NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

ORGANISATION POUR LA CONSERVATION DU SAUMON DE L'ATLANTIQUE NORD



Agenda item 6.4(c) For information

Council

CNL(02)21

Inventory of Research Relating to Salmon Mortality in the Sea

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Inventory of Research Relating to Salmon Mortality in the Sea

- At its Eighteenth Annual Meeting the Council asked that an inventory of all ongoing 1. and scheduled marine salmon research in the period 2002-2004 be compiled and reviewed by the International Cooperative Salmon Research Board (hereinafter referred to as "the Board") so as to identify areas of potential cooperative research and priorities for research for the next three years. At its inaugural meeting, the Board agreed that the development of an inventory of current and scheduled funded research is an essential precursor to defining areas of research requiring new cooperative initiatives or additional funding. The Board reviewed an initial inventory based on information provided by the Parties, and agreed that an estimate of the full economic costs of each study should be sought from the Parties. The Board agreed that initially the inventory should only include projects that were ongoing or which had received confirmation of funding, although in future the Board intends to extend the inventory to include project proposals to funding agencies in addition to projects which have already been funded. The Secretariat was asked to update the inventory through correspondence with the Parties and the revised inventory, as agreed by the Board, is attached as Annex 1.
- 2. The Board agreed a structure for the inventory, with the following five topic areas:
 - long-term monitoring;
 - distribution and migration in the sea;
 - life-history and biological processes;
 - development of methods;
 - specific natural and anthropogenic factors.

A description of each of these topic areas is given in the report of the Board's inaugural meeting, CNL(02)20. In Table 1, the projects have been allocated to these five topic areas on the basis of the main focus of the research, although some projects may generate results of relevance to a number of issues. For example, project I3 involves the use of data storage tags applied to salmon to study spatial and temporal distribution in the North Atlantic. It has, therefore, been allocated to topic area 2b but is also expected to provide information in relation to by-catch of salmon in pelagic fisheries, i.e. topic area 2e. This strong interactive effect between topic areas had previously been noted by the Working Group on International Cooperative Research. Table 2 provides summary information on the projects contained in the inventory.

3. The development of these topic areas should assist the Board in identifying gaps in the existing research programmes, the potential for cooperation among Contracting Parties, and priorities for access to the Fund. As indicated in document CNL(02)20, the priorities of high, medium and low assigned to the topic areas are those currently considered appropriate in relation to potential for cooperation among Contracting Parties and for access to the Fund. They will be kept under review by the Board. Both cooperation and access to the Fund were thought to be highly desirable for practical studies of the distribution and migration of salmon in the sea (project areas 2a, 2b and 2e) and studies of biological processes relating to the marine phase of the life-cycle (project areas 3b and 3c). The Board agreed to focus its initial cooperative research and funding on studies on the distribution and migration of salmon at sea as its highest priority.

3. The Council is asked to note this inventory, which will be used to guide the Board in identifying areas for improved cooperation and coordination of existing research and research gaps which might be addressed in future as funds permit.

Secretary Edinburgh 12 April, 2002

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.	C5, E6, E7, E8, E12, E14, I1, N3, R1,U4	Medium	Low
	b. Time series of marine survival in relation to environmental parameters (e.g. SST)	Desk studies on time series.	El, E9, E11, I2, I5, N2	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).	C2, C3, N4, U5	High	High
	b. Migratory behaviour of individual fish	Active smolt tracking; automated data collection by DSTs.	C1, E4, I3, I4, 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.	D1	High	Low
	d. Migration and bioenergetic models	Desk studies based on data obtained from other studies.	E2, U6	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.		Low	Low
	b. Pre-fishery-recruitment marine factors	Environment, food, predation, growth, parasites and diseases, etc.	N1, U7	High	High
	c. Post-fishery-recruitment marine factors	Environment, food, predation, maturation processes, growth, etc.		High	High
4. Development of methods	a. Post-smolt survey methods	Development of trawls with cameras, tag detection, etc.		Medium	Medium
1	b. Electronic tag technology	Development of smaller/smarter/cheaper tags.		Medium	High
5. Specific natural and	a. Fish farms	Increased sea lice infestations.	E13	Low	Low
anthropogenic factors	b. Predation	Predation by seals, birds, fish, etc. in estuaries/coastal areas.	E10	Low	Low
122 - 1494/043	c. Obstructions to fish movements	Barrages, etc.	E3	Low	Low
	d. Pollutants	Acidification; freshwater contaminants.	C4, E5	Low	Low

Table 1: Inventory of research relating to salmon mortality in the sea - allocation of projects by topic area

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.

Project no.	Title	Summary of objectives	Topic Area	Dates of research	Area of research	Main research methods	Collabo- rating countries
STADATA	CANADA		The state of the state			ALCONTRACTOR OF A	State of the state
C1	Marine migration and survival of post-smolt Atlantic salmon from Bay of Fundy rivers	Provide knowledge about marine habitat of post- smolts. Determine location, timing and extent of mortality at sea and investigate causes and mechanisms of marine mortality.	Distribution/ migration in the sea	April to December 2002- 2004 (project started in 2001)	Bay of Fundy and Gulf of Maine	Acoustic tags and receivers. Smolt traps in rivers (various designs)	USA
C2 Distribution, health and condition of Atlantic salmon from Bay of Fundy rivers while at sea		Trawls with live capture facilities.	USA, Norway				
C3	C3 Atlantic salmon distribution and abundance at sea Hult at sea Determine salmon distribution at sea; collect biological and other data; investigate the relationship between salmon and prey; investigate the relationship between oceanographic parameters and salmon abundance; tag and release salmon.		Distribution/ migration in the sea	Autumn 2001, 2003 and 2005	Labrador Sea and Northern Grand Banks	Drift gill nets. Surface trawls.	None
C4	Integrated field and laboratory assessment of the effects of endocrine disrupting substances on Atlantic salmon smolts	Laboratory and field tests of the effects of endocrine active substances in municipal and industrial effluents; field tests of caged smolts near sites with potential for significant agriculture run-off; ocean field tests of link between exposure to endocrine-disrupting substances and lower adult returns.	Specific natural and anthropogenic factors	2002-2005	Atlantic Canada and Co. Mayo, Ireland	Tarps nets and holding cages in rivers.	Ireland
C5	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, Maritimes region, Gulf region and Quebec.	Long-term monitoring	April – November, annually	Canadian rivers in Newfoundland, Maritimes region, Gulf region and Quebec	Smolt and adult fences and traps, trap nets, rotary screw smolt traps.	None
	DENMARK (FAROE ISLANDS AND GREENLAND)						
DI	Origin of Atlantic salmon captured in a mixed stock fishery at West Greenland	Estimate size and river/sea age composition and relative composition of European and North American origin salmon in the catch at West Greenland.	Distribution/ migration in the sea	Annually during the fishing season, usually August September	West Greenland	Catch sampling, scale analysis, genetic analysis.	USA, UK, Ireland, Canada

Table 2: Summary of research relating to salmon mortality in the sea

Project no.	Title	Summary of objectives	Topic Area	Dates of research	Area of research	Main research methods	Collabo- rating countries
The second	EUROPEAN UNION			A CARLES AND A CARLES			
	EU Member States (UK, Finland, Ireland, France and Sweden)						
E1	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	To improve ability to set conservation limits and to examine methods of estimating pre-fishery abundance (PFA) and to determine how these PFA estimates can be used to provide catch advice.	Long-term monitoring	2000-2002	Desk study	Work is progressed via formal meetings, topic-specific workshops and co- operative studies; no field studies involved.	Norway, Iceland, Canada
	UK – England and Wales						
E2	Modelling the bioenergetics of salmon migration	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.	Distribution/ migration in the sea	April 2002 – April 2004	Desk study	Modelling.	None
E3	Cardiff Bay Fisheries Monitoring Programme	Assess the impact of Cardiff Bay barrage on salmon stocks of the rivers Taff and Ely.	Specific natural and anthropogenic factors	1990-2006	Cardiff Bay at mouth of rivers Taff and Ely, South Wales, UK	Contained acoustic and radio tags, monitoring return rates of microtagged smolts.	None
E4	Salmonid migration and climate change	Describe and model migration routes in relation to marine currents and sea surface temperature and use models to predict impact of oceanographic and climatic conditions on distribution and migration.	Distribution/ migration in the sea	April 1999 – April 2004	Coastal waters around the UK and extending to salmon feeding grounds in Faroes and Greenland Seas	Acoustic transmitters and automated acoustic receivers.	None
E5	Impacts of agricultural contaminants on wild salmonids	Describe the nature and extent of the impact of aquatic contaminants derived from agriculture on migration and survival of smolts and post-smolts.	Specific natural and anthropogenic factors	April 1999 – April 2004	Laboratory study	Laboratory studies and life-cycle models.	Sweden and Canada
E6	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 can be derived and compared with other stocks.	Long-term monitoring	Ongoing annual monitoring programme (subject to annual review)	River Dee (North Wales), River Tamar (SW England)	Rotary screw traps, microtagging, adult traps and counters.	None

Project no.	Title	Summary of objectives	Topic Area	Dates of research	Area of research	Main research methods	Collabo- rating countries
	UK – Northern Ireland						
E7	The marine survival of Atlantic salmon from the River Bush, Northern Ireland	Investigate factors influencing the marine survival of salmon smolts migrating from the River Bush until their return as adults.	Long-term monitoring	1973-2003, New project to continue beyond 2003	River Bush, N. Irish/Irish coastal waters and distant water fisheries	Microtagging, traps, run-reconstruction models, hatchery programme.	International tag recovery programme (Ireland, ICES)
	UK - Scotland						
E8	Post-smolt mortality of Atlantic salmon	To 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	Traps, counters, electro-fishing, PIT tags and detectors.	None
E9	Analysis of post-smolt life history by scale reading	To investigate the relationship between growth and mortality, particularly during the marine phase.	Long-term monitoring	Continuing project under longer term remit	Desk study utilising samples from around Scotland	Scale analysis.	USA
E10	Seal-salmonid interactions	Improve understanding of the interactions between seals and salmon during key phases of the salmon's life-cycle.	Specific natural and anthropogenic factors	April 1999 – March 2002	Scottish estuaries, principally the Conon and Shieldaig.	Analysis of faecal material from seals.	None
	Ireland						
E11	Marine survival of Irish salmon stocks	Provide information on marine survival at various stages of ocean migration.	Long-term monitoring	August 2001 – 2004	Desk study	Analysis of data on marine survival of salmon and marine environmental conditions.	USA
E12	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.	Long-term monitoring	Ongoing programme initiated in 1980.	North Atlantic	Micro-tagging and tag recovery programmes.	Norway, UK, Faroes
E13	Assessment of the levels of the parasite <i>Lepeophtheirus</i> salmonis on Atlantic salmon post-smolts in salmon aquaculture bays along Ireland's western seaboard	To determine if sea lice from marine salmon farming are contributing to increased marine mortality of post-smolts; gather information on post-smolt migration patterns.	Specific natural and anthropogenic factors	May 2002	South-West, West and North-West Coasts of Ireland	Surface trawls with live capture facilities.	None. (Possible future collaboration with Scotland)

Project no.	Title	Summary of objectives	Topic Area	Dates of research	Area of research	Main research methods	Collabo- rating countries
	Finland					the second s	
E14	Temporal variation in abundance of the northern-most populations of Atlantic salmon with emphasis on the River Tana	To examine the importance of ocean climate, predation, marine fisheries and smolt production as primary factors influencing northern populations of salmon.	Long-term monitoring	2002-2005	River Teno (Finland, Norway), estuary, fjord and adjacent areas in the Barents Sea (Norway)	Analysis of abundance and marine survival data, scale analysis, analysis of ocean climate data, stomach content analysis.	Norway, Russia, Canada
Conception .	ICELAND		and the second second			LULIDAN VIERNAUSER	
11	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	Electro-fishing, smolt traps, microtagging, scale analysis, adult counts, analysis of environmental data.	EU (Salmodel) and ICES
12	Survival of 1- and 2- sea-winter salmon in relation to oceanic conditions	To study changes in the ratio of 1SW:2SW salmon in Iceland.	Long-term monitoring	Ongoing	Desk study	Analysis of catch and environmental data.	EU (Salmodel) and ICES
13	Migration of smolts through the estuary of River Ellidaar, Iceland	To monitor the migratory behaviour of smolts.	Distribution/ migration in the sea	2001-2002	Estuary and fjord of River Ellidaar	Acoustic tags and automatic recording receivers.	None
14	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)	To investigate the temporal and spatial distribution of DST-tagged salmon; to study spatial distribution and temperature preferences; to study growth in relation to environmental parameters; to assess by-catch in pelagic fisheries; to study diurnal depth distributions.	Distribution/ migration in the sea	2002-2006	Within the Icelandic and Faroese economic zones and in the Norwegian Sea	Pelagic trawls with live fish capture facilities. DSTs.	Faroe Islands, Norway
15	Variation in growth and return rates of Atlantic salmon from three Icelandic rivers.	To increase knowledge of growth and environmental factors influencing return rates and life-history of different salmon stocks.	Long-term monitoring	2001-2003	River Elliðaár, River Vesturá and River Vesturdalsá	Scale analysis, analysis of environmental data, microtagging.	None so far
- BASE	NORWAY			C. Phasestation			
NI	The importance of early marine feeding on the growth and survival of Atlantic salmon post-smolts in Norwegian fjords	To 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.	Life history/ biological processes	2002-2006 (field work May/June)	Central and Northern Norway	Trawls with live fish capture facilities.	Canada

