

**IP(09)11**

***Protection, Restoration and Enhancement of Salmon Habitat  
Focus Area Report***

***Norway***

## CONTENTS

<b>1</b>	<b>Introduction .....</b>	<b>2</b>
	Objectives of the national management strategy.....	2
	Nature and extent of resource.....	3
	Management entities involved in salmon management .....	3
	Status of stocks, threats to stocks and current management measures.....	4
<b>2</b>	<b>Plan of Action for the Protection and Restoration of Atlantic salmon Habitat .....</b>	<b>6</b>
2.1	Protection of salmon habitat .....	6
	National Salmon River and National Salmon Fjords.....	6
	National protection plan for river systems .....	8
	Status protection of Atlantic salmon habitat according to implementation plan .....	8
2.2	Salmon Habitat Restoration Plan .....	8
	Inventory of Salmon Rivers .....	9
	Plan for Restoration of Salmon habitat .....	9
	Status restoration of Salmon habitat according to implementation plan .....	9
2.3	Acidification and Liming of Acidified Salmon Rivers .....	10
	Background .....	10
	Status of acidification.....	11
	Liming as mitigation Measure in Acidified Salmon Rivers .....	11
	Status liming according to implementation plan.....	12
2.4	Hydropower development and habitat restoration projects .....	12
	Habitat Restoration in Northern Norway .....	13
	Status hydropower development according to implementation plan .....	16

# 1 Introduction

## Objectives of the national management strategy

- 1.1 The legal basis and overall goal for the management of wild Atlantic salmon is expressed in section 1 Objective of the "Act Relating to Salmonids and Fresh-Water Fish etc.":  
*"The objective of the Act is to ensure that natural stocks of anadromous salmonids, fresh water fish and their habitats, as well as other fresh-water organisms, are managed in such a way as to maintain natural diversity and productivity. Within this framework, the Act shall provide a basis for the improvement of stocks with a view to raising yields for the benefit of holders of fishing rights and recreational fishermen.*
- 1.2 Built on this legal basis and a process including extensive stakeholder involvement, specific goals for the management of wild Atlantic salmon were set in 1997 by the Directorate of nature management and approved by the Ministry of environment. These goals have been revised according to a proposal to Parliament (St.prp. nr. 32 (2006-2007)). As a result of this process, Norway's objectives for salmon management are:  
*To conserve and restore spawning stocks at levels of abundance and with a composition, that ensures genetic diversity and the full utilisation of the natural productive capacity of salmon habitat. Salmon habitat shall be managed to preserve diversity of nature and its productive capacity, and threats and adverse impacts shall be identified and eliminated. Wherever this is not possible, adverse impacts on the production, abundance and composition of salmon stocks shall be counteracted or neutralized. Impacts threatening the genetic diversity of salmon shall be reduced to not-harmful levels by 2010. The internationally acknowledged Precautionary Approach shall be applied as a basic principle for all sectors involved. As a basic rule those responsible for adverse impacts on the salmon resource shall also be responsible for restoration and compensation measures.*  
*Within this framework the salmon resource shall be managed to the greatest possible benefits to society, fishing right holders and recreational fishermen.*
- 1.3 In developing these objectives it has been an important goal to reflect and integrate Norway's international obligations under the NASCO convention, NASCO's main management objective,  
"To contribute through consultation and co-operation to the conservation, restoration, enhancement and rational management of salmon stocks taking into account the best scientific advice available", ...  
... and the various guidelines and agreements under the Precautionary approach to salmon management including management of salmon fisheries, habitats, stock enhancement and aquaculture as well as introductions and transfers.

**Table 1:** Challenges, responsible authorities and legislation in salmon management

CHALLENGES	RESPONSIBLE AUTHORITIES	LEGISLATION
Management of Salmon stocks	Environmental authorities	Act relating to Salmonids and Fresh-Water Fish etc.
Hydropower development	Water recourses authorities, environmental authorities	Water Resources Act; Watercourse Regulation Act
Fish farming	Fisheries-, environmental-, and water recourses authorities	Aquaculture act; Food Safety Act, Pollution Control Act, Act relating to harbours and fairways (The Harbour Act)
Pollution	Environmental and fisheries authorities	Pollution Control Act
<i>Gyrodactylus salaris</i>	Environmental and fisheries authorities	Act relating to Salmonids and Fresh-Water Fish etc.; Food Safety Act
Acid precipitation	Environmental authorities	Pollution Control Act, Acid Precipitation Convention
By-catch	Fisheries and environmental authorities	Act relating to sea-water fisheries, etc.; Act relating to Salmonids and Fresh-Water Fish etc.
Physical habitat deterioration in and along watercourses	Water recourses-, environmental-, transport-, agriculture-authorities and municipals	Water Resources Act; Act relating to Salmonids and Fresh-Water Fish etc.; Act relating to Land Use; Planning and Building Act

## Nature and extent of resource

1.4 Norway has 450 rivers that sustain or once sustained self-reproducing Atlantic salmon stocks. About 40% of the remaining overall catches in the North Atlantic are caught in Norwegian coastal waters and salmon rivers. The wild salmon has historically been, and still is, important to Norwegian and Sami culture. Originally as a source of food and spiritual value for the first inhabitants of the country, the Norwegian wild salmon stocks caught the attention of British anglers in the mid-1800s. Since then the biggest revenue from wild salmon is derived from selling fishing permits and providing accommodation, guiding etc. to foreign as well as Norwegian anglers. Approximately 150-200.000 anglers fish for salmon and sea trout every year. Most salmon rivers are located away from the major towns/cities of Norway, thus wild salmon is of significant economic value to the rural countryside. The socio-economic value of the 50 most important wild salmon stocks is estimated to be around 20 billion NOK (2,5 billion €) (Naverud 2001).

