



International Atlantic Salmon Research Board

ICR(08)7
(Updated July 2008)

Inventory of Research Relating to Salmon Mortality in the Sea

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Summary

1. The 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 an essential tool in the development of research priorities for potential funding and in better coordinating existing research efforts. Maintaining the inventory involves updating it as new projects are approved (including those commencing in the current year and for which funding has been confirmed), existing projects are changed, and projects are completed.
2. Having reviewed gaps in the information included in earlier inventories the Board agreed that its initial research priority was studies of the distribution and migration of salmon at sea in relation to feeding opportunities and predation. In 2005, the Board adopted a comprehensive and innovative programme of research, the SALSEA Programme, designed to improve understanding of the distribution and migration of salmon at sea. Its three main workpackages concern the development of supporting technologies, early migration through the inshore zone and marine surveys. The Board recognised that studies of the early migration through the inshore zone were largely nationally funded but the Board might play a role in coordinating such research. Last year the inventory included new studies on the establishment of genetic baselines and on gear trials to test pelagic trawls in support of the marine surveys envisaged under SALSEA. As this latest inventory update shows there has been major progress since last year with funding for marine surveys in both 2008 and 2009 in the North-East Atlantic and in 2008 in the Northwest Atlantic. These marine surveys been achieved through a public-private partnership in which the Atlantic Salmon Trust and the TOTAL Foundation have been major private sector contributors. There has, therefore, been very significant progress in implementing the SALSEA programme.
3. Table 1 provides details of expenditure on research by topic area for each Party. For the first time since the inventory was established all on-going projects have been costed. In Table 2, on-going projects are listed according 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. The total annual expenditure on the 56 on-going projects included in the inventory amounts to approximately £6.4 million approximately 24% higher than in 2008 due largely to two major new projects involving marine surveys of the distribution of salmon at sea. Last year, the Board asked that information for inclusion in the inventory be requested from France in relation to the sampling programme at St Pierre and Miquelon. We have requested this information but at the time of preparation of the paper, no response had been received. A report on the St Pierre and Miquelon fishery is contained in document CNL(08)19.

4. As requested by the Board at its 2006 meeting, those projects that fall within the SALSEA programme have been allocated to the relevant work package in Table 3. Most significantly, there will be major dedicated research surveys for salmon in both 2008 and 2009. Last year the Board agreed that studies involving acoustic tags and DSTs should be listed under work package 3. There are a number of ongoing genetic studies which will contribute to developing a baseline or genetic atlas of stocks to facilitate genetic stock identification of salmon caught in research surveys at sea.
5. Table 4 provides summary information on both the on-going (Table 4a) and completed projects (Table 4b) and full details of these projects are contained in Annexes 1 and 2 respectively. In total, 56 ongoing projects are included in the inventory, an increase of one since last year, although several of these ongoing projects are in their final stages. 9 projects have been completed since last year. The completed projects are:

Canada:

- Integrated field and laboratory assessment of the effects of endocrine-disrupting substances on Atlantic salmon smolts;
- Use of stable isotopes to assess long-term changes in marine trophic ecology of Atlantic salmon (*Salmo salar*);
- Effective population size, gene flow and population structure of Atlantic salmon in Newfoundland and Labrador.

European Union:

- Early distribution and migration of Atlantic salmon smolts off the West of Ireland;
- Cardiff Bay Fisheries Monitoring Programme.

Norway:

- The importance of early marine feeding on the growth and survival of Atlantic salmon post-smolts in Norwegian fjords;
- Distribution and ecology of post-smolts and salmon at sea;
- Dispersal of salmon lice in Norwegian fjords.

Russia:

- Assessment of by-catch of post-smolts of Atlantic salmon in pelagic fisheries in the Norwegian Sea.

In addition, Norway had reported on the completion of a project to investigate the behavior of 'escaped' farmed salmon that had been tagged prior to release in Scotland and Norway. This project was not previously included in the inventory.

6. In total, 10 new projects have been included in the inventory, as follows:

Canada:

- Pelagic ecosystem survey of the Northwest Atlantic;
- Miramichi River kelt movements and survival;
- Stable isotope ratios and lipid content of tissues from non-maturing 1SW Atlantic salmon at West Greenland relative to continent of origin and age at maturity.

European Union:

- SALSEA-Merge: Advancing understanding of Atlantic salmon at sea: merging genetics and ecology to resolve stock-specific migration and distribution patterns (*Note: Norway and the Faroe Islands are also major contributors to this project which involves a consortium of twenty organizations*);
- Genetic sampling to type British salmon stocks;
- The marine life of Atlantic salmon: evidence from the microchemistry of scales;
- Size and condition of returning grilse (1SW) and MSW salmon;
- Atlantic salmon metapopulation investigation in Normandy rivers;

Norway:

- Population-limiting mechanisms for Atlantic salmon during early estuarine and coastal migration (SALPoP);
- The Hardangerfjord salmon lice project.

Secretary
Edinburgh
10 July 2008

Table 1: Approximate Annual Expenditure on Research in Relation to Salmon Mortality at Sea by Topic Area and Party

	Canada	Denmark (Faroe Islands and Greenland)	European Union	Iceland	Norway	Russia	United States of America	Totals by Topic Area
Long-term monitoring	£564,500 1	-	£976,660 10	£146,000 2	£134,000 1	£80,000 1	£14,000 1	£1,915,160 16
Distribution/ migration in the sea	£892,500 8	£84,800 1	£2,314,200 9	£308,000 4	£298,200 2	-	£143,000 4	£4,040,700 28
Life history/ biological processes	£9,500 1	-	£79,940 4	-	-	-	-	£203,200 5
Development of methods	-	-	-	£4,000 1	-	-	-	£4,000 1
Specific natural and anthropogenic factors	-	-	£103,700 3	-	£226,000 2	-	£16,000 1	£231,940 6
Totals by Party	£1,466,500 10	£84,800 1	£3,474,500 26	£458,000 7	£658,200 5	£80,000 1	£173,000 6	£6,395,000 56

The figures shown are in pounds sterling. The number of projects is shown below the expenditure figure. 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: Inventory of research relating to salmon mortality in the sea – allocation of projects by topic area