Project no.	Title	Summary of objectives	Topic Area	Dates of research	Area of research	Main research methods	Collabo- rating countries
N2	Development of models to predict marine survival and return of salmon to Norway	Identify and examine 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.	Long-term monitoring	2002-2005	Desk study of existing data	Analysis of existing data. Computer models.	USA, Canada, and possibly EU
N3	Marine survival and exploitation of salmon from the Rivers Figgjo, Imsa and Drammenselv	Estimate marine survival and marine exploitation of salmon from three rivers in Norway. Develop predictive models.	Long-term monitoring	Long-term ongoing monitoring project	Rivers Figgjo, Imsa and Drammenselv with tag recovery programme in fisheries along Norwegian coast and elsewhere	Smolt tagging and tag recovery programme.	None
N4	Distribution and ecology of post-smolts and salmon at sea	Analyse age, growth and migratory paths in relation to environmental conditions and competitors so as to expand understanding of marine life-history in order to explain observed variations in salmon survival.	Distribution/ migration in the sea	2002-2005 (June, Juły, August)	The Northern North Sea and the Norwegian Sea	Pelagic trawl with live fish capture facilities.	Faroe Islands EU (Ireland)
1 Setter	RUSSIAN FEDERATION				Contraction of the		
RI	Monitoring of the stock status, abundance assessment and provision of catch advice.	Estimate survival of juveniles and adult return rates; estimate natural and fishing mortality; study population dynamics and estimate allowable catch.	Long-term monitoring	Annual monitoring programmes (since 1958)	Rivers Umba, Varzuga, Ponoi, Jokanga, Varzina, Tuloma, Kola, Ura, B.Z.Litsa, Pechora, Severnaya Dvina	Barrier fences, electro-fishing, smolt traps, external tagging.	None
TTT STATE	USA	Richt histing induding to do of the invite	Distribution (Ortabar 2000	Dana Bian	THE REAL PROPERTY OF	0
01	pre- and post-spawning adults: Dennys River adult stocking assessment	and estuarine movements of netpen-reared adults using ultrasonic telemetry.	migration in the sea	October 2006	Cobscook Bay and Gulf of Maine	receivers.	Canada
U2	Estuary and nearshore movements of migrating Atlantic salmon smolts: ultrasonic telemetry of smolts and post-smolts in the Narraguagas River and Narraguagas Bay	Evaluate migration timing and pathways and estimate survival of migrating smolts and post- smolts.	Distribution/ migration in the sea	April – June, 2002-2004	Narraguagas River and Narraguagas Bay	Ultrasonic tags and receivers.	Canada

Project no.	Title	Summary of objectives	Topic Area	Dates of research	Area of research	Main research methods	Collabo- rating countries
U3	Comprehensive evaluation of marine survival of hatchery- stocked smolts: migration behavior 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 – October, 2001-2005	Dennys River, Cobscook Bay	Ultrasonic tags and receivers.	Canada
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	April – October, 2002-2005	Dennys River, Cobscook Bay	Weir-based smolt and adult traps.	Possible identification of marked fish in West Greenland sampling programme
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 relative contribution of stocked hatchery smolts to overall post-smolt populations; evaluate the relative contribution of spatially and temporally distinct smolt releases in post-smolt populations; evaluate the physiology and condition of post- smolts in marine environments.	Distribution/ migration in the sea	May – June, 2002-2004 (2003 and 2004 field work contingent on continued funding)	Penobscot Bay, Gulf of Maine	Post-smolt trawl.	Parallel trawling in Bay of Fundy, Canada
U6	Forecasts of Atlantic salmon transoceanic migration: climate change scenarios and anadromy in the North Atlantic	Develop and evaluate marine migration models for Atlantic salmon for North America and Europe; evaluate the potential effects of climate change on migration patterns of Atlantic salmon.	Distribution/ migration in the sea	2002-2004 (project continuation contingent on additional funding)	Desk study	Modelling of migrations throughout North Atlantic.	Canada
U7	Stable isotope composition of Atlantic salmon scales	Develop retrospective time series of stable isotope ratios to evaluate feeding patterns over time.	Life history/ biological processes	2001-2002 (Project continuation contingent on additional funding)	Desk study	Analysis of scale samples collected at West Greenland and from US returns.	International collaboration in obtaining samples

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

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Annex 1

Inventory of Research relating to Salmon Mortality in the Sea in the Period 2002-2004

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1. CANADA

Party or relevant jurisdiction	Canada
	Maritimes Region
Title of project	Marine migration and survival of post-smolt Atlantic salmon from Bay
	of Fundy rivers
Objective of research	Provide knowledge about marine habitat (migration routes and feeding
project	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.
Brief description of research	Salar MAP, the Atlantic salmon Marine Acoustic-tracking Project,
project	proposes to tag wild Atlantic salmon smolts from inner and outer Bay
	of Fundy rivers and monitor their movements in the Bay of Fundy and
	Gulf of Maine over a period of up to 6-8 months after entry into sea
	water. A new generation of coded acoustic tags, automated
	underwater receivers, and new methodology developed and tested by
	Salar MAP over the past 6 years will be used to map the migration
	routes and fine-scale distribution of post-smolts over time. Wild
	smolts captured using rotary screw traps or other live traps will be
	tagged and released throughout the migration period to examine issues
	of synchrony related to the transition from fresh to salt water and
	subsequent distribution. Naturally-emigrating wild smolts will be
	used to clarify possible environmental influences originating in fresh
	water on migration and survival. A key feature of the approach
	developed is that the high efficiency of the tag detection screens (ref.
	1999 pilot study) could provide a direct measure of survival of tagged
	post-smolts over specific periods and to specific points along the
	migration route. Other fishery-independent information to be obtained
	by tagging will include the timing, location and rate of departure from
	the river and inner and outer bay sectors, travel direction, behaviour
	and movements in relation to environmental associations. The
	potential for interaction with aquaculture cage sites will also be
	determined by tracking. Post-smolt migration routes and distribution
	throughout the Bay of Fundy will be determined during the first
	summer at sea. Extended monitoring to early winter could discover
	where salmon of inner bay stocks go to over-winter, which may be
	crucial to any recovery plans. The information obtained from tagging
	will help direct the efforts of marine surveys using trawling to capture
	live Atlantic salmon for examination and release.
Dates during which research	April to December, 2002-2004
will take place	(Project was started in 2001)
Area in which research will	Bay of Fundy and Gulf of Maine
take place	
Estimated number and	None. All smolts sampled and those surgically tagged will be released
weight of salmon to be	alive.
retained	

Resources	
Estimated cost of the research project	Estimated £176,000 per year (includes DFO ship time and salaries including overheads)
	Approx. £245,000 spent in 2000/01 by NGO partners for capital acquisitions and O&M to start up project.
	Principal Supporting Partners (NGO):
	Atlantic Salmon Federation
	VEMCO Limited
	First Nations
Number of participating scientists	To be finalised
Name of coordinating	Gilles L. Lacroix
scientist in charge of	Department of Fisheries and Oceans
project	Biological Station, St. Andrews, NB, Canada
Details of research	Tracking vessel:
vessels, e.g. name,	SALAR (licence no. C02371NB; Rosborough RF-247, 7.5 m
registration, call sign	fibreglass boat with twin 115 hp outboard motors, based at St.
and description of vessel	Andrews Biological Station)
	Gear deployment vessels:
	CCG Pandalus III (Canada Coast Guard, 12.5 m research vessel, based at St. Andrews Biological Station)
	Commercial Charters (inshore and offshore lobster boats)
	Other CCG vessels (as required)
Type and amount of	Coded acoustic tags (Vemco, various pinger types, sizes, and
gear and other	durations, approx. 200-300 tags per year).
equipment to be used	Automated underwater acoustic monitoring receivers (Vemco, various
	Tracking receivers (Vemco, various types for detection and active
	tracking).
	Receiver moorings (various types and designs, approx. 200).
	Traps for capture of live smolts in rivers (various types and designs,
	including E.G. Solutions rotary screw fish traps, approx. 4 traps).
	Surgical gear and method as per established protocol.
Details of any collaborating	U.S.A.:
countries	John Kocik, National Marine Fisheries Service, NOAA
	Ken Beland, State of Maine Atlantic Salmon Commission
	(smolt tagging and collaboration in tracking post-smolts in the Gulf of Maine)

Party or relevant jurisdiction	Canada
	Maritimes Region
Title of project	Distribution, health and condition of Atlantic salmon from Bay of
	Fundy rivers while at sea
Objective of research	Provide knowledge about marine habitat and health of salmon post-
project	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.
Brief description of research	The project proposes to conduct annual marine surveys using
project	specialised trawling gear and techniques developed specifically to
	capture live Atlantic salmon of all sizes for examination and release.
	Gear and method development and testing cruises were conducted in
	2000 and a 3-week survey was successfully completed in the Bay of
	Fundy in 2001. The surveys will determine the distribution of salmon
	from Bay of Fundy rivers during post-smolt migration at sea and may
	help discover the location of critical feeding habitat for assessment.
	The capture of live salmon at sea will allow assessment of health and
	condition over time and provide key information on growth, prey
	items, diseases and parasites, genetic origin, physiology, and
	environmental associations. This knowledge is essential in uncovering
	potential causes of marine mortality (through identification of factors
	involved or reduction of hypotheses listed to explain mortality). The
	project will benefit from the Salar MAP research activities because
	prior knowledge of migration routes and timing obtained through
	tagging and tracking will help find increasingly rare wild salmon of
	the search for selmer
Datas during which response	May to June 2002 2004
Dates during which research	May to June, 2002-2004
will take place	
Area in which research will	Bay of Fundy and Gulf of Maine
take place	Day of Fundy and Guil of Manie
Estimated number and	All wild post-smolts and wild adult salmon captured alive will be
weight of salmon to be	sampled and released. Fishing mortality (expected to be <5% based on
retained	2001 survey) and salmon identified as having escaned from
- cumitou	aquaculture sites will be retained.
	aquavartare shos will be reallied.

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Resources	
Estimated cost of the research project	Estimated £112,500 per year (includes DFO ship time and salaries including overheads)
	Approx. £22,200 spent in 2000/01 by NGO partners for capital acquisitions to start up project.
	Principal Supporting Partners (NGO):
	First Nations
Number of participating	To be finalised
scientists	To be mansed
Name of coordinating	Gilles L. Lacroix
scientist in charge of	Department of Fisheries and Oceans
project	Biological Station, St. Andrews, NB, Canada
Details of research	Trawling vessel:
vessels, e.g. name,	CCG Alfred Needler (Canada Coast Guard, 40 m fishing/research
registration, call sign and description of vessel	vessel, based at Bedford Institute of Oceanography, Dartmouth)
Type and amount of	Akrehamn post-smolt trawls (2 prototypes designed for surface
gear and other	trawling) and various extensions and accessories.
equipment to be used	Thyboron trawl doors (Type 8 doors for pelagic trawling).
	Light bridles and main warps for surface trawling.
	Live fish capture and holding cod-end tanks (several prototypes
	designed after fish-lift and aquarium developed by J.C. Host, IMR,
	Norway).
	Live fish holding tanks (aboard ship) and fish sampling gear.
ountries	U.S.A.: Bussell Brown National Marina Fishering Service NOAA Woods
ountries	Hole (nost-smolt trawling survey in the Gulf of Maine)
	The post-smolt dawning survey in the out of manie)
	Kevin Friedland, Umass/NOAA CMER Programme (retrospective growth analysis from scales)
	Norway:
	smolt trawling surveys in fjords and at sea)