## Management entities involved in salmon management

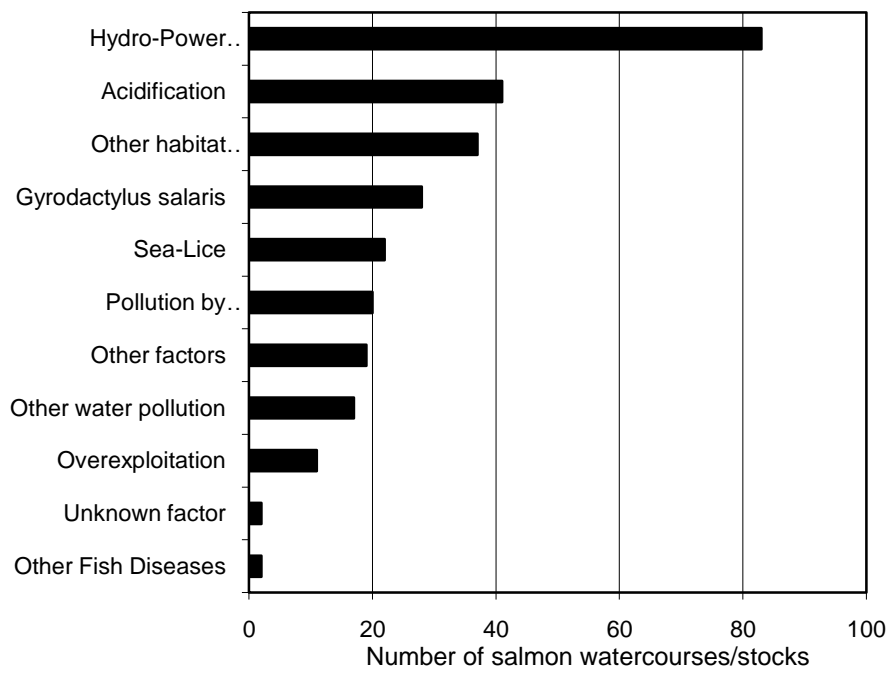
1.5 Although the responsibility for the management of wild Atlantic salmon and the regulation of salmon fisheries both in fresh- and salt water lies with the Ministry of environment (founded on the "Act Relating to Salmonids and Fresh-Water Fish etc". No. 47 of May 1992) the responsibility and legal means to regulate most of the factors affecting salmon and salmon management lie with other authorities and industries. The most important challenges, authorities and legislation involved in or affecting salmon management are shown in **table 1**.

1.6 A number of organisations representing fishing right holders, public interests and conservation interests are involved in different aspects of salmon management. In order to

facilitate stakeholder participation and influence in salmon management a number of local and regional councils have been established. On a national level salmon advisory and consultation meetings are normally held twice a year. National organisations of fishing right holders, recreational and commercial fishing interests, nature conservation, aquaculture and hydropower industries and relevant authorities are represented. Over the last decade, local management bodies in salmon rivers have been given greater responsibility, especially local river-by-river organizations of landowners and fishing right holders.

## Status of stocks, threats to stocks and current management measures

- 1.7 In order to keep an overview of stock status and developments in stocks, the Directorate for Nature Management established a salmon stock registry in 1993. The registry is based on information collected from a number of sources, including local salmon management authorities. This registry contains a category system for salmon rivers based on the condition of the salmon stock in relation to adverse human impact. Category assignment is based on an overall assessment of all important factors affecting the stock's existence and production. Only rivers that have or have had a self-reproducing stock are categorized. Due to insufficient monitoring, the numbers of escaped farmed salmon in spawning stocks are only estimated in a limited number of rivers. Thus escaped farmed salmon has not yet been included as an impact factor in the category system. In a Parliamentary bill (St.prp. nr. 32) from 2006 it is however stated that the parasite *Gyrodactylus salaricus* and interbreeding between escaped farmed salmon and wild salmon are considered to be the two most severe threats to the long-term existence of wild Atlantic salmon in Norway.
- 1.8 The category system for salmon rivers is used as a basis for deploying necessary management measures both on a local, regional and national level. Management guidelines are developed for each category e.g. with regard to fishery regulations. An overview over the frequency of adverse human impacts decisive for category assignment is given in **figure 1**.
- 1.9 Acidification, the parasite *Gyrodactylus salaricus* and river regulation for hydropower purposes are the main reasons for salmon stocks becoming extinct or threatened by extinction. River regulation is the single most widespread adverse human impact factor in salmon rivers in Norway, resulting in both loss of stocks and significant reductions in the productive capacity of salmon rivers. High densities of sea lice caused by aquaculture activities affect survival of post-smolts, and is considered to have reduced adult returns significantly. Monitoring of sea lice infection levels on wild stocks is very limited and the numbers presented are therefore incomplete. Based on the latest research results, interbreeding between escaped farmed and wild salmon are now considered to be amongst the most severe threats to the long-term existence of wild Atlantic salmon in Norway.
- 1.10 Based on this information Norway has decided to focus on the following management areas and adverse human impacts:
- Salmon fisheries
  - Acidification
  - Hydropower development
  - Other habitat deterioration
  - Escaped farmed salmon
  - Sea lice
  - *Gyrodactylus salaricus*