Topic Area	Objective/Issue	Comments/examples	Projects	Potential for cooperation among Contracting Parties	Priority for access to 'Fund'
1. Long-term monitoring	a. Time-series of marine survival/growth estimates	Essential on-going tagging/monitoring programmes; require long-term national funding.	C3, E5, E9, E10, E11, E16, E18, E21, E24, E26, I1, I4, N2, R1, U4	Medium	Low
	b. Time series of marine survival in relation to environmental parameters (e.g. SST)	Desk studies on time series.	E12	Medium	Medium
2. Distribution/migration in the sea	a. Distribution of salmon in the sea	Marine surveys of post-smolt distributions in NEAC and NAC areas; identification of fish caught (e.g. tagging, genetics).	C1, E1, U5	High	High
	b. Migratory behaviour of individual fish	Active smolt tracking; automated data collection by DSTs.	C2, C4, C5, C6, C7, E17, E23, I3, I5, I6, N4, U1, U2, U3	High	High
	c. Origin of catches in directed fisheries	Catch sampling in distant water fisheries; genetic analysis and scale analysis, etc; changes over time.	C8, C9, D1, E2, E7, E14, E19, E22, E25, I7, N3	High	Low
	d. Migration and bioenergetic models	Desk studies based on data obtained from other studies.		Medium	Medium
	e. By-catches in pelagic fisheries	Can be conducted as part of marine surveys of post-smolt distributions; sample commercial pelagic catches.		High	High
3. Life history/biological processes	a. Freshwater factors	Age, growth, migration timing, etc.	E4	Low	Low
	b. Pre-fishery recruitment marine factors	Environment, food, predation, growth, parasites and diseases, etc.		High	High
	c. Post-fishery recruitment marine factors	Environment, food, predation, maturation processes, growth, etc.	C10, E6, E8, E15	High	High
4. Development of methods	a. Post-smolt survey methods	Development of trawls with cameras, tag detection, etc.		Medium	Medium
	b. Electronic tag technology	Development of smaller/smarter/cheaper tags.	I2	Medium	High
5. Specific natural and anthropogenic factors	a. Fish farms	Increased sea lice infestations.	E20, N1, N5	Low	Low
	b. Predation	Predation by seals, birds, fish, etc. in estuaries/coastal areas.	E13, U6	Low	Low
	c. Obstructions to fish movements	Barrages, etc.		Low	Low
	d. Pollutants	Acidification; freshwater contaminants.	E3	Low	Low

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: Expenditure on ongoing projects in the inventory of research of relevance to the SALSEA programme

SALSEA Work Packages	Ongoing Projects
<p>Work Package 1: Supporting Technologies Task 1: Genetic tagging to determine stock origin</p> <p>Task 2: Sampling equipment evolution</p> <p>Task 3: Signals from scales</p>	<p>C8, C9, D1, E2, E7, E14, E19, E22, E25, I7, N3</p> <p>-</p> <p>E8, E12</p>
<p>Work Package 2: Early Migration through the Inshore Zone: fresh waters, estuaries and coastal waters Task 1: Investigate the influence of biological characteristics of Atlantic salmon smolts on their marine mortality</p> <p>Task 3: The impacts of physical factors in fresh water on marine mortality of Atlantic salmon</p> <p>Task 3: Preparing to migrate – investigate the influence of freshwater contaminants on the marine survival of Atlantic salmon</p> <p>Task 4: The part played by key predators</p> <p>Task 5: The impact of aquaculture on mortality of salmon</p>	<p>C3, E5, E9, E10, E11, E18, E21, E24, E26, I1, N2, R1, U4</p> <p>E4</p> <p>E3</p> <p>E13, U6</p> <p>E20, N1, N5</p>
<p>Work Package 3: Investigating the distribution and migration of salmon at sea Task 1: Distribution and migration mechanisms – develop theoretical migration models</p> <p>Task 2: A common approach – refine the plans for a large-scale marine survey</p> <p>Task 3: Salmon at sea – carry out a comprehensive survey - marine surveys - acoustic tagging surveys - data storage tags - others</p> <p>Task 4: Distribution and migration – analyse and collate data</p>	<p>-</p> <p>-</p> <p>C1, E1, U5 C2, C4, C5, C6, C7, E17, E23, N4, U1, U2, U3 I3, I5, I6 C10, E15</p> <p>-</p>
<p>Appendix 1: Supporting technologies, further development of which will support the SALSEA programme 1. Novel trawl sampling technologies</p> <p>2. Data storage tags</p> <p>3. Coded wire tagging</p> <p>4. Sonic tags and sonic detector arrays</p>	<p>-</p> <p>I2</p> <p>E16, I4</p> <p>-</p>

Table 4: Summary of ongoing and completed research projects relating to salmon mortality in the sea

Table 4(a) ONGOING PROJECTS (see Annex 1 for details)

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
CANADA							
C1: Pelagic ecosystem survey of the Northwest Atlantic	Sample the upper pelagic ecosystem during the period corresponding to the early post-smolt phase (August). Determine relative abundance of salmon 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.	Distribution/ migration in the sea.	New entry 2008 23 day period during end of July to beginning of September	North West Atlantic <i>Collaborating countries:</i> USA	Gerald Chaput ChaputG@dfo-mpo.gc.ca Dave Reddin reddind@dfo-mpo.gc.ca Tim Sheehan Tim.Sheehan@noaa.gov	£350,000	Surface pelagic trawl, oceanographic and plankton samplers.
C2: Miramichi River kelt movements and survival	Document the spring movements and survival of kelts from the Miramichi River as they return to the sea. Use pressure sensitive tags to record the depths used by kelts.	Distribution/ migration in the sea	New entry 2008 - 2010	Miramichi River estuary and Gulf of St Lawrence	F Whoriskey asfres@nb.aibn.com	£12,500	Acoustic tags and receiver arrays
C3: Marine survival of Canadian Atlantic salmon stocks: long-term monitoring	Long-term monitoring of smolt production and adult return estimates from a number of rivers in Newfoundland region, Maritimes region, Gulf region and Quebec.	Long-term monitoring	April – November, annually	Canadian rivers in Newfoundland region, Maritimes region, Gulf region and Quebec	Contact for information: Gerald Chaput Chaputg@dfo-mpo.gc.ca	£564,500	Smolt and adult traps, fences, trap nets, rotary screw smolt traps.
C4: Atlantic salmon smolt migration and survival within Canadian rivers, estuaries and during the marine life stage	Provide a time-series of stage specific estimates of mortality rates for smolts at various points of their at-sea migration, including for their transitions through fresh water, 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.	Distribution/ migration in the sea	2003-2008 (spring/summer)	Miramichi River and estuary; Restigouche River and Baie des Chaleurs; Cascapeidia River and estuary; St-Jean (Côte-Nord) River and estuary; Western Arm Brook, Strait of Belle Isle, Cabot Strait, Labrador. <i>Collaborating countries:</i> USA	Fred Whoriskey asfres@nb.aibn.com	£300,000	Acoustic tags and receivers, smolt wheels, small boats and chartered fishing vessel.