Party or relevant jurisdiction	Department of Fisheries and Oceans, Newfoundland Region			
Title of project	Atlantic salmon distribution and abundance at sea			
Objective of research	(1) To determine the distribution and abundance of salmon,			
project	particularly post-smolts, in the Labrador Sea and northern Grand			
	Banks; (2) To collect biological, meristic, morphometric, and			
	biochemical data on salmon; (3) To investigate the relationship			
	between salmon and prey by collecting stomach contents; (4) To			
	investigate the relationship between sea temperature and other			
	oceanographic parameters and salmon abundance; (5) To tag and			
	release salmon in good condition.			
Brief description of research	The distribution of Atlantic salmon will be studied using multiple			
project	mesh drift nets, and if available, a surface trawl in the autumn.			
	Relative abundance with respect to spatial distribution and sea			
	temperature will be inferred from catch rates.			
	Fishing will take place between 49° 00' N and 57° 00' N and			
	40° 00' W and 60° 00' W			
Dates during which research	September, 2001			
will take place				
	Autumn 2003 and 2005			
Area in which research will	Labrador Sea and Northern Grand Banks			
take place				
Estimated number and	500 post-smolts, ~ 0.5 t			
weight of salmon to be				
retained				
Resources				
Estimated cost of the	£146,500 (including overheads) per year in 2003 and 2005			
research project				
Number of participating	1			
scientists	N 115 11			
Name of coordinating	David Reddin			
scientist in charge of				
project				
Details of research	CCGS willred Templeman			
vessels, e.g. name,	Canadian			
and description of	50 m long of 025 GPT			
and description of	50 m long of 925 GK1			
Tune and amount of	~2000 fethoms of monofilement drift gill nets of 77 80 102 115 and			
rype and amount of	127 mm stretched measure			
equipment to be used	127 mm successon measure.			
equipment to be used	Surface trawl			
Details of any collaborating				
countries				

Party or relevant jurisdiction	Canada
Title of project	Integrated field and laboratory assessment of the effects of endocrine
	disrupting substances on Atlantic salmon smolts.
Objective of research project	 Laboratory tests of the effects of endocrine active substances in municipal and industrial effluents, including estrogens, androgens, phytosterols and nonylphenol ethoxylates Field tests of the effects of endocrine active substances in municipal and industrial effluents, including estrogens, androgens, phytosterols and nonylphenol ethoxylates (caging and exposure and release studies) Field tests caging smolts near sites with potential for significant agricultural runoff Ocean field test of link between exposure of smolts to endocrine disrupting substances and subsequent lower adult returns (Burrishoole River, Ireland initially and Canada if methods prove feasible)
Brief description of research project	This project proposal is based on research conducted over the past three years under ESSRF/TSRI (DFO projects 95052 and 92548) funding which evaluated the effects of nonylphenol and other endocrine disrupting substances on growth and survival of Atlantic salmon (<i>Salmo salar</i>) during and after smoltification. Nonylphenol, and the larger group of nonylphenol ethoxylates, are in use in almost all commercial, industrial and domestic sectors. These compounds are members of the second largest class of non-ionic surfactants in use today, the alkylphenol polyethoxylates. Concentrations of these compounds occurring presently in the environment have been shown to have endocrine-disruptive effects on fish in rivers and estuaries downstream of municipal sewage treatment works. Sewage treatment works emit about 4% of their total nonylphenolic compound input as nonylphenol itself. This is a significant percentage as nonylphenol has a greater bioaccumulation potential than the nonylphenol ethoxylates. Nonylphenol ethoxylates are also used in about 20-25% of all pesticide and herbicide formulations available today. Nonylphenol itself (4- nonylphenol) has been used in the past as a major constituent in certain pesticide formulations, some of which were applied in Canada. The current research indicating estrogenic effects on fish at low 4- nonylphenol ethoxylate degradation products (including 4-NP), and not necessarily due to the presence of the pesticide's active ingredient. Atlantic salmon inhabit streams and lakes for their juvenile stages, and in eastern Canada have been exposed to pesticides applied for forest protection most years since the 1950's. Sensitive life stages may be affected by exposure to nonylphenol. Smoltification is a time of great stress for salmon, as they are changing physiologically and adapting to a new environment. Endocrine hormones play an integral part in the smoltification process. Additional stress or modification of endocrine function at this crucial life stage may pose problems for growth and
Dates during which research	2002-2005
will take place	

Area in which research will take place	Atlantic Canada and Co. Mayo, Ireland
Estimated number and weight of salmon to be retained	600 wild smolts per year from Miramichi River (Canada) about 1000 smolts per year from Burrishoole River (Ireland), details have not been finalized for this yet.
Resources	
Estimated cost of the research project	About £89,000 per year, majority from DFO ESSRF plus other funds and in kind support from Environment Canada, DFO and others
Number of participating scientists	12 (DFO, Env Can, UNB, Marine Institute) plus two graduate students
Name of coordinating scientist in charge of project	Joint coordination between: Dr. Wayne L. Fairchild, Fisheries and Oceans Canada, Gulf Fisheries Centre, P.O. Box 5030, Moncton, NB, E3B 9B6, tel: 506-851-2056 fax: 506-851-2079 e-mail: FairchildW@mar.dfo-mpo.gc.ca And Dr. Scott B. Brown, Environment Canada, National Water Research Institute, 867 Lakeshore Road, P.O. Box 5050, Burlington, ON, L7R 4A6, Tel: (905)336-6250, Fax: (905)336-4735, e-mail: Scott.Brown@cciw.ca
Details of research vessels, e.g. name, registration, call sign and description of vessel	None
Type and amount of gear and other equipment to be used	Trap nets and fish holding cages in rivers in Canada
Details of any collaborating countries	Planning underway with Phil McGinnity of the Marine Institute, Salmon Management Services Division, Furnace, Newport, Co. Mayo, Ireland - hatchery facilities, fish husbandry, capture and counting capability for Burrishoole River salmon.

Party or relevant jurisdiction	Canada
Title of project	Marine Survival of Canadian Atlantic Salmon Stocks – Long-term Monitoring
Objective of research project	Smolt production and adult return estimates are available for many salmon populations in Canada, from rivers (wild) and from hatcheries. In some cases, these time series extend to 30 years.
	Spatial and temporal trends in freshwater smolt production and in marine survival are monitored at the following sites:
	In DFO's Newfoundland Region, five (5) facilities: Campbellton River; Northeast River, Placentia and Rocky River; Conne River; and Western Arm Brook
	In DFO's Maritimes Region, three (3) facilities: Nashwaak River, Mactaquac hatchery on Saint John River, and LaHave River (wild and hatchery)
	In DFO's Gulf Region, two (2) facilities on the Miramichi River, both Northwest and Southwest tributaries
	In Quebec, the Societé de la Faune et des parcs du Québec (FAPAQ) has two (2) facilities on Rivière de la Trinité and Rivière St-Jean (Gaspé); in addition, stocked salmon survival is monitored on three (3) rivers: Rivière aux Rochers, Rivière A Mars, and Rivière Malbaie, the latter two in collaboration with CIRSA
Brief description of research project	Newfoundland: Smolt and adult Atlantic salmon abundance is monitored by fish- counting fences or mark-recapture (Conne River smolts). Survival is determined both for smolt to small (< 63 cm) and MSW adult salmon returns. Biological characteristics (e.g. length, weight, condition, age etc.) of both life-stage components are collected along with additional information on run timing and environmental conditions. These data are periodically examined in relation to patterns of annual variation in marine survival of wild smolts.
	Maritimes: Continuation of a 30- and 25-year time series of marine survival for hatchery smolts released to the Saint John (Mactaquac) and LaHave River. Continuation of 6-year data series for wild smolt survival on the Saint John (Nashwaak trib) and LaHave River.
	Gulf: Smolt production and adult return estimates are obtained from the two branches of the Miramichi River. Biological characteristics are described and survival rates assessed relative to size of smolts, age, and sex of returning adults. Program began in 1998 for the Northwest Miramichi and was extended to include the Southwest Miramichi in 2001.

	Quebec: Smolt trap to estimate smolt run by mark-recapture, counting adult return in a fishway (de la Trinité) or direct observation (St-Jean), characteristics of adult returns using recreational catch. For the FAPAQ projects, stocked smolt returns are determined by scale analysis of all returning adult salmon. This data permits estimation of sea survival of the stocked fish. For the CIRSA project stocked fish returns are determined by scale analysis (smolts) and genetic analysis (fry). Reproductive success is determined by genetic analysis.
Dates during which research will take place	April – November, annually
Area in which research will take place	On Canadian rivers named in objectives section
Estimated number and weight of salmon to be retained	Generally not applicable, although in some studies a few smolts are retained (less than 500 overall) for biological sampling
Resources	
Estimated cost of the research project	Newfoundland (£287,000 sub-total): DFO - £209,000 per year, incl overhead NGO Partners - £78,000 per year
	Maritimes (£27,000 sub-total): DFO - £21,500 per year, incl overhead NGO Partners - £5,500 per year
	Gulf (£109,000 sub-total): DFO - £73,000 per year (includes DFO operating costs, capital investment and salaries, incl overhead) Partners: £36,000 spent in 2001/02 by NGO partners (Northumberland Salmon Protective Association, Miramichi Salmon Association, First Nations) for capital acquisitions, and O&M for assistance. Same level of support anticipated in 2002-2004
	Quebec (£141,500 sub-total): FAPAQ - £41,500 per year, incl overhead Hydro Quebec – £22,200 per year CIRSA - £77,800 per year
Number of participating	Canada Total - £564,500Newfoundland (5), Maritimes (3), Gulf (2), Quebec (10)
scientists	
Name of coordinating scientist in charge of project	C. Bourgeois (Rocky River), B. Dempson (Conne River), C.Mullins (Western Arm Brook), M.O'Connell (Northeast Brook, Trepassey), D.Reddin (Campbellton River), T.Goff, R.Jones, P.Amiro (Maritimes), G.Chaput (Gulf), F.Caron, S.Lachance (FAPAQ), L.Bernatchez (CIRSA, U.Laval)
Details of research vessels, e.g. name, registration, call sign and description of vessel	N/A

Type and amount of gear and other equipment to be used	Smolt and adult fences and traps, trap nets, rotary screw smolt traps
Details of any collaborating countries	

2. DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

Faroe Islands

The Faroese Fisheries Laboratory is collaborating in a number of projects detailed in the returns made by other Parties.

Greenland

Party or relevant jurisdiction	Greenland (Denmark)
Title of project	Origin of Atlantic Salmon Captured in a Mixed Stock Fishery at West Greenland
Objective of research project	 estimate the size and river/sea age composition of the commercial fisheries catch of Atlantic salmon evaluate the relative composition of North American and European origin salmon in the commercial catch
Brief description of research project	One of the key data inputs to international stock assessments of Atlantic salmon is the origin of Atlantic salmon harvested in mixed stock fisheries. An international sampling program collects biological data, scale and genetic samples from Atlantic salmon sampled from commercial fisheries catch at West Greenland. Both scale and genetic samples are used to characterise the continent-of-origin of captured salmon. Results from the 1999 sampling indicated that almost 91% of Atlantic salmon sampled in the West Greenland fishery were of North American origin. The proportion of North American fish has increased steadily during the 1990s, prompting concerns about trends in pre-fishery abundance of North American and European stocks. Results of this research are integral to the completion of stock assessments of Atlantic salmon through the ICES North Atlantic Salmon Working Group. Monitoring of the mixed-stock fishery has occurred nearly continuously over the past 3 decades, and is likely to continue as long as there is a fishery at West Greenland.
Dates during which research will take place	During the fishing season, usually August – September 2002 – 2004
Area in which research will take place	West Greenland, Sisimiut, Maniitsoq, Kangaamiut, Nuuk, Fiskenescent, Narsaq and Qaqortoq, Greenland
Estimated number and weight of salmon to be retained	

Resources	
Estimated cost of the research project	Greenland - approximately £10,000 per annum (includes salaries, travel, lodging and equipment) Canada - £45,300 per annum (including £10,000 from Atlantic Salmon Federation) EU (United Kingdom) - £10,000 - £15,000 per annum EU (Ireland) - £3,750 per annum USA - £17,000 per annum Total: £86,050 - £91,050 per annum
Number of participating scientists	4-6 scientists from Greenland working with scientists from U.S.A., Canada, UK, and Ireland
Name of coordinating scientist in charge of project	Helle Siegstad / Per Kanneworff
Details of research vessels, e.g. name, registration, call sign and description of vessel	None
Type and amount of gear and other equipment to be used	Standard sampling equipment Standard genetics laboratory equipment
Details of any collaborating countries	Collaborative project with investigators from US (R. Brown), the United Kingdom (T. Potter and J. MacLean), Ireland (N. O'Maoileidigh) and Canada (D. Reddin). The work is coordinated via NASCO and is reported to ICES (Working Group on North Atlantic Salmon).