**Figure 1:** Overview over frequency of adverse human impacts decisive for category assignment.

## 2 Plan of Action for the Protection and Restoration of Atlantic salmon Habitat

2.1 The NASCO Plan of Action for the Application of the Precautionary Approach to the Protection and Restoration of Atlantic Salmon Habitat (CNL (01)51) are focusing on two main tasks:

- The protection on Atlantic salmon habitat
- Develop plan for restoration of habitats that are negatively affected.

2.2 The Plan should aim to describe all of the necessary elements to provide a consistent, rational approach to protection of salmon habitat and maintain and, where possible, increase the current productive capacity of Atlantic salmon habitat.

### 2.1 Protection of salmon habitat

2.1.1 In Norway there are two schemes than are important for protect salmon habitat. In 2003 the Norwegian Parliament established a system of national salmon rivers and national salmon fjords where the wild Atlantic salmon is granted special protection. Today the scheme comprises 52 national salmon rivers and 29 national salmon fjords. Further 118 salmon rivers or parts of such are protected against further hydropower development by the National Protection Plan for River Systems

#### National Salmon River and National Salmon Fjords

2.1.2 In 2003 the Norwegian Parliament established a system of national salmon rivers and national salmon fjords where the wild Atlantic salmon is granted special protection. A number of sea areas had already been designated as safeguard zones by the Ministry of Fisheries and Coastal Affairs in 1989, and a number of these safeguard zones were carried on in this new management regime. The intention of the national salmon rivers and national salmon fjords is to protect and restore salmon stocks to a level and composition that will maintain diversity. In the national salmon rivers no permission will be given to new enterprises or activities that might harm the wild salmon. In the national salmon fjords no additional salmon aquaculture plants will be established and existing installations will be subject to more stringent standards for preventing escapes and controlling sea lice and other diseases. The salmon stocks included will also be prioritized for other measures aimed at strengthening the wild salmon.

2.1.3 In the first phase of this management regime 37 national salmon rivers and 21 national salmon fjords were established. The Parliament also decided that in the second phase a number of additional rivers should be designated. In 2007 15 additional rivers and 8 additional fjord areas were included in the scheme. In total the scheme now comprises 52 national salmon rivers and 29 national salmon fjords (**figure 2**). The national salmon rivers and fjords are aimed at giving special protection to about 3/4 of the total Norwegian wild salmon production.



**Figure 2:** National salmon fjords (red areas and name in *italic*) and National Salmon Rivers (in bold writing).



## National protection plan for river systems

- 2.1.4 During the conflicts concerning further development of hydroelectric power plants in Norway in the 1960s the idea of a protection plan for river systems started. The first protection plan was accepted by Parliament in 1973. This plan was succeeded by three other protection plans in 1980, 1986 and in 1993. The plan was supplemented in 2005 when 48 new rivers were added. In 2009 the boundaries for one of the salmon rivers previously protected (Tovdalselva) will be extended to cover the total river system.
- 2.1.5 The purpose of the plan is to protect whole river systems to secure the dynamics and variations in these rivers. In practise the plan has protected river systems, or part of river systems against further hydropower development. 387 river systems or parts of river systems are now protected against further hydropower development. However, some of these rivers had developed hydropower by the time the protection plan was accepted. Such power plants and reservoirs are allowed to continue to run and be maintained.
- 2.1.6 Even though this protection plan wasn't designed to safeguard Salmon habitat particularly, today this plan protect 118 salmon rivers or parts of such against further hydropower development. Thus this plan plays a role in the effort to protect Salmon habitat in Norway. As an example 29 of the 54 rivers/parts of river that are protected in the County of Finnmark, are rivers with Salmon. Among these is the Norwegian part of River Tana.

## Status protection of Atlantic salmon habitat according to implementation plan

Nr	Year	Action	Status
1	Spring 2007	Decision on the supplementation of the National Salmon Rivers and Fjords scheme	OK
2	2007	Establish a new habitat management principle "No net Loss"	OK
3	2011	Remove salmon farms from three National Salmon Fjords (Trondheimsfjorden, Altafjorden, Tanafjorden)	Ongoing process

## 2.2 Salmon Habitat Restoration Plan

- 2.2.1 Management goal:
- Salmon habitat adversely affected by human impacts shall be restored where possible and there shall be no further net loss of salmon habitat
- 2.2.2 According to NASCO Plan of Action for the Application of the Precautionary Approach to the Protection and Restoration of Atlantic Salmon Habitat (CNL (01)51) a national plan for restoration of Atlantic salmon habitat should consist of an inventory of salmon rivers and an action plan for restoration of Atlantic salmon habitat.