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
C5: Integrated modelling of juvenile Atlantic salmon movement and physical habitat in fluvial and estuarine environments	Develop and apply an approach capable of relating the behaviour of smolts, during their migration, to physical habitat characteristics in rivers and estuaries. Apply this approach to analysis of smolt migration. Detect potential changes in the migration pattern of smolts in response to the planned presence of sea cages in Baie de Gaspé.	Distribution/ migration in the sea	2005-2008 (spring/ summer	York River and Baie de Gaspé, Quebec <i>Collaborating countries:</i> UK	Julian Dodson julian.dodson@ bio.ulaval.ca	£150,000	Acoustic tags and receivers, smolt wheels, small boats and chartered fishing vessel.
C6: River and extended estuary acoustic tracking of Atlantic salmon (<i>Salmo salar</i>) kelts and bright salmon	Track and document migratory behaviour of Atlantic salmon kelts as they leave the river for the open ocean and bright salmon as they return; identify possible critical habitat sites utilised by kelts and bright salmon during their migration; examine mortality rates of kelts and bright salmon during migration.	Distribution/ migration in the sea	2006 – 2008	LaHave River and estuary, Nova Scotia	Peter G. Amiro AmiroP@ mar.dfo-mpo.gc.ca A Jamie F Gibson Gibson AJF@ mar.dfo-mpo.gc.ca	£30,000	Acoustic tags and receivers.
C7: Estuary acoustic tracking of Atlantic salmon (<i>Salmo salar</i>) smolts and kelts – Conne River, Little River and Bay d’Espoir, Newfoundland	Tag and track migratory behaviour of salmon smolts and kelts leaving the Conne River; determine the movements and migration patterns through the Bay d’Espoir fjord; provide insight into the initial survival and residency of smolts and kelts migrating through the fjord.	Distribution/ migration in the sea	2006-2008	Conne River and estuary, Little River and Bay d’Espoir fjord, Newfoundland	J Brian Dempson dempsonb@ dfo-mpo.gc.ca Keith Clarke clarkekd@dfo-mpo.gc.ca	£15,000	Acoustic tags and receivers.
C8: Spatio-temporal distribution of Atlantic salmon stocks and the impact of the West Greenland fishery	Provide knowledge about the river of origin of the salmon catch in the commercial fishery, particularly at West Greenland; estimate the impacts of fishing on these populations.	Distribution/ migration in the sea	2006-2008	Samples from West Greenland	Louis Bernatchez louis.bernatchez@ bio.ulaval.ca	£15,000	Genetic analysis.
C9: Genetic population structure of Atlantic salmon in Eastern Canada and its implications for conservation	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.	Distribution/ migration in the sea	2004-2008	Rivers in Quebec, Gulf of St Lawrence and Labrador	Louis Bernatchez louis.bernatchez@ bio.ulaval.ca Melanie Dionne melanie.dionne@ giroq.ulaval.ca	£20,000	Genetic analysis.
C10: Stable isotope ratios and lipid content of tissues from non-maturing 1SW Atlantic salmon at West Greenland relative to continent of origin and age at maturity.	Improve understanding of marine ecology of salmon at West Greenland through status 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; has there been a trophic state change between West Greenland and return to home rivers as 2SW salmon.	Life history/ biological process	New entry 2007-2008	West Greenland and from salmon returning to the Miramichi River <i>Collaborating countries:</i> Greenland	Gerald Chaput Chaputg@dfo-mpo.gc.ca Tim Sheehan Tim.Sheehan@noaa.gov	£9,500 (excludes cost of purchase of samples (See Project D1)	Lipid and stable isotope analyses.

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
DENMARK (FAROE ISLANDS AND GREENLAND)							
D1: West Greenland Salmon Fishery Sampling Programme	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 to models. Collect information from internal and external tags. Collect information on diseases and parasites. Collect samples for stable isotope and lipid analyses (new in 2007).	Distribution/ migration in the sea	Annually during the fishing season, (August – October)	West Greenland <i>Collaborating countries:</i> USA, UK, Ireland, Canada	Helle Siegstad helle@natur.gl	£84,800 in 2007	Catch sampling, scale analysis, genetic analysis, disease and parasite screening. Lipid and stable isotope analyses.
EUROPEAN UNION							
E1: SALSEA-Merge: Advancing understanding of Atlantic salmon at sea: Merging genetics and ecology to resolve stock – specific migration and distribution patterns.	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.	Distribution/ migration in the sea	New Entry April 2008 – April 2011	North-East Atlantic with marine surveys off coast of Ireland and UK, around the Faroes and in the Northern Norwegian Sea and Barents Sea <i>Collaborating countries:</i> Denmark, Finland, France, Faroes, Iceland, Ireland, Norway, Spain, UK	Jens Christian Holst jens.christian.holst@imr.no	£1.5 million	Pelagic live capture trawls, pelagic trawls, genetic analysis, oceanographic data analysis
UK- England, Wales and Scotland							
E2: Genetic sampling to type British salmon stocks	Coordinate and support the establishment of baseline information on the genetic character of breeding populations within and among rivers in Britain	Distribution/ migration in the sea	New Entry 1 April 2008 – 31 March 2010	England, Wales and Scotland	Miran Aprahamian miran.aprahamian@environment – agency.gov.uk	£60,000	Genetic Analyses