3. European Union

Party or relevant jurisdiction	European Union
Title of project	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
Objectives of research project	-To improve our ability to set salmon conservation limits (CLs); addressing transportability and dynamic change issues, also taking into account underlying stock structure, and;
	-To 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.
Note: only the PFA/marine side of the project is reported here)	Development of catch advice for NEAC salmon in distant water fisheries depends critically on availability of methods of assessing stock status in advance of fishing and relating this to conservation requirements in rivers of origin. SALMODEL aims to provide improvements to the existing interim methods of developing catch advice at ICES (which do not have predictive capability for NEAC
	stocks) and to explore and evaluate options for developing fully predicative PFA models. Two workpackages address these areas:
	Workpackage 4 is: -examining current models used to estimate PFA, including that used by ICES
	-evaluating the quality of historic data used to run the ICES PFA model
	-assessing sensitivity of the model to data types and variation, and testing assumptions of incorporation of natural mortality "m" into PFA models
	-evaluating the basis of the NEAC stock groupings being used in the catch advice process.
	Workpackage 5 is: -evaluating options for developing a predictive PFA model from the historic time series employing environmental and other data
	-investigating forward-running predictive PFA models based on smolt production estimates/indices
	-developing approaches for model validation
	-examining scales at which the various model types can be applied
Dates during which research	2000-2002
will take place	
Area in which research will	Work is progressed via formal meetings, topic-specific workshops and
take place	co-operative studies; no field studies are involved.

Estimated number and weight of salmon to be retained	Not applicable
Resources	
Estimated cost of the research project	£461,000 in total (to cover costs associated with travel to meetings and preparation for meetings).
Number of participating scientists	17 European members; 2 Canadian participants; + invited external experts
Name of coordinating scientist in charge of project	Dr Walter Crozier
Details of research vessels, e.g. name, registration, call sign and description of vessel	Not applicable
Type and amount of gear and other equipment to be used	Not applicable
Details of any collaborating countries	UK (E&W Scotland, N. Ireland); France; Ireland; Norway; Sweden; Finland; Iceland; Canada.

Party or relevant jurisdiction	EU - UK (England and Wales)
Title of project	Modelling the Bioenergetics of Salmon Migration
Objective of research	The principal objectives of the research are to model the energetic
project	requirements of salmon during their marine migrations and predict the effects of environmental and oceanographic changes on smolt growth and survival.
Brief description of research project	Successful migration of salmon within the marine environment requires that sufficient energy stores are either available prior to or replenished throughout migration. Therefore, the overall energy budget of a smolt may be an extremely important factor contributing to the migratory success, growth and survival in the sea. The project will develop a model to describe the basic energy requirements of salmon and how it is utilised for movement, maintenance and growth in the marine environment. The model will be used to predict the effects of environmental and oceanographic changes (e.g. sea surface temperature, ocean currents, food availability) on smolt growth and survival in the sea.
Dates during which research	April 2002 – April 2004
will take place	
Area in which research will	The research will model the migrations of selected stocks of salmon
take place	from English and Welsh rivers.
Estimated number and weight of salmon to be retained	N/A
Resources	010.000
Estimated cost of the research project	£40,000 per annum
Number of participating scientists	2 CEFAS scientists
Name of coordinating scientist in charge of project	Dr Andy Moore
Details of research vessels, e.g. name, registration, call sign and description of vessel	N/A
Type and amount of gear and other equipment to be used	N/A
Details of any collaborating countries	N/A

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Party or relevant jurisdiction	EU - UK (England and Wales)
Title of project	Cardiff Bay Fisheries Monitoring Programme
Objective of research project	Assess the impact of Cardiff Bay Barrage on salmon and sea trout stocks in rivers Taff and Ely
Brief description of research project	1. Tracking movements of adult salmon up to and past barrage and through impoundment using contained acoustic and radio tags.
	2. Tracking movements of smolts through impoundment and past barrage.
	3. Monitoring changes in the return rates of microtagged smolts (hatchery origin) before, during and after construction.
Dates during which research will take place	Through years 1990-2006
Area in which research will take place	Cardiff Bay at mouth of rivers Taff, Ely, South Wales, UK.
Estimated number and weight of salmon to be retained	Up to 20 per year
Resources	
Estimated cost of the research project	c. £250,000 per annum
Number of participating scientists	5/6 per annum
Name of coordinating scientist in charge of project	Peter Gough
Details of research	'Challanger'
registration, call sign	M00WB70085
vessel	7-4 Metres long
Type and amount of	<60 C.A.R.T tags pa.
gear and other equipment to be used	40-50 smolt tags pa.
	10,000 - 70,000 metre tagged and/or fin-clipped smolts stocked each year.
Details of any collaborating countries	None

Party or relevant jurisdiction	EU- UK (England and Wales)
Title of project	Salmonid Migration and Climate Change
144 - 009	
Objective of research	The main objective of the research is to describe and model the
project	environmental factors affecting the migration of salmonids and to
	predict the effects of climate change on salmonid migration and
	survival in the sea.
Brief description of research	Telemetry studies at CEFAS on the movements of post-smolts in
project	coastal waters have provided information on the importance of water
	research project will further develop the migration studies to examine
	the movements and distribution of salmon and sea trout smalts in the
	marine environment. Models will be developed to describe the
	migration routes of post-smolts in relation to marine currents and sea
	surface temperature and the results will be used to predict the impact
	of oceanographic and climatic conditions on distribution and migration
	of salmonids in the marine environment.
Dates during which research	1 April 1999 - 31 March 2004.
will take place	
Area in which research will	Coastal waters around the UK and extending to salmon feeding
take place	grounds in Faroes and Greenland seas.
Estimated number and	250 salmon smolts
weight of salmon to be	
retained	
Resources	0140.000
Estimated cost of the	£140,000 per annum
research project	5 CEEAS acientista
number of participating	5 CEFAS scientists
Name of coordinating	Dr Andrew Moore
scientist in charge of	DI Allurew Moore
project	
Details of research	N/A
vessels, e.g. name,	
registration, call sign	
and description of	
vessel	
Type and amount of	Acoustic transmitters and automated acoustic receiver systems
gear and other	
equipment to be used	
Details of any collaborating	N/A
countries	

Party or relevant jurisdiction	
	EU (UK - England and Wales)
Title of project	Impacts of agricultural contaminants on wild salmonids
Objective of research project	The main objective of the research is to describe the nature and extent of the impact of aquatic contaminants derived from agriculture (e.g. pesticides) on migration and marine survival of salmonid smolts and post-smolts.
Brief description of research project	Recent research has demonstrated that the freshwater and the marine environments cannot be considered in isolation and that the conditions within the freshwater zone experienced by Atlantic salmon may be critical to their subsequent survival within the sea. In particular, exposure of juvenile salmon to a range of sub-lethal concentrations of freshwater contaminants such as pesticides and endocrine-disrupting chemicals (EDCs) may operate to reduce survival in fish once they have emigrated to sea. The research project will describe how freshwater contaminants such as the pesticide atrazine can interfere with the parr-smolt transformation and reduce the ability of the fish to physiologically adapt to saline conditions. Laboratory studies have indicated that smolts exposed in freshwater to environmental levels of the pesticide atrazine have reduced levels of gill Na ⁺ K ⁺ ATPase activity and plasma ion concentrations. Subsequent exposure to seawater resulted in poor hypo-osmoregulatory performance and mortality. In addition, modification by pesticides may also delay or inhibit smolt migration. The results of the studies will be incorporated into existing life-cycle models to determine the impact of freshwater contaminants on salmon at the stock and population level.
Dates during which research will take place	April 1999 - April 2004
Area in which research will take place	England and Wales
Estimated number and weight of salmon to be retained	N/A

Resources	
Estimated cost of the research project	£425,000 (over 5 years)
Number of participating scientists	6
Name of coordinating scientist in charge of project	Dr Andy Moore
Details of research vessels, e.g. name, registration, call sign and description of vessel	N/A
Type and amount of gear and other equipment to be used	N/A
Details of any collaborating countries	Sweden and Canada

Party or relevant jurisdiction	EU (UK - England and Wales)
Title of project	Deriving estimates of marine survival and exploitation for monitored river stocks in England and Wales.
Objective of research project	The objective of this programme is to establish 'monitored' rivers in England & Wales where estimates of marine survival and exploitation in marine fisheries can be derived and compared with other North Atlantic stocks.
Brief description of research project	For a number of indicator stocks around the North Atlantic there is evidence that the marine survival of salmon is highly variable and is currently well below average. However, there are no available data sets for stocks in England and Wales. It is recognised that data needs to be collected in a consistent manner from year to year in order to provide a reliable time series of data and to allow trends to be identified. It has also been agreed that information on more than one stock would be preferable to allow for possible spatial differences. Two stocks have therefore been selected for investigation in the first instance; these are the River Dee (North Wales) and the River Tamar (SW England). Both these stocks have a reasonable proportion of MSW salmon. Smolt tagging programmes (with wild smolts) have been initiated at both sites and new sites and trapping methods (rotary screw traps) have been identified on both rivers that will enable the trapping and tagging of wild fish on the main stems of these rivers. Smolt run estimates will be derived using mark-recapture methods. Both rivers also have existing facilities (counters/traps) for estimating the adult run, although these will be upgraded as necessary (e.g. installation of adult trap on the River Tamar). The investigations are being run on a collaborative basis by CEFAS and the EA.
Dates during which research will take place	Ongoing annual monitoring programme (subject to annual review).
Area in which research will take place	River Dee (North Wales) River Tamar (SW England)
Estimated number and weight of salmon to be retained	N/A
Resources	
Estimated cost of the research project	N/A (Part of larger monitoring & assessment programmes).
Number of participating scientists	\sim 10 – involves staff from the CEFAS Salmon & Freshwater Team and personnel from the EA's National Salmon and Trout Fisheries Centre and from EA regional offices.
Name of coordinating scientist in charge of project	Ian Russell (CEFAS), Ian Davidson (EA – Dee), Simon Toms (EA – Tamar)

Details of research vessels, e.g. name, registration, call sign and description of vessel	N/A
Type and amount of gear and other equipment to be used	Rotary screw fish traps, coded wire microtagging equipment, adult fish traps and counters.
Details of any collaborating countries	N/A

Party or relevant jurisdiction	EU – UK (Northern Ireland)
Title of Project	The marine survival of Atlantic salmon from the R. Bush, N. Ireland
Objective of research	To investigate factors influencing the survival at sea of salmon smolts migrating from the R. Bush until their return as adult salmon
Brief description of research	This long-term project centres on enumerating numbers of migrating
project	wild smolts and returning adults to the R. Bush by means of trapping
1 5	facilities, in order to assess return rates and maturation schedules. A
	programme of microtagging with wild and hatchery origin smolts
	provides detailed information on exploitation levels and patterns
	pertaining in coastal and distant waters fisheries. Run-reconstruction
	modelling of returning fish provides information on return rates to
D (1) 1 1 1	Irish homewaters, which provides an index of natural marine survival.
Dates during which research	1973-2003, New project to continue beyond 2003.
Area in which recorred will	P. Dush N. Irigh/Irigh agostal waters and distant water fightrias
take place	R. Bush, N. Historitsh coastal waters and distant water fisheries.
Estimated number and	None retained, as tag recovery based on already captured fish. Tagged
weight of salmon to be	adults at R. Bush retained alive as broodstock for hatchery
retained	programme.
Resources	107.000
Estimated cost of the research project	£27,000 per annum
Number of participating scientists	2x project scientists + 3 technical staff
Name of coordinating	Dr Walter Crozier/Dr Gersham Kennedy
scientist in charge of	
project	
Details of research	None
vessels, e.g. name,	
registration, call sign	
and description of	
Tune and amount of	None
geer and other	TAOLIC
equipment to be used	
Details of any collaborating	International tag recovery programme in co-operation with Irish
countries	authorities and ICES

Party or relevant jurisdiction	EU - UK (Scotland)
Title of project	Post-smolt mortality of Atlantic salmon
Objective of research project	To assess post-smolt mortality rates of Atlantic salmon from the rivers North Esk, Aberdeenshire Dee (two tributaries) and Conon (a river harnessed for hydro-electricity generation) and their contribution to fisheries that exploit them
Brief description of research project	North Esk: Project started in 1964. Annual smolt production estimates are made using stratified mark-recapture models. Fish are tagged using coded-wire microtags or modified Carlin tags. Age distribution and sex ratio data are collected by sampling trap catches of smolts. Analysis of recapture data yields information on post-smolt mortality levels and contribution of North Esk salmon to fisheries.
	River Dee: Juvenile surveys by electro-fishing and traps have been operated in the Girnock Burn since 1966, and in the Baddoch Burn since 1989. Fish are tagged using coded-wire microtags. Salmon and grilse entering the tributaries to spawn are trapped and age and length distribution data are collected. Stock-recruitment relationships are investigated. Analysis of recapture data yields information on post- smolt mortality levels and contribution of Upper Dee salmon to fisheries.
	River Conon: Collaborative project with Conon District Salmon Fishery Board and Scottish And Southern Energy started in 1996. Juvenile salmon are captured by electro-fishing and trapping exercises in selected parts of the River Conon catchment. The fish are tagged using a variety of tags including coded-wire microtags (occasionally) and PIT tags (annually). Returning adults are registered automatically as they pass through a Borland lift in Torr Achilty Dam. Occasional surveys and trapping exercises have recorded the proportion of tagged fish in the net-and-coble and rod-and-line fisheries.
Dates during which research will take place	Ongoing
Area in which research will take place	North Esk, Western catchment of River Dee, River Conon salmon fishery district
Estimated number and weight of salmon to be retained	N/A