## Inventory of Salmon Rivers

2.2.3 An inventory of salmon habitat according to the NASCO agreement is under development. In 2007 river data and salmon production data for 80 rivers incl. all National Salmon Rivers was established. Information includes e.g:

- Catchment area
- Category of the Salmon stock
- Habitat impact data from the category system
- Length of river where salmon can access, included tributaries (historical and present).
- River area where salmon can access (habitat accessible for smolt production)
- Area and perimeter of lakes
- Production capacity of salmon

## Plan for Restoration of Salmon habitat

2.2.4 A plan for the restoration of Atlantic salmon habitat (other than liming, see section 2.3) will consist of a general strategy, including measures to minimize adverse impacts, objectives describing the extent of salmon habitat restoration measures and a prioritization of restoration projects, restoring habitat, taking into account cost/benefit considerations. Thus the plan will also serve as a framework for better management of salmon habitat and in general. National Salmon Rivers will in general be given high priority. A restoration plan will be developed successively and completed by the end of 2010.

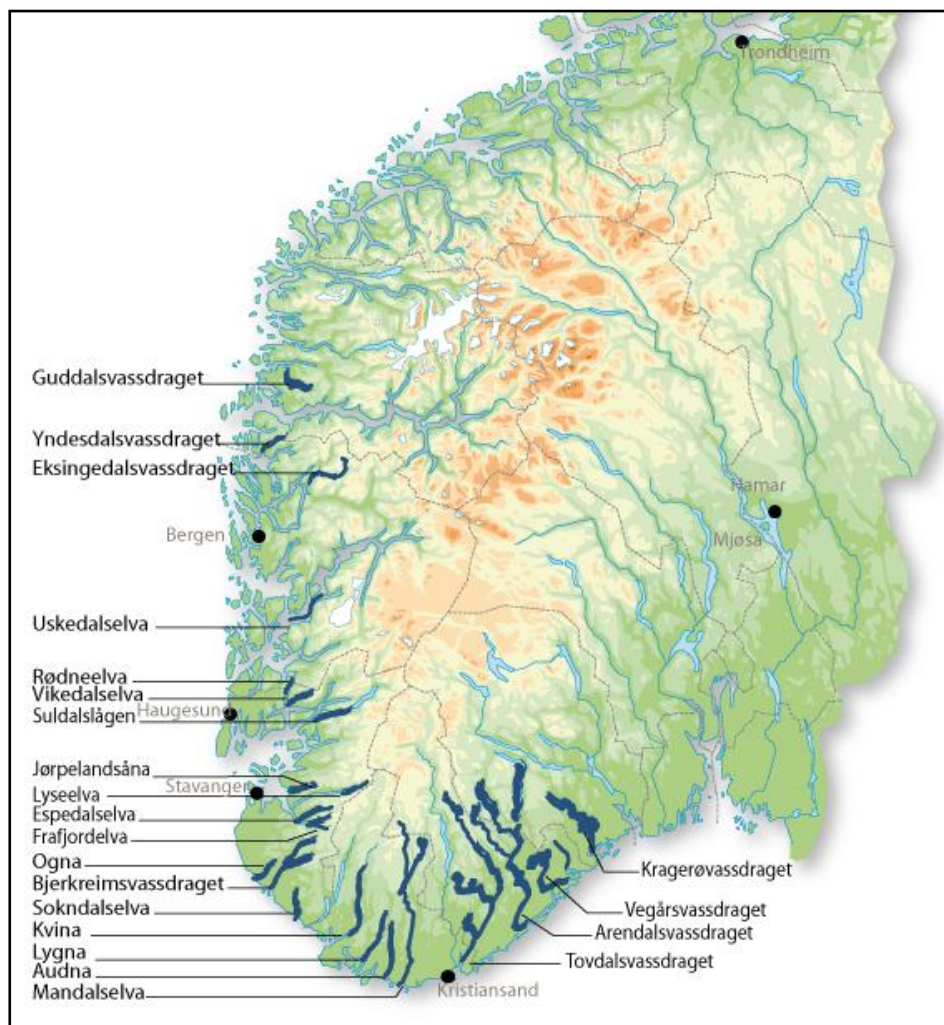
## Status restoration of Salmon habitat according to implementation plan

No	Year	Action	Status
1	2006	River data and salmon production data for 80 rivers incl. all <i>National Salmon Rivers</i>	80 rivers in 2007
2	2007-2008	Productive capacity all remaining salmon rivers with considerable river fisheries	Spawning targets 180 rivers 2008; spawning targets for remaining rivers under development (2009) will provide data on present productive capacity.
3	2008	River data for all remaining salmon rivers	100 rivers in 2008;
4	2008	Habitat impact data all <i>National Salmon Rivers</i>	Data available; data not added into data base.
5	2008	Plan for restoration of fish ladders	Plan that will be completed in 2009
6	2008	Plan for restoration of Salmon habitat covering all <i>National Salmon Rivers</i>	Delayed; starting up in 2010
7	2009	Habitat impact data further 80 rivers	Delayed; starting up in 2009
8	2009	Plan for restoration of Salmon habitat further 80 rivers	Delayed; starting up in 2011
9	2009	Productive capacity/ Habitat impact data remaining rivers	Data on productive capacity in 2009/impact data starting up in 2009.
10	2010	Plan for restoration of Salmon habitat remaining rivers	Starting up in 2011