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
UK – England and Wales							
E3: Diffuse pollution and freshwater fish populations	Investigate the role of diffuse aquatic contaminants in regulating populations of freshwater fish with particular reference to salmonid stocks and fisheries.	Specific natural and anthropogenic factors	April 2005 – March 2010	England and Wales	Andrew Moore a.moore@cefas.co.uk	£13,700	Integrated research programme involving ecotoxicological studies, telemetry and literature review, etc.
E4: The influence of the freshwater environment on salmonid populations	Investigate 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, anaesthetisation tagging) in influencing marine survival.	Life history/ biological processes	April 2005 – March 2010	England and Wales	Andrew Moore a.moore@cefas.co.uk	£14,540	Large-scale microtagging and PIT tagging.
E5: Deriving estimates of marine survival and exploitation for monitored river stocks in England and Wales	Establish ‘monitored’ rivers where estimates of marine survival and exploitation in marine fisheries can be derived and compared with other North Atlantic stocks.	Long-term monitoring	Ongoing annual monitoring programme	River Dee (North Wales), River Tamar (SW England)	Ian Davidson ian.davidson@environment-agency.wales.gov.uk Simon Toms simon.toms@environment-agency.gov.uk Ian Russell i.c.russell@cefas.co.uk	£120,000	Rotary screw traps, microtagging, adult traps and counters.
E6: Factors affecting the distribution and behaviour of salmonid populations	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.	Life history/ biological processes	April 2005 – March 2010	England and Wales	Andrew Moore a.moore@cefas.co.uk	£13,400	Integrated research programme involving physiological studies, analysis of stable isotopes, telemetry, literature review, etc.
E7: Atlantic salmon Arc Project, ASAP	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.	Distribution/ migration in the sea	May 2004 – July 2008	Europe, North Atlantic <i>Collaborating countries:</i> Spain, France, Ireland, Scotland, USA, Iceland	Dylan Bright dylan@wrt.org.uk	£555,000	Genetic analysis.

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
E8: The marine life of Atlantic salmon : evidence from the microchemistry of scales	The objectives include measuring 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.	Life history /biological processes	New Entry 2007 - 2010	England and Wales	Clive Trueman trueman@noc.soton.ac.uk	£22,000	Stable isotope and trace element analysis.
UK – Northern Ireland							
E9: The marine survival of Atlantic salmon from the River Bush, Northern Ireland	Investigate factors influencing the survival at sea of salmon smolts migrating from the River Bush until their return as adults.	Long-term monitoring	1973 – 2011	River Bush, N. Irish/Irish coastal waters and distant-water fisheries <i>Collaborating countries:</i> Ireland (tag recovery programme)	Gersham Kennedy gersham.kennedy@afbini.gov.uk Richard Kennedy Richard.kennedy@afbini.gov.uk	£47,460	Microtagging, traps, run-reconstruction models.
E10: Development of conservation limits, pre-fishery abundance and management of the Foyle salmon fishery	To build upon the existing Foyle salmon management system, to 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.	Long-term monitoring	2005-2008	Foyle area, Ireland <i>Collaborating countries:</i> Ireland, France, Scotland	Patrick Boylan p.boylan@loughs-agency.org	£41,700	Modelling study.
UK - Scotland							
E11: Post-smolt mortality of Atlantic salmon	Assess post-smolt mortality rates of Atlantic salmon from three Scottish rivers, and the contribution of these salmon to fisheries that exploit them.	Long-term monitoring	Ongoing	North Esk, Western catchment of River Dee, River Conon salmon fishery district	Julian Maclean (N. Esk) j.c.maclea@marlab.ac.uk Alan Youngson (River Dee) a.youngson@marlab.ac.uk John Armstrong (River Conon) j.armstrong@marlab.ac.uk	Approximately £50,000	Traps, counters, rotary screw traps, electro-fishing, PIT tags and detectors.
E12: Analysis of post-smolt life history by scale reading	Investigate the relationship between growth and mortality, particularly during the marine phase, by analysis of scale growth patterns.	Long-term monitoring	Continuing project under longer-term remit	Samples from around Scotland but North Esk and Gironck Burn in particular <i>Collaborating countries:</i> USA and Canada	Julian Maclean j.c.maclea@marlab.ac.uk	Approximately £10,000	Scale analysis.

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
E13: Protecting salmonid fisheries from seal damage	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. Identify factors influencing salmon migration routes in estuaries and relate to presence of predators. Examine occurrence of seal-damaged salmon on a wide geographic scale.	Specific natural and anthropogenic factors	April 2003 - March 2008	Principally North-East Scotland (Cromarty Firth). Possible work in other estuaries and extension into West Coast	John Armstrong j.armstrong@marlab.ac.uk	£80,000 in 2007/08	DNA analysis, acoustic tags and receivers, inflatable craft.
E14: Fisheries-induced evolution	Determine the incidence and extent of heritable genetic changes in salmon stocks due to fishery programmes.	Distribution/ migration in the sea	2007-2010	Scotland and across European species' distribution, including marine migration routes. <i>Collaborating countries:</i> Austria, Norway, France, Denmark, Belgium, UK, Netherlands, Finland, Germany	Ulf Dieckman dieckman@iiasa.ac.at Alan Youngson A.Youngson@marlab.ac.uk	£52,000 (FRS cost)	Case studies, genetic analyses and modelling.
E15: Size and condition of returning grilse (1SW) and MSW salmon	Investigate decadal trends in the size and condition of adult salmon returning to Scotland.	Life history/ biological processes	New entry 2007 -	Six locations in Scotland, in particular North Esk.	Philip Bacon P.J.Bacon@MarLab.ac.uk	£30,000	Collection of biometric data.
Ireland							
E16: National coded wire tagging and tag recovery programme	Provide information on marine survival and exploitation rates by commercial fisheries; estimate contribution of individual river stocks to catches; examine performance of selected experimental groups; and evaluate potential for salmon ranching.	Long-term monitoring	Ongoing programme initiated in 1980	Tag recovery from around North Atlantic <i>Collaborating countries:</i> Norway, UK, Faroes, France, Spain, Germany, Denmark	Niall O'Maoileidigh niall.omaileidigh@marine.ie	£300,000	Micro-tagging and tag recovery programmes.
E17: Migration of salmon in estuarine and coastal waters	Investigate the timing, route of migration and aspects of the biology of migrating ranched salmon smolts in comparison to the native wild smolt migration.	Distribution/ migration in the sea	2005-2008	Burrishoole catchment, Newport and Clew Bay, Co. Mayo <i>Collaborating countries:</i> UK	Russell Poole, russell.poole@marine.ie Deirdre Cotter deirdre.cotter@marine.ie Niall O'Maoileidigh niall.omaileidigh@marine.ie	£24,000	Acoustic tags, receiver arrays, echo sounders.
E18: Marine survival of wild Atlantic salmon from the Burrishoole River, Ireland	Investigate factors influencing the survival at sea of salmon smolts migrating from the Burrishoole River until their return as adult salmon.	Long-term monitoring	1960 -	Burrishoole River	Russell Poole russell.poole@marine.ie	£72,000	Upstream and downstream traps.