Resources	
Estimated cost of the research project	N/A - subsumed within larger project to investigate population dynamics
Number of participating scientists	North Esk - 7 (also employed on other projects) River Dee - 5 (also employed on other projects) River Conon - 6 (includes non-FRS staff, and all are also employed on other projects)
Name of coordinating	North Esk - Julian MacLean
scientist in charge of	River Dee - Alan Youngson
project	River Conon - John Armstrong
Details of research vessels, e.g. name, registration, call sign and description of vessel	N/A
Type and amount of gear and other	North Esk - Purpose-built smolt trap and resistivity counter on the lower reaches of the North Esk
equipment to be used	River Dee - Purpose-built traps, electro-fishing
	River Conon - Electro-fishing gear, traps, PIT tagging equipment and
	detectors
Details of any collaborating	N/A
countries	

Party or relevant jurisdiction	EU – UK (Scotland)
Title of project	Analysis of post-smolt life history by scale reading.
Objective of research	To investigate the relationship between growth and mortality in
project	Atlantic salmon, particularly during the marine phase, by analysis of
	scale growth patterns.
Brief description of research	Scale samples of fish of known age (recaptures from smolt tagging
project	operations) and from salmon catches generally are examined to assess
	growth characteristics. Associations between growth performance and
	independent measures of mortality are examined with the aim of
	identifying the periods crucial to survival.
Dates during which research	Continuing project under longer term remit.
will take place	
Area in which research will	Samples from around Scotland and from the North Esk and Girnock
take place	Burn (Aberdeenshire Dee) in particular
Estimated number and	N/A
weight of salmon to be	
retained	
Kesources	AT/A 1 1 1 1 1
Estimated cost of the	N/A – subsumed within general scale-reading programme.
research project	2 (1 1
Number of participating	3 (also employed on other projects)
Scientists	Lulian Mark and
Name of coordinating	Junan MacLean
scientist in charge of	
Details of research	NI/A
Details of research	N/A
registration call sign	
and description of	
vessel	
Type and amount of	N/A
gear and other	****
equipment to be used	
Details of any collaborating	USA
countries	**#00000777

Party or relevant jurisdiction	EU – UK (Scotland)
Title of project	Seal/Salmonid Interactions
Objective of research	To provide an improved understanding of the interactions between
project	seals and salmon during key phases of the salmon life-cycle
Brief description of research	To study whether and to what extent the presence of seals is linked to
project	runs of smolt and adult salmon.
	To examine seal faeces for the remains of salmon.
Dates during which research	April 1999 – March 2002
will take place	
Area in which research will	Scottish estuaries, principally the Conon and Shieldaig
take place	
Estimated number and	250 Salmon Smolts
weight of salmon to be	
Recommend	
Resources	£60,000 not onnum
research project	200,000 per amium
Number of participating	4 (also employed on other projects)
scientists	4 (also employed on other projects)
Name of coordinating	John Armstrong
scientist in charge of	voin innouong
project	
Details of research	N/A
vessels, e.g. name,	
registration, call sign	
and description of	
vessel	
Type and amount of	N/A
gear and other	
equipment to be used	N7/1
Details of any collaborating	N/A
countries	

Party or relevant jurisdiction	EU – Ireland
Title of project	Marine survival of Irish Salmon Stocks
Objective of research	The programme was initiated in 1999 to:
project	Provide information on marine survival at various stages of ocean
	migration.
Brief description of research	Marine Institute have funded a fellowship for an entry level scientist to
project	enter a PhD programme in the University of Massachusetts. The
	fellowship will enable the researcher to avail of the extensive
	information sets on oceanographic parameters relevant to survival of
	salmonids at sea. The long-term objective is to examine the
	relationships between marine survival indices available for irish
Datas during which research	Samon stocks with corresponding marine environmental data sets.
will take place	August 2001 - 2004
Area in which research will	Oceanic data will be examined for:
take place	Post-smolts Norwegian Sea Wyville Thompson Ridge North of
	Scotland. North of Faroes
	Grilse West Greenland, Irish coast
	MSW North of Faroes, Irish coast
Estimated number and	N/A
weight of salmon to be	
retained	
Resources	
Estimated cost of the	£25,000 per annum (Phase 1 – studentship)
research project	
Number of participating	5
scientists	
Name of coordinating	Dr Kevin Friedland (US), Dr Niall O' Maoileidigh (Ireland)
scientist in charge of	
project	37/4
Details of research	N/A
vessels, e.g. name,	
and description of	
vessel	
Type and amount of	N/A
gear and other	4 V 4 A
equipment to be used	
Details of any collaborating	USA
countries	

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Party or relevant jurisdiction	EU – Ireland
Title of project	National Coded Wire Tagging and Tag Recovery Programme
Objective of research	The programme was initiated in 1980 to:
project	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
	Evaluate the potential of a salmon ranching industry in Ireland
Brief description of research	Up to 500,000 salmon smolts are tagged with coded wire tags and
project	released from 9 Irish rivers annually. Tag recovery takes place in
	scanning programmes in Greenland and Faroes and in experimental
	trawling in the Norwegian Sea and North of Scotland. Subsequently,
	tags are recovered from nomewater fisheries at over 40 locations in
	aromined for tags (150,000 to 250,000 figh) and actual tag recovery
	(unraised) can be as high as 6% for specific groups
Dates during which research	Tagging November to April
will take place	Recovery Post-smolts – May to July (Norwegian Sea)
will allo place	September-November (Faroes)
	Grilse – May to November
	MSW – January to November
Area in which research will	Tag recover
take place	Post-smolts Norwegian Sea, Wyville Thompson Ridge, North of
-	Scotland, North of Faroes
	Grilse West Greenland, Irish coastal fisheries, Irish rivers
	MSW North of Faroes, Irish coastal fisheries, Irish rivers
Estimated number and	Up to 200,000 adults may be examined and cored to retrieve tags.
weight of salmon to be	Up to 40 post-smolts may be recovered in high seas experimental
retained	fisheries of Faroes and Norwegian Sea
Resources	
Estimated cost of the	£300,000 per annum nationally funded (does not include sampling in
research project	experimental fisheries in high seas, etc.)
Number of participating	5
Name of acordinating	Dr Niell O' Meeileidich
scientist in charge of	Dr Mail O Maoileidigh
project	
Details of research	
vessels e a name	
registration, call sign	
and description of	
vessel	
Type and amount of	
gear and other	
equipment to be used	
Details of any collaborating	Norway, UK, Faroes
countries	Strand Stra

Party or relevant jurisdiction	EU – Ireland
Title of project	Assessment of the levels of the parasite Lepeophtheirus salmonis on
	Atlantic salmon post-smolts in salmon aquaculture bays along
	Ireland's western seaboard.
Objective of research	To determine whether sea lice from marine salmon farms are a
project	contributory factor in increased marine mortality of salmon post-
	smolts migrating from bays with salmon aquaculture.
	A further objective is to other information on salmon post small
	migration patterns
Brief description of research	Trawling is undertaken using the Fishlift live aquarium to conture
project	salmon post-smolts in selected have along Ireland's Western seaboard
project	Salmon post-smolts are examined for sea lice and data is collected on
	post-smolt diet, growth and migration. Trawling further off-shore has
	provided information on post-smolt migration patterns.
Dates during which research	First week in May, 2002
will take place	5
Area in which research will	South-West Coast (Kenmare Bay), West Coast (Killary Harbour,
take place	Bertraghboy Bay, Clew Bay), North-West Coast (Inver Bay).
Estimated number and	
weight of salmon to be	Up to 250 post-smolts
retained	
Resources	C20.000
research project	120,000
Number of participating	Тууо
scientists	1.40
Name of coordinating	Dr. Patrick Gargan, Central Fisheries Board
scientist in charge of	
project	
Details of research	Naomh Jude, based in Rossaveel, Connemara, Co Galway.
vessels, e.g. name,	85 ft pelagic trawler, 850 HP.
registration, call sign	
and description of	
vessel	
Type and amount of	Salmon smolt surface trawl with Spectra ropes. Fishlift live aquarium,
gear and other	separator frame and cod-end.
equipment to be used	The second se
Details of any collaborating	None at present. It is intended to expand the post-smolt migration work
countries	in inture years with the possible inclusion of Scottish scientists.

Party or relevant jurisdiction	EU – Finland
Title of project	Temporal variation in abundance of the northern-most populations of
	Atlantic salmon with emphasis on the River Tana
Objective of research project	To examine the importance of ocean climate, predation, marine fisheries, and smolt production as primary factors influencing the abundance of the northern-most and highly productive populations of Atlantic salmon, with emphasis on the River Tana. The sub-goals are to:
	 Examine the influence of ocean climate on temporal variation in Atlantic salmon abundance and life history parameters of River Tana salmon and co-variation with salmon from other northern rivers Evaluate the impact of predation by marine fish and birds on the abundance of River Tana salmon Determine smolt and adult salmon abundance, initially, from one tributary, as an index of marine survival for the River Tana system Develop management plans for northern Atlantic salmon rivers by
Brief description of research .project	integrating biological and local knowledge of the resource Variation in salmon abundance and influence of ocean climate on both abundance and life history parameters
	 Analysis of the variation in River Tana salmon abundance, life history parameters, and scale growth characteristics Associative linkages with ocean climate data Co-variation among other northern salmon rivers
	Impact of predation by marine fish and birds
	• Stomach analyses of goosanders and cod in the Tana estuary
	Smolt and adult salmon abundance: index of marine survival
	• Index river, a tributary of the Tana river
	Integration of biological information into the management of northern Atlantic salmon rivers
	 Evaluation and review of current management strategies Consultation with local administrations, fishery owners and organizations
	 Integration of updated biological information, and provide recommendations for new management measures, if required
Dates during which research will take place	2002-2005
Area in which research will take place	River Teno (Finland, Norway), estuary, fjord and adjacent areas in the Barents Sea (Norway)

Estimated number and weight of salmon to be retained	-
Resources	
Estimated cost of the research project	Approximately £430,000
Number of participating scientists	10-12
Name of coordinating scientist in charge of project	Dr Martin Svenning, NINA Tromso, Norway
Details of research vessels, e.g. name, registration, call sign and description of vessel	-
Type and amount of gear and other equipment to be used	
Details of any collaborating countries	Norwegian Institute for Nature Research, Co-ordinating Institution Department of Biology and Nature Conservation, Agriculture University of Norway Norwegian College of Fishery Science, University of Tromsø Tromsø University Museum Department of Environmental Affairs, Office of the County of Finnmark Finnish Game and Fisheries Research Institute Polar Research Institute of Marine Fisheries and Oceanography, Murmansk, Russia Department of Fisheries and Oceans - Canada

4. ICELAND

Party or relevant jurisdiction	Iceland Institute of Freshwater Fisheries, Reykjavik
Title of project	Return rate of salmon in three index rivers in Iceland in relation to population and environmental factors
Objective of research project	To monitor the status and trends in salmon stocks in Iceland
Brief description of research project	Complete study of all life stages in 3 index rivers of 3 main salmon regions in Iceland. Adult count, catch statistics, spawning and juvenile surveys, smolt count and microtagging, return rate of 1 and 2 SW salmon. Comparison to environmental factors at sea and in river as well as to populations factors. Less extensive research done in more rivers in the regions
Dates during which research will take place	Ongoing for the last 10 years and will continue
Area in which research will take place	Iceland and surrounding ocean
Estimated number and weight of salmon to be retained	Some 100's of smolts are being sacrificed every year
Resources	
Estimated cost of the research project	£96,000 per annum (includes all electrofishing surveys, operation of smolt traps, tagging, counting of adult fish, scale sampling and data analysis
Number of participating scientists	5
Name of coordinating scientist in charge of project	Thorolfur Antonsson
Details of research vessels, e.g. name, registration, call sign and description of vessel	Not relevant
Type and amount of gear and other equipment to be used	Traps, tagging etc.
Details of any collaborating countries	Within ICES and Salmodel (EU project)