## 2.3 Acidification and Liming of Acidified Salmon Rivers

### Background

2.3.1 Due to its high acid sensitivity, production of salmon in many salmon rivers in southern Norway was greatly reduced as early as 1920, several decades before acid rain was recognized as an environmental problem. The causes of acidification of surface water in Scandinavia were clarified during the 1960's and 1970's, almost a century after the first negative effect on fish populations was detected. The first indications of acidification affecting fish are from episodic deaths of Atlantic salmon in some southern rivers in Norway around 1910. Official Norwegian salmon catch statistics showed a large decline in catches around 1900. In the two southern counties, Aust-Agder and Vest-Agder, catches declined about 80% from 1885 to 1920. Sporadic catches of salmon were reported up to the late 1960's, but the salmon stocks in this region were virtually extinct around 1960.



**Figure 3:** Norwegian Rivers that are limed as a mitigating measure in acidified Salmon Rivers.

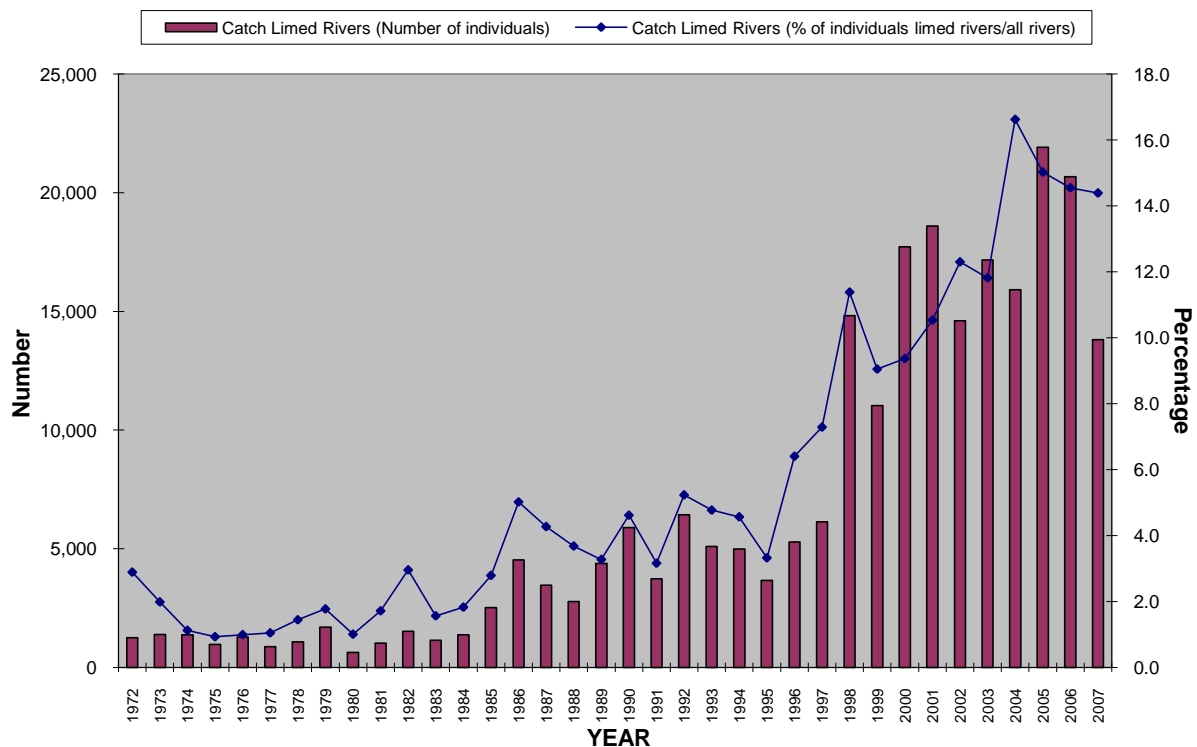
## Status of acidification

2.3.2 Today 52 Norwegian salmon stocks are affected by acidification. International agreements on reduced atmospheric emissions have reduced acidification considerably. In Europe the sulphur emissions have declined by 60 % since 1980 which have led to reduced acidification effects in Norway. However, the extreme acid sensitivity of salmon makes the destiny of this species in Southern Norway uncertain. Liming in combination with reduced emissions, will still be an important contribution to protection of the Atlantic salmon in Norway.

## Liming as mitigation Measure in Acidified Salmon Rivers

2.3.3 To counteract negative impacts from acidification the Directorate for Nature Management has developed an Action plan on liming for the period 2004–2010. Liming is an effective measure to protect and restore fish populations in acidified waters. Liming of acidified salmon rivers has become important in Norway the last 15 years, and in 2008. As showed in **figure 3**, 22 salmon rivers were limed at a yearly cost of about NOK 45 million (approximately £ 4.5 million). Mean densities of salmon fry in limed rivers increased from 10 to 60 fish per 100 m<sup>2</sup> in the period 1991–2002. The catches of salmon in the limed rivers contributed in 2007 to about 14% of the total river catch measured in number of salmon caught in Norway (**figure 4**). The catch has increased from 5 tonnes prior to liming in the early 1980`s, to about 40 tonnes the recent years. The catch in limed rivers is expected to be between 75 and 80 tonnes in 2015.