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
E19: National Development Plan - National Genetic Stock Identification Project	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.	Distribution/migration in the sea	2006-2007 Dissemination of results only in 2008	All Irish rivers <i>Collaborating countries:</i> UK, Spain	Tom Cross t.cross@ucc.ie Paddy Gargan paddy.gargan@cfb.ie Philip McGinnity phil.mcginny@marine.ie	0 (in 2008)	Genetic analysis.
E20: Interactions between aquaculture and wild salmonid fish	Assess efficacy of prophylactic treatments for salmon smolts migrating through aquaculture bays.	Specific natural and anthropogenic factors	2003-2008	Burrishoole, Shannon, Lee and Screebe, and drift net fishery around Irish coast	D Jackson dave.jackson@marine.ie	£10,000	Traps, microtagging, commercial fishery.
France							
E21: The sea survival of Atlantic salmon from the River Scorff, Brittany	Estimation and long-term monitoring of survival at sea in the southern part of the European distribution range of the species.	Long-term monitoring	1994 on	River Scorff (Southern Brittany)	Etienne Prévost eprevost@st-pee.inra.fr	£52,000	Adult and smolt trapping facilities.
E22: Atlantic salmon metapopulation investigation in Normandy rivers	Estimate exchanges between rivers flowing into the Mont Saint-Michel Bay and the impact on management of salmon populations.	Distribution/migration in the sea	New entry 2007-2010	Rivers flowing into Mont Saint-Michel Bay, Normandy	Jean-Luc Bagliniere Jean-Luc.Bagliniere@rennes.inra.fr	£40,000	Standard sampling equipment and genetics laboratory equipment traps.
Denmark							
E23: Mortality of Atlantic salmon smolts during estuary migration	Estimate mortality of salmon smolts during migration through estuaries and compare the return ratio of wild, stocked ½- and one-yearlings.	Distribution/migration in the sea	April 2000 to June 2008 Analysis and publication of results in 2008	River Skjern Å and River Stor Å (North Sea) and River Guden Å (Kattegat) and their estuaries	Anders Koed ak@difres.dk Kim Aarestrup kaa@difres.dk	£30,000 in 2008	Rotary screw traps, radio and acoustic telemetry equipment.

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
Finland							
E24: Long-term variation in population dynamics, life history characteristics, sea growth and origin (wild/reared) of salmon in the rivers Teno (Tana) and Näätämöjoki (Neidenelva)	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 Näätämöjoki. Relate the population dynamics of the juvenile salmon and returning adult salmon in preceding and subsequent generations	Long-term monitoring	Long-term ongoing	Northern Finland and Norway <i>Collaborating countries:</i> Norway	Jaakko Erkinaro jaakko.erkinaro@rktl.fi	£275,000	Collection of catch statistics and sampling. Analysis of scale samples (2,000-8,000 annually). Electro-fishing.
E25: Towards sustainable fishing and biodiversity preservation of north-west Russian salmonid stocks by using molecular genetic techniques for stock and parasite monitoring	Collect and analyse genetic and ecological data; establish a sound biological basis for monitoring and management; understand susceptibility and resistance to parasites such as <i>G. salaris</i> .	Distribution/migration in the sea	1999-2010	NW Russia <i>Collaborating countries:</i> Russia	Craig Primmer craig.primmer@utu.fi	£53,200	Genetic techniques.
Sweden							
E26: Long-term variation in population dynamics, life-history and exploitation of salmon stocks in monitored rivers	Estimate long-term variation of survival in different life-stages, life-history characteristics and growth of wild salmon in the River Åtran and its major tributary. Estimate sea survival, growth and exploitation for wild fish in the River Åtran and wild and reared fish in the rivers Lagan and Nissan.	Long-term monitoring	Ongoing	Rivers Åtran, Lagan and Nissan	Lars Karlsson lars.karlsson@fisheriverket.se	£8,500	Adult and smolt traps. Carlin tags.
ICELAND							
II: Return rate of salmon in three index rivers in Iceland in relation to population and environmental factors	Monitor status of, and trends in, salmon stocks in three index rivers.	Long-term monitoring	Ongoing for the last 10 years and will continue	Iceland and surrounding ocean <i>Collaborating countries:</i> Through ICES	Thorolfur Antonsson thorolfur.antonsson@veidimal.is	£96,000	Traps, tagging, scale sampling, electro-fishing.

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
I2: Tagging mortality and the time of recovery related to internal tagging of hatchery-reared salmon smolts with DST micro-tags (Star-Oddi)	Investigate the mortality and time of recovery associated with different handling and tagging techniques with dummy DSTs.	Development of methods	2004-2008 (Report preparation only in 2007, 2008)	Islandlax hatchery	Ingi Runar Jonsson ingi.runar.jonsson@veidimal.is Sigurdur Gudjonsson sigurdur.gudjonsson@veidimal.is	£4,000 in 2008	DSTs (Star-Oddi).
I3: DST tagging of reared salmon smolts	Record the temperature and depth of water experienced by salmon from the west of Iceland during the first year at sea.	Distribution/migration in the sea	2005-2008	South-West Iceland	Sigurdur Gudjonsson sigurdur.gudjonsson@veidimal.is	£170,000	DSTs (Star-Oddi), oceanographic information.
I4: Survival of salmon during the first and second year at sea	Evaluate the survival of hatchery-reared smolts during the first and second year at sea.	Long-term monitoring	2005-2009	South-West Iceland	Sigurdur Gudjonsson sigurdur.gudjonsson@veidimal.is	£50,000	Release site, traps, microtagging, oceanographic information.
I5: Distribution and behavioural ecology of salmon at sea	Investigate the temporal and spatial distribution of DST-tagged salmon at sea. Investigate diurnal depth distribution, growth in relation to environmental parameters and by-catch in pelagic fisheries.	Distribution/migration in the sea	2005-2011 (pre-phase in 2003 and 2004)	Tagging site: River Tungufljot and River Hafnara Salmon Ranching Station (smolts) and River Botnsa and River Skoga (recovered kelts). Study area: North Atlantic <i>Collaborating countries:</i> Faroe Islands, Norway	Johannes Sturlaugsson johannes@laxfiskar.is	£50,000 (varying from £35,000 - £150,000 per annum)	DSTs (Star-Oddi).
I6: Orientation and navigation of salmon at sea	Investigate the orientation and navigation of salmon at sea during their spawning migration using compass DSTs.	Distribution/migration in the sea	2006-2009	Tagging site: River Hafnara Salmon Ranching Station Study site: Icelandic waters <i>Collaborating countries:</i> Sweden	Johannes Sturlaugsson johannes@laxfiskar.is	£53,000	DSTs (Star-Oddi).
I7: Mapping genetic diversity of Icelandic Atlantic salmon	Obtain baseline information on the genetic diversity of Icelandic Atlantic salmon.	Distribution/migration in the sea	2003-2008	Iceland	Sigurdur Gudjonsson sigurdur.gudjonsson@veidimal.is	£35,000	Genetic analysis.
NORWAY							
N1: Significance of salmon lice for growth and survival of salmon in the sea	Estimate the effects of salmon lice on post-smolt growth and survival, dependent on release site and time and year of release.	Specific natural and anthropogenic factors	2006-2008	Western Norway, River Dale, Matre Aquaculture Station	Ove Skilbrei ove.skilbrei@imr.no	£75,000	Smolt trap, tags, SLICE.