Party or relevant jurisdiction	Iceland
	Institute of Freshwater Fisheries, Reykjavik
Title of project	Survival at sea of 1- and 2-sea-winter salmon in relation to oceanic conditions
Objective of research project	To study the changes in the ratio of 1SW:2SW salmon in Iceland
Brief description of research project	Accurate catch statistics reflect the trends in stock size and composition of Icelandic salmon. These changes are studied in relation to oceanic and climatic factors. Environmental factors from various sources, satellite data, data on the internet, etc.
Dates during which research will take place	Ongoing
Area in which research will take place	Iceland. Desk study
Estimated number and weight of salmon to be retained	0
Resources	
Estimated cost of the research project	£64,000 per annum (includes cost of assembling environmental data and catch data (approximately 70% of total) and their subsequent analysis (approximately 30% of total)
Number of participating scientists	3
Name of coordinating scientist in charge of project	Sigurdur Gudjonsson
Details of research vessels, e.g. name, registration, call sign and description of vessel	Not relevant
Type and amount of gear and other equipment to be used	
Details of any collaborating countries	Within ICES and Salmodel (EU project)

Party or relevant jurisdiction	Iceland Institute of Freehwater Ficherice, Penkinyik
Title of project	Migratian of smalte through the actuant of Diver Ellidean Jealand
The of project	Migration of smolts through the estuary of Kiver Enduar, iceland
Objective of research	To monitor the migratory benaviour of smolts from the River Elifdaar
project	in the estuary and fjord
Brief description of research	With the use of acoustic tags and auto-recording receivers, smolt migration behaviour is recorded through the estuary and small ford.
Dates during which research will take place	2001-2002
Area in which research will take place	Estuary and fjord of R. Ellidaar
Estimated number and weight of salmon to be retained	Some 10's of smolts
Resources	
Estimated cost of the research project	£96,000 per annum
Number of participating scientists	4
Name of coordinating scientist in charge of project	Sigurdur Gudjonsson
Details of research vessels, e.g. name, registration, call sign and description of vessel	Small boats
Type and amount of gear and other equipment to be used	Acoustic tags and auto recording receivers
Details of any collaborating	None
countries	

Party or relevant jurisdiction	Iceland Institute of Freshwater Fisheries, Vagnhofda 7, IS - 110 Reykjavik Iceland <i>in co-operation with</i> Marine Research Institute Skulagata 4, Post Box 1390 IS - 121 Reykjavik Iceland
litle of project	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)
Objective of research project	To investigate the temporal and spatial distribution of DST-tagged salmon in the N-Atlantic: - spatial distribution and temperature preferences - growth in relation to environmental parameters - by-catch of salmon in other pelagic fisheries on the high seas - diurnal depth distribution
Brief description of research project	The project is a joint effort between Iceland, Norway & Faroe Islands. Study period 2002-2006 (Taggings within 2002-2004).
	The project is based on experiences and results from earlier investigations undertaken by the participating countries. In Iceland tagging of Atlantic salmon (1SW & 2SW) with DSTs started in 1993 and has been carried out since. These studies provided information on migration behaviour of homing salmon in oceanic and coastal waters and gave valuable methodological experience (tagging, data evaluation etc.) DST development work was carried out in parallel and resulted in new generation smaller DSTs that will be used in the study described here. Recent studies carried out by Faroe Islands and Norway have given valuable information on Atlantic salmon in the ocean and also resulted in new research equipment such as the pelagic trawl equipped with Fish Lifter MKII designed to catch salmon alive. Taken together these developments provide a platform for this study and in order to use that opportunity these Nordic nations have linked their research activity.
	In 2002-2004 we will capture post-smolts and grilse using salmon pelagic trawl. Captured fish will be tagged internally with DSTs and additional fish will be tagged solely with external conventional T-bar tags. The DSTs we use (DSTmilli and DSTmicro) will measure both fish depth (pressure) and temperature. Angling catches in home-waters will be the basic way of recovering the DSTs.
Dates during which research will take place	Research schedules and corresponding funding have been approved by the Icelandic Research Council and the Nordic Council of Ministers. The study taggings starts in summer/autumn 2002 and will be continued in 2003 and 2004. Analyses and reporting will be completed in 2006.
Area in which research will take place	North Atlantic: The Icelandic surveys (tagging etc.) will mostly be within the Icelandic 200 mile economical zone. The Faroese surveys will mostly be within the Faroese economical zone. The Norwegian surveys will mostly be within the Norwegian Sea.

Estimated number and	20 - 50 salmon (> 600 g) per year,
weight of salmon to be	i.e. 20 - 50 kg pr year of damaged fish.
retained	All viable fish will be tagged and released.
Resources	
Estimated cost of the research project	Total cost for Icelandic component of research is £88,000 per annum. The total cost of participating countries is estimated to be £207,000 per annum.
Number of participating scientists	2 in Iceland & a total of 5 persons for the overall Nordic project
Name of coordinating	Johannes Sturlaugsson, Institute of Freshwater Fisheries, is
scientist in charge	coordinating scientist of the Icelandic part and
of project	Marianne Holm, Institute of Marine Research, Bergen, Norway is coordinating scientist in charge of the overall Nordic project (Norway, Faroe Islands and Iceland).
Details of research vessels, e.g. name, registration, call sign	R/V "Arni Fridriksson", Iceland, 70 m research vessel fully equipped for high seas investigations
and description of vessel	R/V "Johan Hjort", Norway, LDGJ, 65 m research vessel fully equipped for high seas investigations
	R/V "Magnus Heinason", Faroes, research vessel fully equipped for high seas investigations
Type and amount of gear and other equipment to be used	Each ship is scheduled to be using a pelagic trawl equipped with Fish Lifter MKII (Holst & MacDonald 2000) designed to catch salmon alive.
	A total of 150 DSTs (DSTmicro & DSTmilli from Star-Oddi) will be used for internal tagging of post-smolts and grilse.
	The DSTs will sample information on both fish depth (pressure) and temperature for periods up to 2 years.
Details of any collaborating countries	The Faroese Fishery Laboratory, Torshavn.
	The Institute of Marine Research, Norway

Party or relevant jurisdiction	Iceland
	Institute of Freshwater Fisheries; University of Iceland, Dept. of
	Biology
Title of project	Variation in growth and return rates of Atlantic salmon from three
	Icelandic rivers.
Objective of research	To increase knowledge of growth and environmental factors
project	influencing return rates and in general life history of different salmon stocks in Iceland.
Brief description of research project	Series of scale samples are studied to estimate growth rate in fresh water and at sea in three Icelandic salmon stocks from three distinct geographical areas. The data is correlated to environmental data and return rates. The second research interest is to compare groups of smolts, individually microtagged from those rivers, to see possible differences in growth history in fresh water between recaptured salmon and those which don't return to the river. The data is also used to estimate the accuracy of different back calculation methods.
Dates during which research	2001-2003
will take place	
Area in which research will	River Elliðaár in S- Iceland
take place	River Vesturá in N- Iceland
	River Vesturdalsá in NA- Iceland
Estimated number and	Scale samples taken from 2000-3000 adults.
weight of salmon to be	Microtagging and scale sampling from 6000-8000 smolts
retained	
Resources	
Estimated cost of the	£20,000 - £40,000 per annum
research project	
Number of	3-5
participating scientists	
Name of coordinating scientist in charge of project	Thorkell Heidarsson (thorkell@veidimal.is)
Details of research vessels, e.g. name, registration, call sign and description of vessel	None
Type and amount of	Car for field work
gear and other	Microtagging gear
equipment to be used	Dissecting microscope
	Image analyses software/hardware
	Database for data handling
	Computers etc.
Details of any collaborating	None so far
countries	

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5. NORWAY

Party or relevant jurisdiction	Norway
Title of project	The importance of early marine feeding on the growth and survival of Atlantic salmon post-smolt in Norwegian fjords
Objective of research project	The principal objective of the project (2002-2006) is to study the importance of early marine feeding on post-smolt growth and survival in coastal areas. The sub-goals are to:
	 Analyse spatial variation in early marine post-smolt recomp and growth along a north-south geographic scale (comparative study) Investigate how post-smolt feeding and growth is associated with: timing of smolt descent, marine prey availability, parasite infection, fjord migration and abiotic factors (case study)
Brief description of research project	Much of the variation observed in marine survival of Atlantic salmon may be explained by differences in early post-smolt feeding and subsequent growth. Results from a pre-project indicate a prolonged fjord migration of post-smolts and extensive feeding on energy rich marine prey in northern Norway, while results from southern Norway suggest a shorter fjord residency and lower degree of feeding. However, feeding intensity varied annually within several of the systems, which may be related to variability in prey abundance on both temporal and spatial scales. We hypothesise that this may help explain why large variation in relative abundance is observed among years and why salmon populations are generally regarded as less sustainable in the south. Here we propose to study: (A) the importance of early marine feeding and growth of post-smolts on a north-south geographical scale (comparative study). Furthermore, a detailed explanatory case study (B) will provide complementary results that will assist in evaluating important relationships among smolt run timing, marine prey availability, fjord migratory behaviour, incidence of marine parasites, and abiotic factors as they possibly relate to the subsequent growth and variation in abundance of adult salmon. This approach will generate new knowledge important for future management of salmon populations, and contribute to a better understanding of the fluctuations in return rates of adult salmon.
Dates during which research will take place	5 years study, field work mainly during May/June
Area in which research will take place	Central and Northern Norway
Estimated number and weight of salmon to be retained	

Resources	
Estimated cost of the research project	 Funding from Norwegian Research Council: 2002 - £56,000; 2003 - £96,000; 2004 - £96,000; 2005 - £64,000; 2006 - £56,000. In addition, approximately 25% own funding from participating institutions and cost of operating research vessel (from Norwegian College of Fishery Science) estimated as: 2002 - £74,500; 2003 - £71,000; 2004 - £57,000; 2005 - £49,750; 2006 - £12,250. Total expenditure: 2002 - £130,500; 2003 - £167,000; 2004 - £153,000; 2005 - £113,750; 2006 - £68,250.
Number of participating scientists	8
Name of coordinating scientist in charge of project	Bengt Finstad
Details of research vessels, e.g. name, registration, call sign and description of vessel	F/F Hyas and F/F Johan Ruud
Type and amount of gear and other equipment to be used	Fish lift trawl
Details of any collaborating countries	 Norwegian Institute for Nature Research in cooperation with Norwegian College of Fishery Science (NFH), University of Tromsø Norwegian Institute of Fisheries and Aquaculture (FF), Tromsø Department of Fisheries and Oceans, Newfoundland, Canada

Party or relevant jurisdiction	Norway
Title of project	Development of models to predict marine survival and return of salmon to Norway.
Objective of research project	To develop models to predict marine survival and return of Atlantic salmon to Norway.
Brief description of research project	 To 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 Cooperate with scientists from other countries working with similar research.
Dates during which research will take place	2002-2005
Area in which research will take place	Utilize information already available
Estimated number and weight of salmon to be retained	None
Resources	
Estimated cost of the research project	£50,000 - £60,000 per annum
Number of participating scientists	7-10
Name of coordinating scientist in charge of project	Lars Petter Hansen
Details of research vessels, e.g. name, registration, call sign and description of vessel	
Type and amount of gear and other equipment to be used	
Details of any collaborating countries	USA, Canada, (EU?)

Party or relevant jurisdiction	Norway
Title of project	Marine survival and exploitation of salmon from the Rivers Figgjo,
	Imsa and Drammenselv.
Objective of research	1. Estimation of marine survival
project	2. Estimation of marine exploitation
	3. Data input in predictive models
Brief description of research	Maintain time series of smolt taggings (wild and hatchery reared) and
project	tag returns in index rivers. Use the information to study fluctuations in
	marine survival and growth as well as describe changes in marine
	exploitation.
Dates during which research	Long-term ongoing monitoring project
will take place	
Area in which research will	Tagging in rivers Figgjo, Imsa and Drammenselv with tag recovery
take place	programme in fisheries along Norwegian coast and elsewhere
Estimated number and	
weight of salmon to be	
retained	
Resources	
Estimated cost of the	Approximately £104,000 per annum
research project	
Number of participating	3
scientists	
Name of coordinating	Lars P. Hansen; Nina Jonsson
scientist in charge of	
project	
Details of research	
vessels, e.g. name,	
registration, call sign and	
description of vessel	
Type and amount of gear	
and other equipment to	
be used	
Details of any collaborating	
countries	