2.3.4 It is estimated that the salmon stocks in limed rivers can be fully re-established after about 15 years of liming. Two strategies have been used: Liming in combination with rebuilding of stocks, or liming only. So far both strategies seem to be successful, but we do not yet know the genetic effect or the long-term result of either strategy. Research is in progress on the re-colonisation process of salmon (population dynamics, genetic effects, stocking vs. natural re-colonisation etc). The current



**Figure 4:** Number of Salmon caught in limed rivers in the period 1972 – 2007 (bars) and proportions of total salmon catch that have been caught in limed rivers.

Action plan for liming of watercourses 2004 – 2010 is based on a stable level of funding of about 88 million NOK each year. About half of this amount is spend on liming activities in salmon rivers.

### Status liming according to implementation plan

No	Year	Action	Status
1	2006-2010	Continue liming of 22 Salmon rivers and assess the inclusion of new rivers	OK
2	2006	Start liming of the River Nidelva, Aust-Agder county	Started 2006
3	2007	Necessary investments in ongoing liming projects in rivers in the county of Vest-Agder	Kvina: Need 3 mill NOK - 3 mill in 2006 Audna: Need 3 mill NOK - 1.3 mill in 2007 Lygna: Need 4 mill NOK - 4 mill in 2007
4	2007	Examine the need and feasibility of liming in the river Otra, Vest-Agder county	Evaluated 2007 - salmon stock not threatened by acidification; monitor situation; new evaluation after 2010.
5	2008	Start liming of the river Storåna in Ørdsdal, Rogaland county	Several lakes upstream Storåna limed.
6	2008	Complete necessary investments in ongoing liming projects in rivers in county of Vest-Agder	Kvina: Operating Audna: Investments continue 2009/2010 Lygna: Construction 2009
7	2009	Start liming of the river Otra and Sogndalselva, Vest-Agder county, if necessary	Will be considered in revision of Action plan that will apply from 2011.
8	2007-2010	Start liming of the rivers Årdal in Rogaland county and Tysse in Hordaland county	Will be considered in revision of Action plan that will apply from 2011.
9	2010	Revise Action plan for liming of watercourses	As planned.

## 2.4 Hydropower development and habitat restoration projects

2.4.1 A large proportion of the salmon rivers in Norway are regulated for hydropower purposes, which can heavily affect the natural physical and biological processes of the watercourses. Physical impacts in regulated rivers might be: Migration obstacles such as dams, dewatering of river stretches, rapid fluctuations in water level, changed water temperatures, deposition of fine sediments and gradual homogenisation and degradation of bottom substrate. The physical changes will typically affect biodiversity in terms of reduced diversity of species, reduced biomass and production, depleted fish stocks and, consequently, reduced fishing opportunities.

2.4.2 A third of the Norwegian salmon rivers are developed for hydropower production, and hydropower development has been identified as a significant negative factor for a total of 85 salmon stocks. A majority of the highest-producing salmon rivers in the country are regulated, including several top-20 rivers such as Altaelva, Namsen, Orkla, Driva, Surna, Lærdalselva, Suldalslågen and Numedalslågen. With respect to anthropogenic eradications of salmon stocks, hydropower development is a major factor resulting in 19 lost stocks, which exceeds the effects of acid rain (16 lost stocks) as well as the introduction of *Gyrodactylus salaris* (10 lost stocks). The regulatory regime in a number of key salmon rivers will be scrutinised with respect to biological and environmental constraints during the next decade. The modernised regime is supposed to mitigate the negative impacts.

- 2.4.3 After 1980 provisions on water flow have been included in most of the hydropower concessions. The need for mitigation and compensatory measures are considerable in salmon rivers with reduced water flow and significant changes in the water temperature regime and ice cover. In general, the concessionaire is obliged to stock a certain number of salmon smolt, largely corresponding to the estimated loss in smolt production. In less affected rivers, the concessionaire might stock salmon egg, fry or parr instead of smolt. The licensing authority in agreement with the responsible authority could as an alternative or substitute decide other compensatory measures such as habitat restoration or constructing fish passages that give the fish access to unregulated stretches.
- 2.4.4 New hydropower development shall not have significant adverse affects on wild salmon. Moreover renewal of already established licences and the revision of licence conditions represent the most important option to improve conditions for wild salmon stocks in regulated rivers. In 1992 the Norwegian parliament decided that all rules of operation and other conditions attached to the licence given for a predefined or undefined period are subject to possible revision within a thirty-year period, i.e. not later than year 2022.
- 2.4.5 The need for revision of conditions with regard to wild salmon stocks will be considered on a case-by-case basis taking into account the need for stability in electricity production. In *National Salmon Rivers* wild salmon interests will be given special priority.