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
N2: Marine survival, growth and exploitation of salmon from the Rivers Figgjo, Imsa, Drammenselv and Halselv	Estimate marine survival, marine growth and changes in marine exploitation of salmon from four rivers in Norway. Develop predictive models.	Long-term monitoring	Long-term ongoing monitoring project	Rivers Figgjo, Imsa, Drammenselv and Halselv with tag recovery programme in fisheries along Norwegian coast and elsewhere	Lars Petter Hansen l.p.hansen@nina.no Nina Jonsson Nina.jonsson@nina.no Arne Johan Jensen Arne.jensen@nina.no	£134,000	Fish traps, electro-fishing.
N3: Individual assignment of salmon caught in the ocean to region of origin	Investigate genetic variation in Norwegian 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.	Distribution/ migration in the sea	January 2006 – December 2008	Norway <i>Collaborating countries:</i> Finland	Oystein Skaala oystein.skaala@imr.no Vidar Wennevik vidar.wennevik@imr.no	£107,000	Electro-fishing equipment, genetic analysis.
N4: Population-limiting mechanisms for Atlantic salmon during early estuarine and coastal migration (SALPoP)	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.	Distribution/ migration in the sea	New entry 2008 - 2012	Eresfjord in Møre and Romsdal, mid Norway <i>Collaborating countries:</i> Sweden, UK, Canada	Bengt Finstad bengt.finstad@nina.no	£191,200 in 2008	Acoustic telemetry, external tags, fish health screening.
N5: The Hardangerfjord salmon lice project	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.	Specific natural and anthropogenic factors	New entry 2007 - 2010	Hardangerfjord on the Norwegian west coast <i>Collaborating countries:</i> Canada, UK	Bengt Finstad bengt.finstad@nina.no	£151,000 in 2008	Lice monitoring, models
RUSSIAN FEDERATION							
R1: Monitoring of the stock status, abundance assessment and provision of advice on the allowable level of harvest of Atlantic salmon	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.	Long-term monitoring	Annual monitoring programmes (May to October)	Atlantic salmon rivers of the Kola Peninsula, Archangel Region and Karelian Republic	Alexander Zubchenko zav@pinro.ru, salmon@pinro.ru Igor Studenov igor@sevpinro.ru	£80,000	Barrier fences, nets, electro-fishing, smolt traps, external tagging.
USA							
U1: Penobscot hatchery versus wild smolt telemetry	Evaluate migration timing and pathways in the Penobscot Estuary and Bay and estimate survival of migrating smolts and post-smolts.	Distribution/ migration in the sea	2005-2009	Penobscot Estuary Penobscot Bay <i>Collaboration Countries:</i> Canada	James Hawkes James.Hawkes@noaa.gov	£43,000 (public funding)	Ultrasonic tags and receivers. Small research boats and leased commercial vessels.

Project No. and Title	Summary of objectives	Topic Area	Date of research	Area of research/ Collaborating countries	Coordinating Scientist(s)	Annual expenditure (Pounds Sterling – approx.)	Main research methods
U2: Ultrasonic telemetry of smolts and post-smolts in the Narraguagus River and Narraguagus Bay	Evaluate migration timing and pathways in the lower Narraguagus River and Narraguagus Bay and estimate survival of migrating smolts and post-smolts.	Distribution/ migration in the sea	2002-2008 (Fieldwork April-June 2002-2005, data analysis and publication 2005-2008)	Narraguagus River and Narraguagus Bay (2002-2005) Gulf of Maine (2002-2004) <i>Collaborating countries:</i> Canada	James Hawkes James.Hawkes@noaa.gov	£49,000 (public funding)	Ultrasonic tags and receivers. Small research boats and leased commercial vessels.
U3: Comprehensive evaluation of marine survival of hatchery-stocked smolts: migration behaviour and success of Dennys River smolts	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.	Distribution/ migration in the sea	April – June, 2001-2008 (Data analysis and publication 2005-2008)	Dennys River, Cobscook Bay, Gulf of Maine <i>Collaborating countries:</i> Canada	James Hawkes James.Hawkes@noaa.gov	£28,000 (public funding)	Ultrasonic tags and receivers. Electro-fishing gear. Small research boats and leased commercial vessels.
U4: Comprehensive evaluation of marine survival of hatchery-stocked smolts: Dennys River smolt stocking assessment	Evaluate smolt-to-adult survival rates based on temporal and spatial patterns of release; determine optimal stocking levels to achieve stock rebuilding objectives.	Long-term monitoring	May – October, 2001-2008	Dennys River, Cobscook Bay, Gulf of Maine <i>Collaborating countries:</i> Recovery of marked fish through NASCO West Greenland sampling programme	Greg Mackey greg.mackey@maine.gov	£14,000 (public funding)	Elastomer marks, rotary smolt traps, weir-based smolt and adult traps.
U5: Evaluation of estuary and nearshore marine distributions of Atlantic salmon post-smolts in Penobscot Bay and the Gulf of Maine	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.	Distribution/ migration in the sea	May – June, to 2008	Penobscot Bay, Gulf of Maine	Tim Sheehan Tim.Sheehan@noaa.gov	£23,000 (public funding)	Post-smolt trawl, oceanographic instruments, commercial trawlers.
U6: Cormorant harassment in the Narraguagus River/Narraguagus Bay	Reduce predation on migrating salmon smolts by excluding double-crested cormorants from the Lower Narraguagus River and Bay, and assess the efficiency of non-lethal predator exclusion as a means of reducing predation on migrating salmon smolts.	Specific natural and anthropogenic factors	2005-2008 (Data analysis and publication only in 2005-2008)	Lower Narraguagus River, Estuary and Narraguagus Bay, Maine	James Hawkes James.Hawkes@noaa.gov	£16,000 (public funding)	Shotguns with firecracker and screamer shells, laser, small boat, cameras.