Party or relevant jurisdiction	Norway
Title of project	Distribution and ecology of post-smolts and salmon at sea
Title of project Objective of research project Brief description of research project	By analysing age, growth, migratory paths in relationship to environmental conditions and competitors, describe and expand the understanding of salmon marine life history in order to provide explanations to observed variations in salmon survival. Test hypotheses on : 1. Independence of/ relationships between food availability & post- smolt feeding and growth 2. Post-smolt migration and distribution in time and space 3. Salmon stock separation/overlap in time and space The oceanic phase of the Atlantic salmon and the influence of the marine environment encountered upon growth and survival of salmon stocks is increasingly recognised as an important stock regulatory
	factor among salmon scientists and managers. Knowledge of the migrations, the geographic distribution and general ecology of post- smolts and larger Atlantic salmon in oceanic waters are still sparse. The project proposal is a follow up of the pre-project work (NFR-nr 145890/78). The historical samples worked up during the pre-project will be analysed and published. Based on data needs identified during the workshop new data will be collected on cruises in 2002-2005 and the project will also furnish historical and new post-smolt data to several of the projects applied for to the RCN. Within the scope of a post-graduate fellowship, growth potential and patterns of post-smolts will be analysed by an experimentation of the project will and patterns of post-smolts and public the project sample of the project and patterns of post-smolts will be an experimentation of the project sample of the project and patterns of post-smolts will be an experimentation of the project sample of the project and patterns of post-smolts will be an experimentation of the project of the project project of the project project project of the project pro
	will be examined by energetic content in fish and feed, and by computer-based image analysis of scale samples. The method will be useful to assess influence of environmental traits on post-smolt growth and survival and may prove useful to separate northern and southern European salmon stocks.
Dates during which research will take place	June 20 – July 8; Main project described above August $1 - 17$ (post-smolts may be captured in conjunction with the annual herring surveys)
Area in which research will take place	The Northern North Sea and the Norwegian Sea
Estimated number and weight of salmon to be retained	 50 salmon, total 150 kg 250 post-smolts, total 25 kg

Resources	
Estimated cost of the research project	£175 000 per annum, including Ph.D. grant, and running costs, matching funds for ships and scientists at IMR and cooperative institutes
Number of participating scientists	9 scientists
Name of coordinating scientist in charge of project	Marianne Holm, Senior Scientific officer
Details of research vessels, e.g. name, registration, call sign and description of vessel	 R/V "Johan Hjort", Norway, LDGJ, 65 m research vessel fully equipped for year-round high seas research operations R/V "G.O. Sars", Norway, 70 m research vessel fully equipped for year-round high seas research operations R/V "Michael Sars", Norway, 47 m research vessel equipped for high seas research during summertime
Type and amount of gear and other equipment to be used	Each ship will be using a specially designed trawl equipped with Fish Lifter MKII (Holst & MacDonald 2000) designed to catch salmon alive
Details of any collaborating countries	 Institute of Marine Research, P.O. Box 1870 Nordnes, N- 5817Bergen, Norway Fisheries Research Institute, Torshavn, Faroe Islands Marine Institute, Dublin, Ireland

6. RUSSIAN FEDERATION

Project No. R1

Title of projectMonitoring of the stock status, abundance assessment and provision of advice on allowable level of harvest of Atlantic salmon.Objective of research projectTo derive estimates of survival of juveniles and adult return rates, estimates of natural and fishing mortality, to study the dynamics of population characteristics, to estimate allowable catch.Brief description of research projectInformation is collected on the quality of spawning habitat of Atlantic salmon, the impact of human activities on the habitat, and the biology of salmon (age structure, size distribution, weight, sex composition, fecundity, proportion of various biological groups in the spawning run, dynamics of smolt migration and spawning run). The behaviour of adults during the freshwater period of life is studied, estimates of part density are derived, spawning requirements is monitored, the condition and success of spawning is assessed, and the harvestable surplus is determined. Freshwater fish fauna and interactions of Atlantic salmon with other species are studied, trophic and territorial competitors, and predators of juveniles are identified. Estimates of natural and fishing	Party or relevant jurisdiction	Russian Federation
advice on allowable level of harvest of Atlantic salmon.Objective of research projectTo derive estimates of survival of juveniles and adult return rates, estimates of natural and fishing mortality, to study the dynamics of population characteristics, to estimate allowable catch.Brief description of research projectInformation is collected on the quality of spawning habitat of Atlantic salmon, the impact of human activities on the habitat, and the biology of salmon (age structure, size distribution, weight, sex composition, fecundity, proportion of various biological groups in the spawning run, dynamics of smolt migration and spawning run). The behaviour of adults during the freshwater period of life is studied, estimates of part density are derived, spawning requirements are determined, the level of attainment of spawning is assessed, and the harvestable surplus is determined. Freshwater fish fauna and interactions of Atlantic salmon with other species are studied, trophic and territorial competitors, and predators of juveniles are identified. Estimates of natural and fishing	Title of project	Monitoring of the stock status, abundance assessment and provision of
Objective of research projectTo derive estimates of survival of juveniles and adult return rates, estimates of natural and fishing mortality, to study the dynamics of population characteristics, to estimate allowable catch.Brief description of research projectInformation is collected on the quality of spawning habitat of Atlantic salmon, the impact of human activities on the habitat, and the biology of salmon (age structure, size distribution, weight, sex composition, fecundity, proportion of various biological groups in the spawning run, dynamics of smolt migration and spawning run). The behaviour of adults during the freshwater period of life is studied, estimates of parr density are derived, spawning requirements are determined, the level of attainment of spawning is assessed, and the harvestable surplus is determined. Freshwater fish fauna and interactions of Atlantic salmon with other species are studied, trophic and territorial competitors, and predators of juveniles are identified. Estimates of natural and fishing	- 12 ² - 62	advice on allowable level of harvest of Atlantic salmon.
projectestimates of natural and fishing mortality, to study the dynamics of population characteristics, to estimate allowable catch.Brief description of research projectInformation is collected on the quality of spawning habitat of Atlantic salmon, the impact of human activities on the habitat, and the biology of salmon (age structure, size distribution, weight, sex composition, fecundity, proportion of various biological groups in the spawning run, dynamics of smolt migration and spawning run). The behaviour of adults during the freshwater period of life is studied, estimates of parr density are derived, spawning requirements are determined, the level of attainment of spawning is assessed, and the harvestable surplus is determined. Freshwater fish fauna and interactions of Atlantic salmon with other species are studied, trophic and territorial competitors, and predators of juveniles are identified. Estimates of natural and fishing	Objective of research	To derive estimates of survival of juveniles and adult return rates,
population characteristics, to estimate allowable catch.Brief description of research projectInformation is collected on the quality of spawning habitat of Atlantic salmon, the impact of human activities on the habitat, and the biology of salmon (age structure, size distribution, weight, sex composition, fecundity, proportion of various biological groups in the spawning run, dynamics of smolt migration and spawning run). The behaviour of adults during the freshwater period of life is studied, estimates of parr density are derived, spawning requirements are determined, the level of attainment of spawning is assessed, and the harvestable surplus is determined. Freshwater fish fauna and interactions of Atlantic salmon with other species are studied, trophic and territorial competitors, and predators of juveniles are identified. Estimates of natural and fishing	project	estimates of natural and fishing mortality, to study the dynamics of
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with other species are studied, trophic and territorial competitors, and predators of juveniles are identified. Estimates of natural and fishing	~	determined. Freehwater fish fours and interactions of Atlantic column
predators of juveniles are identified. Estimates of natural and fishing		with other species are studied trophic and territorial competitors, and
predators of judenices are identified. Estimates of natural and fishing		predators of inveniles are identified. Estimates of natural and fishing
mortality of salmon are derived. Estimates of survival and adult feturn		mortality of salmon are derived. Estimates of survival and adult return
rates are derived. To study the population characteristics tagging of adults		rates are derived. To study the population characteristics tagging of adults
and smolts with external tags is carried out.		and smolts with external tags is carried out.
Dates during which research Annual monitoring programmes (since 1958).	Dates during which research	Annual monitoring programmes (since 1958).
will take place	will take place	
Area in which research will Rivers Umba, Varzuga, Ponoi, Jokanga, Varzina, Tuloma, Kola, Ura,	Area in which research will	Rivers Umba, Varzuga, Ponoi, Jokanga, Varzina, Tuloma, Kola, Ura,
take place B.Z.Litsa, Pechora, Severnaya Dvina.	take place	B.Z.Litsa, Pechora, Severnaya Dvina.
Estimated number and About 5 000 salmon and 7 500 parr and smolts	Estimated number and	About 5 000 salmon and 7 500 parr and smolts
weight of salmon to be	weight of salmon to be	
retained	retained	
Resources	Resources	
Estimated cost of the Approximately £140,000 per annum	Estimated cost of the	Approximately £140,000 per annum
research project	research project	
Number of participating ~ 25 scientists from PINRO and SevPINRO	Number of participating	~ 25 scientists from PINRO and SevPINRO
scientists	scientists	
Name of coordinating Alexander Zubchenko (PINRO), Igor Studenov (SevPINRO)	Name of coordinating	Alexander Zubchenko (PINRO), Igor Studenov (SevPINRO)
scientist in charge of	scientist in charge of	
project	project	N/A
Details of research N/A	Details of research	N/A
vessels, e.g. name,	vessels, e.g. name,	
registration, call sign	and description of	
and description of	vessel	
Type and amount of Barrier fences electrofishing smalt trans external tags	Tune and amount of	Barrier fences electrofishing smalt trans external tags
gear and other	appeared other	Darrier rendes, electronishing, smort traps, external tags
equipment to be used	equipment to be used	
Details of any collaborating N/A	Details of any collaborating	× / / /
countries		N/A

7. UNITED STATES OF AMERICA

Party or relevant jurisdiction	United States of America
Title of project	Estuary Movements of Pre- and Post-Spawning Adults:
	Dennys River Adult Stocking Assessment
Objective of research	This assessment programme consisted of 8 objectives:
project	1) riverine and estuarine movements of netpen reared adults
	using ultrasonic telemetry;
	2) evaluation of spawning characteristics of these stocked adults
	as compared to wild adults;
	3) assess spawning habitat selection;
	4) post-spawning disposition (immediate out-migrants, kelts, or presumed deceased) and timing of estuary entrance:
	5) monitoring the stage-specific contribution attributable to
	natural reproduction by these stocked adults;
	6) estimate fry emergence rates for progeny of these stocked
	adults;
	7) develop stage-specific survival estimates within a control site;
	8) evaluate the reproductive success of progeny originating from
	these stocked adults.
D ·	
Brief description of research project	During October 2000, 96 netpen reared, two-sea-winter, mature, Dennys River-specific Atlantic salmon were stocked into the mainstem and estuary areas of the Dennys River. This represents 100% of the minimum egg deposition rate for the Dennys River drainage as determined by stock-specific fecundity estimates and habitat survey data according to established management guidelines. A Memorandum of Understanding outlining this trial programme and the need to fully evaluate it was drafted and is intended to be signed by the National Marine Fisheries Service, U.S. Fish & Wildlife Service, State of Maine natural resource agencies, and Atlantic Salmon of Maine. Additional netpen reared adults were stocked in the Dennys River and estuary areas in October 2001. A comprehensive Assessment Plan was developed to monitor the progress of these adults and the progeny of these adults over a period of 6 years.
Dates during which research	October 2000 – October 2006
will take place	Deres Direct
Area in which research will	Colored Device
take place	Codscook Bay
Entimated much as and	Guil of Iviaine
estimated number and	it is anticipated that no Atlantic salmon will be retained during this
retained	project.
retained	

Resources	
Estimated cost of the research project	Approximately £14,000 per annum
Number of participating scientists	~3
Name of coordinating scientist in charge of project	Tim Sheehan NOAA Fisheries, Woods Hole, MA
Details of research vessels, e.g. name, registration, call sign and description of vessel	Equipment deployed from small research boats and leased commercial vessels. Vessel use is subject to change annually.
Type and amount of gear and other equipment to be used	Ultrasonic Telemetry Tags (~50-60 annually) Stationary Ultrasonic Receivers (12-15 annually)
Details of any collaborating countries	An ultrasonic receiver array deployed by a Canadian investigator (G. Lacroix) is capable to detecting and recording tagged fish.

Party or relevant jurisdiction	United States of America
Title of project	Estuary and Nearshore Movements of Migrating Atlantic Salmon Smolts: Project: Ultrasonic Telemetry of Smolts and Post-smolts in the Narraguagus River and Narraguagus Bay
Objective of research	1) evaluate migration timing and pathways in the lower
project	Narraguagus River and Narraguagus Bay
15	2) estimate survival of migrating smolts and post-smolts
Brief description of research project	Analysis of telemetry data collected from 1997-1999 in the Narraguagus River system continued during 2001. During these years, minimums of 100 wild Atlantic salmon smolts were surgically implanted with ultrasonic tags. We prepared, tested, and deployed stationary detection units during mid-April in Narraguagus Bay to monitor the emigration of Atlantic salmon smolts. We deployed a total of 26 units in the Narraguagus River (4), Estuary (4), and Bay (18) to evaluate the number of smolts passing ecological transition zones. Preliminary results suggest that a substantial portion of marine mortality may be occurring in nearshore habitats. We also determined the migration routes as they enter the Gulf of Maine. The mouth of Narraguagus Bay has two major corridors: Trafton (3.5 km) and Strout (1.6. km) that are delineated by Dyer Island. Of the smolts detected in the outer marine array, 90% exited the Trafton corridor. Within the Trafton Channel, the majority of smolts were travelling closer to Trafton Island than either shore. These results were consistent in all three years. The results from this study will be used to design an expanded programme in 2002 that will include monitoring outside embayments, further into the Gulf of Maine. If feasible we will try to encircle where the Bay encounters the Eastern Maine Coastal Current in 2002
Dates during which research	April-June, 2002-2004
will take place	
Area in which research will	Narraguagus River
take place	Narraguagus Bay
Estimated number and	It is anticipated that no Atlantic salmon will be retained during this
weight of salmon to be	project. Ultrasonic transmitters will be implanted in up to 100 wild
retained	smolts annually.