### Habitat Restoration in Northern Norway

- 2.4.6 Habitat restoration/improvement projects are carried out in several salmon rivers, by hydro electrical companies, water recourses and environmental authorities and by different stakeholders.
- 2.4.7 The Norwegian Water Resources and Energy Directorate (NVE) has run a river restoration program in the three northernmost counties in Norway (Nordland, Troms and Finnmark). The funds have mainly been provided by NVE (63%), local authorities (12%) and hydropower

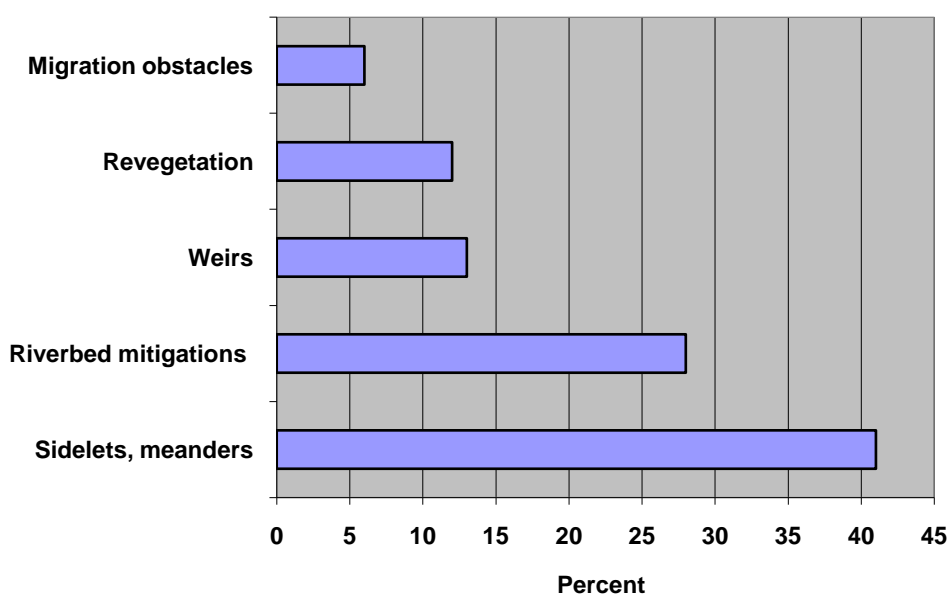
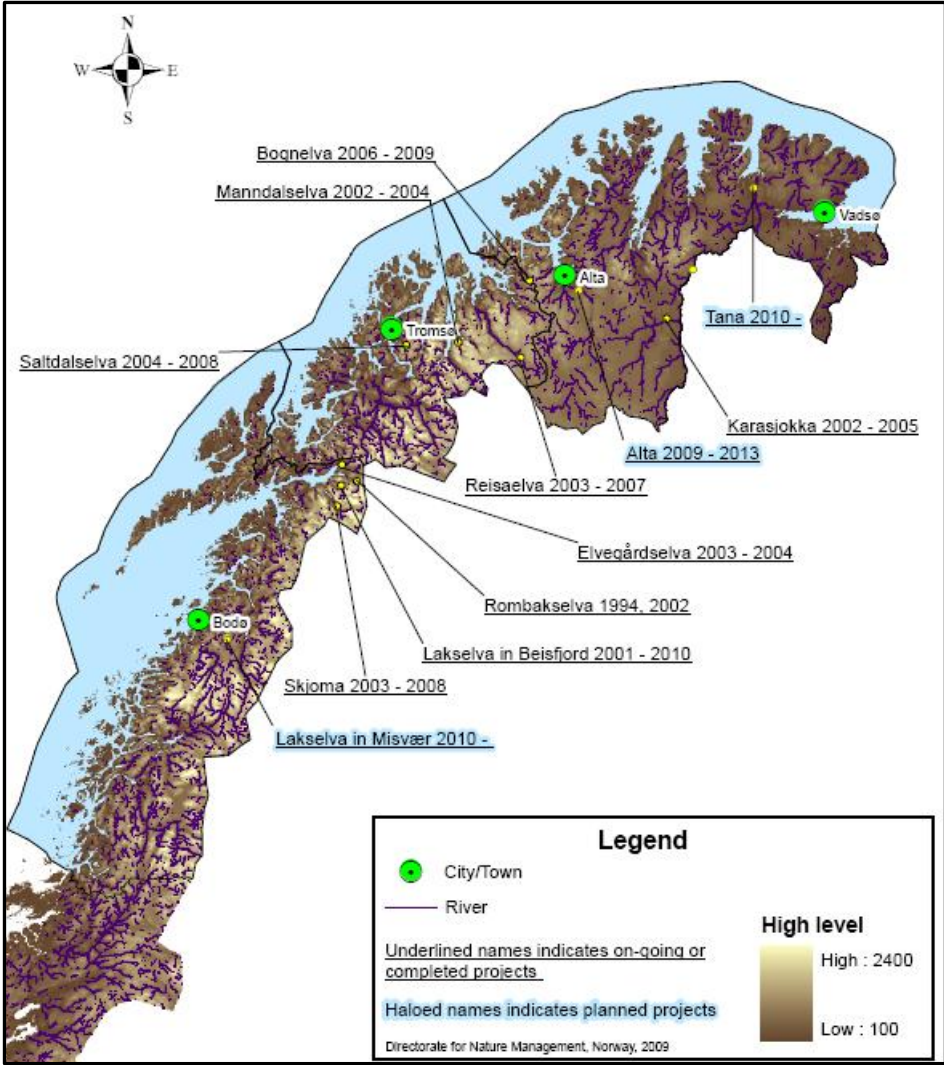


Figure 5: Methods used in the projects to improve river habitat quality.

companies (12%). The Directorate of public roads, Agriculture Authorities, local stakeholders and the Directorate for Nature Management has also been parts in financing the program. The program is at part of the activities under The North Calotte Council, which is cooperation between the northern parts of Norway, Sweden, Finland and the European part of northern Russia. This program has up to now only involved Norway, Sweden and Finland.

