***Ad Hoc* Review Group**

IP(07)20 FINAL

Implementation Plan

European Union – France

IP(07)20 FINAL

France's implementation plan in line with NASCO's recommendations concerning the protection, management and enhancement of the Atlantic salmon and its habitat

1. Objective of the present document

NASCO has recently defined a strategic approach ('*Next Steps for NASCO'*). This approach requires that each of its Contracting Parties develop an « implementation plan » to demonstrate how they are striving to apply NASCO's guidelines, recommendations and resolutions. These concern the following:

- the Precautionary Approach, adopted in 1998,
- the Habitat protection and restoration, as defined in 2001 [CNL(01)51],
- Stock restoration programmes, for which guidelines were drawn up in 2004 [CNL(04)55],
- the aquaculture, introductions and transfers, and transgenic salmons, a subject which warranted the adoption, in 2006, of a detailed resolution: *The Williamsburg Resolution* [CNL(06)48],
- social and economic factors, to be taken into account in decisions made about salmon, as it was formalized in 2004 [CNL(04)57].

At the NASCO's Annual Meeting in June 2007 at Bar Harbor (Maine, USA), provisional plans from France, Germany and Portugal were submitted and it was decided that the final plans would be forwarded to NASCO, for examination, by the 1st of November 2007, prior to being returned to the members states in March 2008.

This document is the Implementation Plan from France. It follows the instructions on how to draft these "implementation plans", as published by NASCO in 2006 [NSTF(06)10].

2. Salmon in France

In the 21st century, there are, in France, about fifty water courses or basins inhabited by the Atlantic Salmon (*Salmo salar* L.). These extend from the Rhine, border with Germany, in the North-East, to the Bidassoa River, frontier with Spain in the South-West. Figure 1 highlights the most important ones. The salmon populations of these basins display varied status. Some are natural and enduringly stable; others are in a precarious situation and depending greatly on the regular stocking in juveniles, as in the case of some reintroduction projects.

Annex 1 provides a list of the water courses in which the presence of salmon, sporadic or regular, is known. An indication of the status of each of these is also offered using the model provided by the International Union for Nature's Conservation (*l'Union Internationale pour la Conservation de la nature (UICN*)) and taking into account their situation with regard to the conservation limit, where it has been set. The biological information available for these rivers is also indicated. It is important to note that this list does not cover all the water courses which have historically been inhabited by salmons – their number is greater – but only those which have been equipped with control systems allowing to record the presence of salmons, in however small numbers this may be.

2.1. Fisheries and salmon exploitation regime

Fishing for migratory fishes takes place either in a river and estuary zone, or at sea. The river area is under the responsibility of the Ministry for Ecology, Sustainable Planning and Development (*Ministère de l'écologie, du développement et de l'aménagement durables*), whereas the marine area is controlled by the Ministry of Agriculture and Fisheries (*Ministère de l'agriculture et de la pêche*).

Fishing activity in the river and estuary zone is regulated by bylaws set by the Regional Prefects for maritime fishing and by Departmental Prefects for river fishing. These decrees must be consistent with the management plans developed by the Migratory fishes management committees (acronym: Cogepomi), as per their respective zones of authority (see below).