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Resources	
Estimated cost of the research project	Approximately £49,000 per annum
Number of participating scientists	~3
Name of coordinating scientist in charge of project	Dr. John Kocik NOAA Fisheries, Orono, Maine
Details of research vessels, e.g. name, registration, call sign and description of vessel	Equipment deployed from small research boats and leased commercial vessels. Vessel use is subject to change annually.
Type and amount of gear and other equipment to be used	Ultrasonic Telemetry Tags (~60-100 annually) Stationary Ultrasonic Receivers (30-40 annually)
Details of any collaborating countries	Collaborative work with Canada (G. Lacroix, PI) was initiated in 2001 that will determine if US fish enter the Bay of Fundy and if Canadian fish enter Gulf of Maine regions that the United States monitors. This will be accomplished through a coordinated effort where all units deployed will be capable of detecting tags released by both programmes.

Party or relevant jurisdiction	United States of America
Title of project	Comprehensive Evaluation of Marine Survival of Hatchery Stocked
	Smolts: Migration behavior and success of Dennys River Smolts
Objective of research	1) evaluate migration speed and behavior from lower river release
project	sites through estuarine habitat
	2) estimate survival of migrating smolts and identify areas where
	mortality may be occurring
Brief description of research project	The Maine Atlantic Salmon Technical Advisory Committee (TAC) developed and fishery managers supported the experimental evaluation of river-specific Atlantic salmon smolts in the Dennys River for a
	investigations were initiated in 2001 to estimate nearshore marine
	mortality and migration routes of these stocked smolts. Seventy fish
	with surgically implanted ultrasonic pingers will be released and their
	movements evaluated with an array. 12 Automated Pinger Detection
	Units will be deployed to provide 100% coverage of migration routes
	through Cobscook Bay. A weir-based smolt trap will be operated and
	utilized to evaluate survival immediately prior to entering the marine
Data Aning which was such	system.
will take place	April – October, 2001-2005
Area in which research will	Dennys River
take place	Cobscook Bay
Estimated number and	It is anticipated that no Atlantic salmon will be retained during this
weight of salmon to be	project. Up to 200 hatchery smolts will receive surgically implanted
retained	ultrasonic tags annually.
Kesources	1
research project	Approximately £28,000 per annum
Number of participating scientists	~3
Name of coordinating	Tim Sheehan
scientist in charge of	NOAA Fisheries, Woods Hole, MA
project	
Details of research	None
vessels, e.g. name,	
registration, call sign	
and description of	
Vessel	Nemes Illiterarie Teas
Type and amount of	Venico Ultrasonic Tags
acuinment to be used	VEIIICO V KZ KECEIVEIS
Details of any collaborating	Collaborative work with Canada (G. Lagrain) was initiated in 2001
countries	that will determine if US fish enter the Bay of Fundy and if Canadian fish enter Gulf of Maine regions that the United States monitors. This will be accomplished through a coordinated effort where all units deployed will be capable of detecting tags released by both programmes.

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Party or relevant jurisdiction	United States of America
Title of project	Comprehensive Evaluation of Marine Survival of Hatchery Stocked
	Smolts: Dennys River Smolt Stocking Assessment
Objective of research	1) evaluate smolt to adult survival rates of Atlantic salmon smolts
project	based on temporal and spatial patterns of release
	2) determine optimal stocking levels to achieve stock rebuilding
	objectives
Brief description of research	The Maine Atlantic Salmon Technical Advisory Committee (TAC)
project	developed and fishery managers supported the experimental evaluation
	of fiver-specific Atlantic salmon smolts in the Dennys River for a
	minimum of five years (2001-2006). Stocking fates were developed
	based on retrospective analysis of Penodscol River stocking and adult
	indicated that a range of 32 000 (low) to 56 000 (high) would result in
	a 75% probability of achieving 2SW Atlantic salmon returns of at least
	67 (low) or 117 (high) adults. A total of 52 000 smolts were stocked
	in 2001, and an estimated 50,000 will be released in 2002. All stocked
~	fish will receive an elastomer mark and adipose fin clip to allow
	quantitative evaluation of survival in relation to release location and
	time. A weir-based smolt trap will be operated and utilized to evaluate
	survival immediately prior to entering the marine system. Returning
	adults will be enumerated and identified at a weir-based adult trap.
Dates during which research	April – October, 2002-2005
will take place	
Area in which research will	Dennys River
take place	Cobscook Bay
Estimated number and	It is anticipated that no Atlantic salmon will be retained during this
retained	project.
Resources	
Estimated cost of the	Approximately f14 000 per annum
research project	Approximately 214,000 per annum
Number of participating	~3
scientists	
Name of coordinating	Dr. Russell Brown
scientist in charge of	NOAA Fisheries, Woods Hole, MA
project	
Details of research	None
vessels, e.g. name,	
registration, call sign	
and description of	
vessel	
Type and amount of	Weir-Based Smolt Trap
gear and other	Weir-Based Adult Trap
equipment to be used	Elastomer Marks and Marking Equipment
D / 1 / 1 /	
Details of any collaborating	Elastomer marks may be recovered during the NASCO international
countries	cooperative sampling program at west Greenland.

Party or relevant jurisdiction	United States of America
Title of project	Evaluation of Estuary and Nearshore Marine Distributions of Atlantic
67 June 1	Salmon Post-Smolts in Penobscot Bay and the Gulf of Maine
Objective of research	1) evaluate nearshore distribution and migration pathways of
project	smolts and post-smolts
	2) estimate the relative contribution of stocked hatchery smolts to
	overall post-smolt populations
	3) evaluate the relative contribution of spatially and temporally
	distinct smolt releases on post-smolt populations
	4) evaluate the physiological condition of post-smolts in marine
	environments
Brief description of research	Synchronous declines in the survival of Atlantic salmon smolts
project	throughout North America indicate a sharp decline in marine survival.
	Many investigators hypothesize that this decline occurs early in the
	marine phase, as Atlantic salmon smolts transition from freshwater to
	marine environments. In May 2001, a surface pelagic trawl survey
	was initiated in the Penobscot Bay estuary and nearshore waters of the
	Gulf of Maine to sample hatchery and naturally reared Atlantic salmon
	smolts in the marine environment. To capture post-smolts in open
	marine waters, we pair-trawled a Norwegian-designed pelagic net
	through surface waters. During the 9-day survey, a total of 1,458
	Atlantic salmon post-smolts were captured, and salmon were detected
	at 49 of 61 stations occupied during the survey. Biological data
	including size, scale samples, genetic samples, physiology samples,
	and diet composition were collected from a subsample of fish.
	Preliminary analyses of scale samples indicate a low proportion of
	naturally reared fish among captured fish. A total of 355 visual
	implant elastomer marked fish stocked in the Penobscot River were
	recovered during the survey, allowing for assessment of the relative
	contribution of hatchery-stocked fish to post-smolt populations.
	Analysis of collected physiology samples is expected to provide
D + 1 + 1 + 1	information on saltwater transition.
Dates during which research	May-June, 2002-2004
will take place	2003-2004 field work contingent on continued funding
Area in which research will	Penobscot Bay
take place	Guir or Maine
Estimated number and	Although project objectives and methodology strive to minimize
weight of salmon to be	mortality of Atlantic salmon, immediate mortality was estimated to be
retained	8% during the 2001 survey.

Resources	
Estimated cost of the research project	2001:Approximately £98,0002002-2004:Approximately £105,000 per annum2003-2004 field work contingent on continued funding
Number of participating scientists	2
Name of coordinating scientist in charge of project	Dr. Russell Brown NOAA Fisheries, Woods Hole, MA
Details of research vessels, e.g. name, registration, call sign and description of vessel	F/V Nobska (United States) 30-m commercial trawler F/V Morue (United States) 30-m commercial trawler Vessel leases are bid on an annual basis and vessels utilized are subject to change.
Type and amount of gear and other equipment to be used	Post-smolt trawl Standard oceanographic instruments
Details of any collaborating countries	No direct collaboration Parallel post-smolt trawling programme in the Bay of Fundy (G. Lacroix) offers potential for future direct collaboration.

Party or relevant jurisdiction	United States of America
Title of project	Forecasts of Atlantic Salmon Transoceanic Migration: Climate Change
	Scenarios and Anadromy in the North Atlantic
Objective of research	1) develop and evaluate marine migration models for Atlantic
project	salmon from North American and European stocks
	2) evaluate the potential effects of climate change on migration
	patterns for Atlantic salmon
Brief description of research	Atlantic salmon undertake transoceanic migrations as part of their
project	complex anadromous life history. In addition to the impact of climate
	on growth, maturation, and distribution in the ocean, salmon must
	nome to their natal rivers to spawn, the success of which is likely
	impacted by ocean conditions. After rearing in nesh water, samon
	migrations. Since they are entering a new set of habitat regimes the
	climate-related timing of this migration and the conditions they find in
	the coastal ocean are critical. We have developed a migration model
8	that can be validated for most stocks of Atlantic salmon from North
	America and Europe. The probability of migration distribution is
	determined as a function of swimming potential, current vectors, and
	migration orientation. The absence of foraging behavior in the model
	has not significantly compromised its performance, owning to the
	likelihood that prey co-vary with other environmental variables. The
	model was run with forecasted surface temperature and currents for the
	North Atlantic segment of the Climate System Model developed at the
	National Center for Atmospheric Research. These simulations attempt
	to define the range of possible impacts climate change may have on
Data daria di 1	salmon populations.
Dates during which research	2002-2004
A reg in which research will	Area to be modelled includes North Atlantia Ocean
take place	Area to be modelied includes North Atlantic Ocean
Estimated number and	No Atlantic salmon will be sampled or retained during the course of
weight of salmon to be	this project.
retained	ins projeen
Resources	
Estimated cost of the	Not Available
research project	
Number of participating	1
scientists	
Name of coordinating	Dr. Kevin Friedland
scientist in charge of	
project	
Details of research	None
vessels, e.g. name,	
registration, call sign	
and description of	
vessel	
Type and amount of	Computers, Databases
gear and other	
equipment to be used	
Details of any collaborating	Some collaboration with Canadian investigators
countries	

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Party or relevant jurisdiction	United States
Title of project	Stable Isotope Composition of Atlantic Salmon Scales
Objective of research project	The objective of this study is to develop a retrospective time series of stable isotope ratios for the DPS in Maine and the mixed stock samples from the continental stock complex to evaluate the feeding patterns of the stocks over time.
Brief description of research project	Atlantic salmon populations in the North Atlantic have experienced unprecedented declines in abundance during the past two decades. Of greater concern for the management of US salmon populations are the trends in the two-sea-winter salmon, especially those comprising the populations in the ESA distinct population segment. Although studies of climate and salmon survival suggest recruitment is patterned by events early in the post-smolt year, the apparent tele-connection between stock complexes suggests that factors related to life history events later in the post-smolt year or during the one-sea-winter year may be important as well. If growth has decreased in salmon during the post-smolt or one-sea-winter years, survival would likely be negatively impacted. Concomitant with the decline in stock abundance of salmon in the North Atlantic, a number of lines of evidence suggest that growth has also declined in the same time period. It is not known if this decline in size-at-age is a reflection of decreased growth during the post-smolt year or a decline in feeding opportunity when the fish are on the feeding grounds as one-sea-winter salmon. It is also not known if fish from the DPS are suffering the same decreased growth and tracking with the general pool of salmon in the Northwest Atlantic. There is no direct feeding data to approach these problems; however, many investigators have had success in evaluating feeding position with the analysis of stable isotopes in fish hard parts, such as scales. Furthermore, retrospective time series of growth will also be developed to provide an explanatory variable in regard to the feeding patterns.
Dates during which research will take place	2001-2002 Project continuation contingent on additional funding.
Area in which research will take place	Scale samples collected during West Greenland sampling programme and from returning adults in the United States.
Estimated number and weight of salmon to be retained	It is anticipated that no Atlantic salmon will be retained during this project.

Resources	
Estimated cost of the research project	Not Available
Number of participating scientists	1
Name of coordinating scientist in charge of project	Dr. Kevin Friedland, NOAA Fisheries, Amherst, MA
Details of research vessels, e.g. name, registration, call sign and description of vessel	None
Type and amount of gear and other equipment to be used	Standard laboratory and isotope analysis equipment
Details of any collaborating countries	Collaboration with some international investigators to secure scale samples.