2.4.8 The first project was initiated in the beginning of the 1990ies. At that time the focuses was on embankments and landscape, together with the public and their use of the areas, vegetation, placing big stones in riverbed and to break up straight river courses (canalization). In lack of a plan for the habitat restoration measures were carried through as single projects, without any plan and prioritizing. Gradually this changed to development of general plans where focus was set on entire rivers and entire watersheds.

2.4.9 Several methods have been used to restore/improve habitats in the rivers (**figure 5**). Most often used are efforts to Restoring of river banks by removing or reconstruction of flood and erosion protection. This is to make it possible to reopen side channels and let the river start



**Figure 6:** Map showing rivers where restoration projects have been carried out and project that are planned.

meandering again. Also by adding groups of stones on river bed, both to provide shelter for fish and to improve water current system has been frequently used. Furthermore reconstruction/removal of weirs and open migration barriers, together with establishing riparian vegetation has been used. After, and sometimes also before measures have been carried out, there have been research activity in the rivers to document the effects of the measures.

### Status and plans

2.4.10 From the beginning until today, 24 projects have been carried out through this program, most of them in Salmon Rivers. There have been projects in 10 salmon rivers (**table 2**). New projects in River Alta together with two additional rivers are planned to start from 2009 (**table 3**). Locations of rivers where restoration projects have been carried out, or planned, are shown in **figure 6**.

**Table 2:** Rivers with Atlantic salmon where habitat restoration project has been carried out.

River	Period	Type of encroachment	Type of measures	Research
Saltdalselva	2004-2008	Flood and erosion protection, road enrockment, Closure of streams	Removed landfill. Opened flood channels and migration barriers. Groups of rocks placed in river bed.	Fish populations and pollution. Evaluation report 2009
Skjoma	2003-2008	Hydropower (reduced water flow) and weirs	Reconstruction of weirs. Groups of rocks placed in river bed	Fish populations
Lakselva in Beisfjord	2001-2010	Flood protection and canalization	Reconstruction/removal of flood protection and weirs. Groups of rock in river bed. Revegetation	Fish populations prior to measures. Considered from 2009
Rombakselva	1994, 2002	Hydropower (reduced water flow)	Excavation of pools. Groups of rock in river bed. Opening of channels	Mapping of young fish and spawners
Elvegårdselva	2003-2004	Safeguarding against flood and erosion and canalization	Reconstruction and removal of landfill. Opening flood channels. Reduced canalization. Groups of rock in river bed	Fish populations prior to measures. Considered from 2009
Manndalselva	2002-2004	Flood and erosion protection and canalization	Opening of river course. Groups of rock in river bed. Reconstruction of weirs	Fish populations. Considered from 2009
Reisaelva	2003-2007	Flood and erosion protection and canalization	Reconstruction of landfill. Opening of flood/side channels. Revegetation	Fish populations prior to measures. Considered from 2009
Bognelva	2006-2009	Flood/erosion protection and canalization	Opening of river course. Groups of rock in river bed. Reconstruction of migration barriers. Construction of new habitats	Fish populations. Considered from 2009
Risvågrelva	2007-2008	Mass withdrawals and new river course	Removing landfill for reconstructing of lake	
Tana	2000-2005	Erosion protection, road building and fish migration barriers	Reconstructing flood protection and migration barriers in side streams	Fish populations (cooperation with Finish researchers)



**Table 3:** Rivers with Atlantic salmon where habitat restoration project are planned to start.

River	Period	Type of encroachment	Type of measures	Research
Lakselva in Misvær	2010-	Flood and erosion protection	To be decided in 2009	To be decided in 2009. Pilot project finished in 2009
Alta	2009-2013	Flood and erosion protection	Reconstruction/removal of flood and erosion protection. Opening of flood/side channels.	Program planed Possible pilot project in consequence of WFD and Flood Directive
Tana	2010-	Flood and erosion protection	To be decided in 2009	

### Status hydropower development according to implementation plan

Nr	Year	Action	Status
1	2007	Improved supervision of existing conditions in hydropower licences	OK
2	2007	Develop an overview over timescales for renewal or revision of hydro power licences, open to the public on the Internet	340 possible renewal or revision of licences until 2022. ( <a href="#">Link</a> )
3	2007-2008	Develop guidelines for revision of licence conditions in relevant rivers incl. salmon rivers	Preliminary guidelines finished in 2008
4	2007-2008	Develop an improved control system for existing conditions in relation to salmon	Project 2009-2011
5	2007-2009	Revise imposed mitigation measures in all <i>National Salmon Rivers</i>	Project 2009-2011
6	2007-2011	Establish and restore salmon stocks in rivers where conditions again become suitable for salmon	Continuous activity
7	2007-2011	Establish salmon production monitoring in all regulated salmon rivers	Continuous activity
8	2007 - 2011	Conduct revision of licence conditions in all relevant rivers	Continuous activity