Note: Germany and the Netherlands had previously indicated that they do not carry out research on the marine phase of salmon. No information was provided by other EU Member States (Portugal and Spain) with salmon interests.

Table 4(b) COMPLETED PROJECTS (see Annex 2 for details)

Party	Project Title and Details of Coordinating Scientist(s)	Summary of Objectives	Year removed from inventory
Canada	Marine migration and survival of post-smolt Atlantic salmon from Bay of Fundy rivers <i>Coordinating scientist:</i> Gilles L Lacroix LacroixG@dfo-mpo.gc.ca	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.	2003
Canada	Distribution, health and condition of Atlantic salmon from Bay of Fundy rivers while at sea <i>Coordinating scientist:</i> Gilles L Lacroix LacroixG@dfo-mpo.gc.ca	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.	2004
Canada	Marine migration and survival of post-smolt Atlantic salmon from the Saint-Jean River (Gaspé) <i>Coordinating scientist:</i> Julian Dodson julian.dodson@bio.ulaval.ca Francois Caron francois.caron2@mrnf.gouv.qc.ca	Provide knowledge of the marine habitat (migration routes and feeding grounds) used by salmon post-smolts from Bay of Gaspé 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.	Not previously included (completed in 2005)
Canada	Marine migration and survival of kelt Atlantic salmon from the Saint-Jean River (Gaspé) <i>Coordinating scientist:</i> Francois Caron francois.caron2@mrnf.gouv.qc.ca	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.	Not previously included (completed in 2006)
Canada	Tracking experimentally 'escaped' farmed salmon <i>Coordinating scientist:</i> Fred Whoriskey asfres@nb.aibn.com	Determine the course tracks and fates of sonically tagged farmed salmon released in winter and spring.	2006
Canada	Atlantic salmon distribution and abundance at sea <i>Coordinating scientist:</i> David Reddin reddind@dfo-mpo.gc.ca	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.	2006
Canada	Integrated field and laboratory assessment of the effects of endocrine – disrupting substances on Atlantic salmon smolts. <i>Coordinating scientist:</i> Wayne Fairchild Fairchildw@mar.dfo.mpo.gc.ca	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.	2008

Party	Project Title and Details of Coordinating Scientist(s)	Summary of Objectives	Year removed from inventory
Canada	Use of stable isotopes to assess long-term changes in marine trophic ecology of Atlantic salmon (<i>Salmo salar</i>) <i>Coordinating scientist:</i> J Brian Dempson dempsonb@dfo-mpo.gc.ca	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 isotopic signatures within and among stocks to various differences in feeding ecology in time and space; examine evidence of environmental influences on trends in isotopic signatures; examine linkings of stable isotope signatures with trends in abundance.	2008
Canada	Effective population size, gene flow and population structure of Atlantic salmon in Newfoundland and Labrador <i>Coordinating scientist:</i> Daniel Ruzzante daniel.ruzzante@dal.ca	Document population structure and connectivity (gene flow) among Newfoundland and Southern Labrador rivers. Test for temporal stability of the structure over the past 50 years.	2008
European Union	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 <i>Coordinating scientist:</i> Walter Crozier walter.crozier@dardni.gov.uk	Improve our ability to set salmon conservation limits (CLs), addressing transportability and dynamic change issues, also taking into account underlying stock structure, and; Examine methods of estimating pre-fishery abundance (PFA) for north-east Atlantic (NEAC) salmon stocks and to determine whether and how PFA estimates can be used to give catch advice.	2003
European Union – Denmark	Estuarine migration of smolts in the Rivers Skjern Å (North Sea) and River Guden Å <i>Coordinating scientist:</i> Gorm Rasmussen gr@dfu.min.dk	To 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.	Not previously included
European Union – France	Evolution of biological characteristics in Atlantic salmon from all the Armorican massif rivers (Brittany and Low-Normandy, France) <i>Coordinating scientist:</i> Jean-Luc Baglinière Jean-Luc Bagliniere:rennes.inra.fr	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.	2005
European Union – Ireland	Assessment of the levels of the parasite <i>Lepeophtheirus salmonis</i> on Atlantic salmon post-smolts in salmon aquaculture bays along Ireland's western seaboard <i>Coordinating scientist:</i> Paddy Gargan paddy.gargan@cfb.ie	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.	2003
European Union – Ireland	Oceanic factors influencing marine survival of Irish salmon stocks <i>Coordinating scientists:</i> Niall O'Maoileidigh niall.omaileidigh@marine.ie Kevin Friedland friedlandk@forwild.umass.edu	Provide information on marine survival at various stages of ocean migration.	2006

Party	Project Title and Details of Coordinating Scientist(s)	Summary of Objectives	Year removed from inventory
European Union – Ireland	Sustainable management of interactions between aquaculture and wild salmonid fish (EU SUMBAWS project – Irish component of project only) <i>Coordinating scientist:</i> Paddy Gargan paddy.gargan@cfb.ie Niall O'Maoileidigh niall.omaileidigh@marine.ie	To assess efficacy of prophylactic treatments for salmon smolts migrating through aquaculture bays.	2007
European Union –Ireland	Early distribution and migration of Atlantic salmon smolts off the West of Ireland <i>Coordinating scientist:</i> Niall O'Maoileidigh niall.omaileidigh@marine.ie	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 background and genetic analysis; relate run-timing, timing of migration, swimming speed, growth, etc to oceanographic parameters.	2008
European Union – United Kingdom (England and Wales)	Salmonid migration and climate change <i>Coordinating scientist:</i> Andrew Moore a.moore@cefas.co.uk	Describe and model the environmental factors affecting the migration of salmonids and investigate the effects of climate change on salmonid migration and survival both in fresh water and the sea.	2005
European Union - United Kingdom (England and Wales)	Impacts of agricultural contaminants on wild salmonids <i>Coordinating scientist:</i> Andrew Moore a.moore@cefas.co.uk	Identify and describe the effects of environmental levels of agricultural pesticides on salmonid embryo survival, smolt emigration and marine survival and model their potential impacts at the population level. In addition, the role of pheromones in sea trout biology was investigated in order to predict the effects of water quality on sea trout reproduction.	2005
European Union - United Kingdom (England and Wales)	Impact of intensive in-river aquaculture on wild salmonids <i>Coordinating scientist:</i> Andrew Moore a.moore@cefas.co.uk	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.	2007
European Union - United Kingdom (England and Wales)	Modelling the bioenergetics of Atlantic salmon migration <i>Coordinating scientist:</i> Douglas Booker dobo@ceh.ac.uk	Model the energetic requirements of salmon during their marine migrations and predict the effects of environmental and oceanographic changes on smolt growth and survival.	2007
European Union - United Kingdom (England and Wales)	Cardiff Bay Fisheries Monitoring Programme <i>Coordinating scientist:</i> Peter Gough peter.gough@environment-agency.wales.gov.uk	Assess the impact of Cardiff Bay barrage on salmon stocks of the rivers Taff and Ely.	2008

