansett Bay and estimate survival of migrating smolts and post-smolts.</td>
<td>2002 - 2009</td>
<td>Distribution/ migration in the sea</td>
<td>Migration behaviour of individual fish</td>
<td>Narragansett River, Narragansett Bay and Gulf of Maine</td>
<td>Canada, James Hawkes</td>
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<tr>
<td>United States of America</td>
<td>U4</td>
<td>Penobscot hatchery versus wild smolt telemetry</td>
<td>Ongoing</td>
<td>Evaluate migration timing and pathways in the Penobscot Estuary and Bay and estimate survival of migrating smolts and post-smolts.</td>
<td>2005 - 2017</td>
<td>Distribution/ migration in the sea</td>
<td>Migration behaviour of individual fish</td>
<td>Penobscot Estuary, Penobscot Bay</td>
<td>Canada, James Hawkes</td>
<td></td>
<td>£10,000</td>
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<tr>
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<tr>
<td>United States of America</td>
<td>U5</td>
<td>Comprehensive evaluation of marine survival of hatchery-stocked smolts: migration behaviour and success of Dennys River smolts</td>
<td>Ongoing</td>
<td>Evaluate migration speed and behaviour from lower river release sites through estuarine habitat; estimate survival of migrating smolts and identify areas where mortality may be occurring.</td>
<td>2001 - 2017</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Dennys River, Cooscook Bay, Gulf of Maine</td>
<td>Canada</td>
<td>James Hawkes</td>
<td>£10,000</td>
</tr>
<tr>
<td>United States of America</td>
<td>U7</td>
<td>Evaluation of estuary and nearshore marine distributions of Atlantic salmon post-smolts in Penobscot Bay and the Gulf of Maine</td>
<td>Completed</td>
<td>Evaluate nearshore distribution and migration pathways of smolts and post-smolts; estimate the relative contribution of stocked hatchery smolts to overall post-smolt populations; evaluate the relative contribution of spatially and temporally distinct smolt releases on post-smolt populations; evaluate the physiological condition of post-smolts in marine environments.</td>
<td>2001 - 2011</td>
<td>Distribution/migration in the sea</td>
<td>Distribution of salmon in the sea</td>
<td>Penobscot Bay, Gulf of Maine</td>
<td>Tim Sheehan</td>
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<tr>
<td>United States of America</td>
<td>U8</td>
<td>Cormorant harassment in the Narraguagus River/Narraguagus Bay</td>
<td>Completed</td>
<td>Reduce predation on migrating salmon smolts by excluding double-crested cormorants from the Lower Narraguagus River and Bay, and assess the efficacy of non-lethal predator exclusion as a means of reducing predation on migrating Atlantic salmon smolts.</td>
<td>2005 - 2012</td>
<td>Specific natural and anthropogenic factors</td>
<td>Predation</td>
<td>Lower Narraguagus River, Estuary and Narraguagus Bay, Maine</td>
<td>James Hawkes</td>
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<tr>
<td>United States of America</td>
<td>U9</td>
<td>SALSEA Greenland</td>
<td>Ongoing</td>
<td>Advance understanding of the ecology of the Atlantic salmon West Greenland stock complex and to gain insights into the factors resulting in recent significant increases in marine mortality across the North Atlantic. (The baseline sampling programme at West Greenland is described in project D1)</td>
<td>2009 - 2018</td>
<td>Distribution/migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Ilulissat, Sisimiut, Nuuk and Qaqortoq, Greenland</td>
<td>Collaborative project with countries detailed in project D1 and scientists from SALSEA-Merge</td>
<td>Tim Sheehan</td>
<td>£15,000</td>
</tr>
<tr>
<td>United States of America</td>
<td>U10</td>
<td>Using Pop-up Satellite Tags (PSATs) to track adult Atlantic salmon in the Northwest Atlantic</td>
<td>Ongoing</td>
<td>Provide information on localized movement patterns of Atlantic salmon off the coast of West Greenland, large scale movement and migration patterns en route to natal rivers in North America and Europe, locations of overwinter residences and depths and temperatures experienced during the second or third winter at sea in the North Atlantic. These data will be used to evaluate if conditions experienced from September through April are favourable for survival and subsequent spawning escapement.</td>
<td>2010 - 2017</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Coastal waters off West Greenland</td>
<td>Norway, Greenland and UK</td>
<td>Mark Renkawitz</td>
<td>£10,000</td>
</tr>
<tr>
<td>United States of America</td>
<td>U11</td>
<td>Impact of oceanographic changes on Atlantic salmon survival in the Northwest Atlantic</td>
<td>Completed</td>