Party	Project Title and Details of Coordinating Scientist(s)	Summary of Objectives	Year removed from inventory
European Union - United Kingdom (Scotland)	Testing and development of Institute of Marine Research (IMR), Bergen, Norway, salmon trawl gear <i>Coordinating scientist:</i> Julian MacLean j.c.maclea@marlab.ac.uk Jens Christian Holst jens.christian.holst@imr.no Dick Shelton freda.shelton@btopenworld.com	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.	2006
Iceland	Migration of smolts through the estuary of the River Ellidaar, Iceland <i>Coordinating scientist:</i> Sigurdur Gudjonsson sigurdur.gudjonsson@veidimal.is	Monitor the migratory behaviour of smolts.	2004
Iceland	Survival at sea of 1- and 2-sea-winter salmon in relation to oceanic conditions. <i>Coordinating scientist:</i> Sigurdur Gudjonsson sigurdur.gudjonsson@veidimal.is	Study changes in the ratio of 1SW:2SW salmon and in the annual number of salmon caught in rivers in south-west Iceland in relation to oceanic climate.	2006
Iceland	Variation in growth and return rates of Atlantic salmon from three Icelandic rivers <i>Coordinating scientist:</i> Thorkell Heidarsson Thorkell@veidimal.is Thorolfur Antonsson thorolfur.antonsson@veidimal.is	Increase knowledge of growth and environmental factors influencing return rates and life-history of different salmon stocks in Iceland.	2006
Iceland	Growth of Atlantic salmon in the River Hofsa, north-east Iceland, in relation to ocean and in-river conditions. <i>Coordinating scientist:</i> Sigurdur Gudjonsson sigurdur.gudjonsson@veidimal.is Sigurdur Mar Einarsson sigurdur.mar@veidimal.is	Investigate the use of salmon growth, back-calculated from scale samples, in relation to ocean conditions and the size and age composition of the salmon run.	2007
Norway	Identification of salmon by geochemical signatures; further development and testing of methods <i>Coordinating scientist:</i> Peder Fiske peder.fiske@nina.no	The main objectives of this project were to: <ul style="list-style-type: none"> • 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. 	2003
Norway	Development of models to predict marine survival and return of salmon to Norway <i>Coordinating scientist:</i> Lars Petter Hansen l.p.hansen@nina.no	Identify and examine feasibility of applying time series of marine environmental data, ecoplankton productivity, productivity of pelagic fish and salmon life-history information for model development. Develop appropriate models.	2006

Party	Project Title and Details of Coordinating Scientist(s)	Summary of Objectives	Year removed from inventory
Norway	By-catch in pelagic fisheries as a population-regulating factor in wild salmon stocks <i>Coordinating scientist:</i> Jens Christian Holst jens.christian.holst@imr.no	Investigate the extent of by-catch and develop management advice to reduce by-catch while maintaining catch rates in the mackerel fishery.	2006
Norway	Sea lice as a population-regulating factor in Norwegian salmon: status, effects of measures taken and future management <i>Coordinating scientist:</i> Jens Christian Holst jens.christian.holst@imr.no	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.	2006
Norway	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) <i>Coordinating scientist:</i> Marianne Holm marianne.holm@imr.no	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.	2007
Norway	Temporal variation in abundance of the northern-most populations of Atlantic salmon with emphasis on the River Tana <i>Coordinating scientist</i> Martin Svenning martin.svenning@nina.no	Examine the influence of ocean climate, predation, marine fisheries and smolt production on the abundance of salmon in the River Tana	2007
Norway	The importance of early marine feeding on the growth and survival of Atlantic salmon post-smolts in Norwegian fjords. <i>Coordinating scientist:</i> Bengt Finstad bengt.finstad@nina.no	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.	2008
Norway	Distribution and ecology of post-smolts and salmon at sea. <i>Coordinating scientist:</i> Marianne Holm marianne.holm@imr.no	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.	2008
Norway	Dispersal of salmon lice in Norwegian fjords <i>Coordinating scientist:</i> Karen Boxaspen karinb@imr.no	Estimate and describe to what extent free-living salmon lice larvae disperse from wild and farmed sources within and between areas.	2008
Norway	Experimental tagging programme for investigating the behaviour of escaped farmed salmon: pilot study <i>Coordinating scientist:</i> Lars Petter Hansen l.p.hansen@nina.no	Examine the migration of escaped large farmed salmon and test if they are transported with the currents and appear in Norwegian waters.	Not previously included in the inventory but reported in 2008
Russian Federation	Assessment of by-catch of post-smolts of Atlantic salmon in pelagic fisheries in the Norwegian Sea. <i>Coordinating scientist:</i> Boris Prischepa pboris@pinro.ru Alexander Zubchenko zav@pinro.ru	Assess occurrence of post-smolts in catches by Russian vessels engaged in the pelagic fisheries for mackerel, blue whiting and herring.	2008

Party	Project Title and Details of Coordinating Scientist(s)	Summary of Objectives	Year removed from inventory
United States	Forecasts of Atlantic salmon transoceanic migration: climate change scenarios and anadromy in the North Atlantic <i>Coordinating scientist:</i> Kevin Friedland friedlandk@forwild.umass.edu	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.	2005
United States	Stable isotope composition of Atlantic salmon scales <i>Coordinating scientist:</i> Kevin Friedland friedlandk@forwild.umass.edu	Develop a retrospective time series of stable isotope ratios to evaluate feeding patterns over time.	2005