<td>Determine mechanisms controlling the ecosystem-salmon connections and hypothesize on their implications for salmon populations in the future.</td>
<td>2010 - 2014</td>
<td>Long-term monitoring</td>
<td>Time series of marine survival in relation to environmental parameters</td>
<td>Desk study</td>
<td>Tim Sheehan</td>
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<tr>
<td>United States of America</td>
<td>U12</td>
<td>Evaluation of the importance of predator and prey fields and ocean circulation on Atlantic salmon growth and survival in the Gulf of Maine</td>
<td>Completed</td>
<td>Evaluate the consequences for Atlantic salmon post-smolt growth and survival of the match or mismatch of spawning runs of diadromous fishes, aggregations of other marine forage fishes, and thermal/circulation patterns in the Gulf of Maine (GofM) with the timing of Atlantic salmon out-migration.</td>
<td>2010 - 2014</td>
<td>Life history/biological processes</td>
<td>Pre-fishery recruitment marine factors</td>
<td>Desk study</td>
<td>John Kocik</td>
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<tr>
<td>United States of America</td>
<td>U13</td>
<td>Migration timing of Atlantic salmon smolts from Penobscot Bay to the Scotian Shelf</td>
<td>Ongoing</td>
<td>Evaluate the migration timing and likely spatial extent of Gulf of Maine Atlantic salmon post-smolts along migration to the Ocean Tracking Network’s Halifax Array and other distant water telemetry assets in the OTN network.</td>
<td>2013 - 2017</td>
<td>Distribution/migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Desk study</td>
<td>Canada</td>
<td>John Kocik</td>
<td>£10,000</td>
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<tr>
<td>United States of America</td>
<td>U14</td>
<td>Impact of oceanographic changes on Atlantic salmon survival in the Northwest Atlantic</td>
<td>Ongoing</td>
<td>Investigate the hypothesis that ecosystem changes have influenced the energy needed by and available to Atlantic salmon and thereby have affected salmon growth, survival, and productivity during their marine phase.</td>
<td>2014 - 2019</td>
<td>Life history/biological processes</td>
<td>Pre-fishery recruitment marine factors</td>
<td>Desk Study</td>
<td>Tim Sheehan</td>
<td>£70,000</td>
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<tr>
<td>United States of America</td>
<td>U15</td>
<td>Species interactions in the Penobscot Estuary</td>
<td>Ongoing</td>
<td>Merge datasets from acoustic telemetry smolt tagging studies and hydro-acoustic data collected within the Penobscot Estuary; describe overlap of timing and location (along river and within the water column) data of Atlantic salmon smolts and hydro-acoustic data targets (river herring); and describe and compare these data and how it relates to survival.</td>
<td>2013 - 2017</td>
<td>Specific natural and anthropogenic factors</td>
<td>Predation</td>
<td>Penobscot Estuary, Maine</td>
<td>James Hawkes</td>
<td>£50,000</td>
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<tr>
<td>United States of America</td>
<td>U16</td>
<td>Acoustic telemetry evaluation of migration performance in the Kennebec Estuary</td>
<td>Ongoing</td>
<td>Evaluate smolt emigration dynamics and timing in the Lower Kennebec River and Estuary and Merrymeeting Bay; and estimate survival of migrating smolts and post-smolts.</td>
<td>2014 - 2017</td>
<td>Distribution / migration in the sea</td>
<td>Migratory behaviour of individual fish</td>
<td>Kennebec Estuary, Maine</td>
<td>Graham Goulette</td>
<td>£53,000</td>
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<tr>
<td>United States of America</td>
<td>U17</td>
<td>Effects of climate-driven ecosystem change on Atlantic salmon growth and survival at sea; analyses of West Greenland salmon</td>
<td>New Entry</td>
<td>Understand Atlantic salmon growth as a mechanism linking ecosystem conditions to population outcomes.</td>
<td>2017 - 2018</td>
<td>Life history/biological process</td>
<td>Post-fishery recruitment marine factors</td>
<td>Desktop study. Scale samples collected at Greenland.</td>
<td>Canada</td>
<td>Timothy Sheehan</td>
<td>£45,000</td>
</tr>
<tr>
<td>France – St Pierre and Miquelon</td>
<td>F1</td>
<td>St Pierre and Miquelon Salmon Fishery Sampling Programme</td>
<td>Ongoing</td>
<td>Improve understanding of the biological characteristics and origin of salmon harvested in the fishery at St Pierre and Miquelon.</td>
<td>Annual</td>
<td>Distribution/ migration in the sea</td>
<td>Origin of catches in directed fisheries</td>
<td>Around the islands of St Pierre and Miquelon</td>
<td>Canada</td>
<td>Herlé Goraguer</td>
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