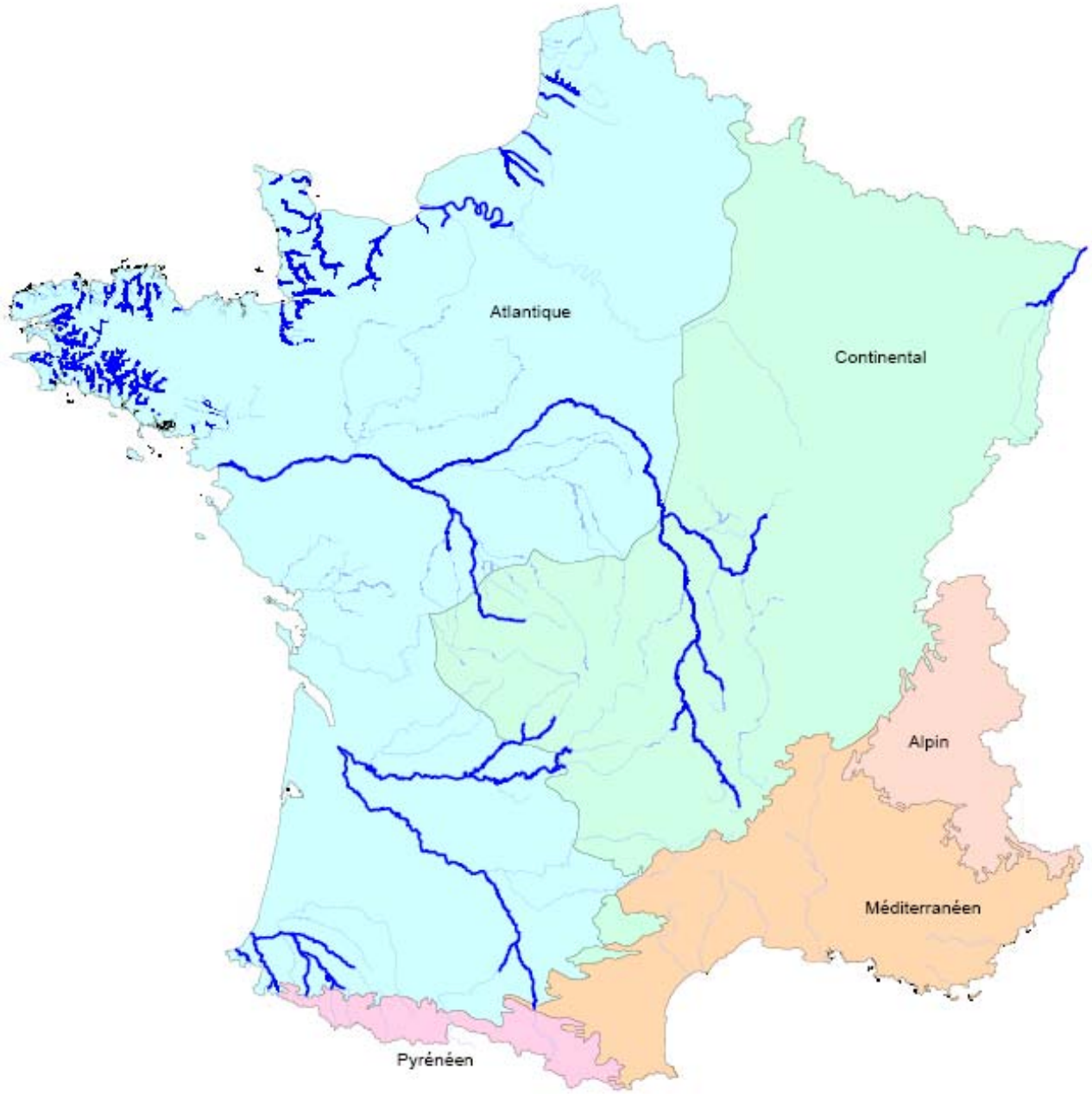
In the river zones, it is only permitted to fish for salmon in the water courses, or in part of the water courses, listed as salmon watercourses by Ministerial decree (decrees of 21/02/1986 and of 26/11/1987). The practice of angling requires the purchase of a fishing card with a « migratory fish » Inland Revenue stamp. Further, as from 1987, the declaration of catches and the tagging of all salmon caught have become

compulsory. Professional gear fishing in rivers is administered through a system of permits: compulsory permits for “volume fishing” (« *grande pêche* »), and permits awarded per fishing lot. Finally, professional gear fishing in estuarine zones is only allowed once a permit « CIPE » has been awarded by the Inter-professional Commission for Fishing in Estuary (*Commission Interprofessionnelle de Pêche en Estuaire*). Just as in the case for anglers, professional fishermen operating in estuaries and river zones must also declare their catches.

In the maritime area, the declaration and tagging of salmon catches is not compulsory.

The season for river salmon fishing generally runs from March to July. Since 1994, however, there have been some extensions or “windows of opportunity” in an increasing number of basins, up until October so as to allow exploitation of late returns of grilses. On the Adour basin, these autumnal openings only concern angling and not professional fishing.

Figure 1. Sections of water courses inhabited by the Atlantic salmon in France



The Atlantic salmon is officially exploited in France by:
- 2000 to 2400 leisure anglers (number fluctuating depending on the year),

- 16 professional river fishermen using drifting gill nets[1], in the river zone of the Adour basin,
- 37 sea fishermen using drifting gill nets in the maritime zone of the Adour basin.

Legal and illegal catches also occur in maritime areas (fishing reserves or specific local bans). More often than not, their number remains however either un-estimated or unknown.

Some professional sea and river gear fishermen used to fish for salmon in the Loire until 1993. Since 1994, salmon fishing is forbidden in the Loire and its tributaries so as to protect the residual population of the Allier salmons. However, there is still a gear fishing activity taking place, although this practice is directed at sedentary or migratory fishes other than salmons.

The estimates of catches illustrated in Table 1 are obtained by adding together the catches from these identified fisheries, which take place in fluvial or estuarine zones. Wild salmon yearly catches vary between 8 and 13 tons, with numbers of fishes amounting from generally 2500 to 4500 salmons. The average between 2000 and 2004 was of 11.6 tons, of which 38 % were taken in estuaries and 62% in rivers, with sea catches remaining unknown in most years (table 1). The proportion of 1SW salmons in the catches vary depending on the year (30 % to 70 %), although it has been closer to 40 to 60 % in latter years, which is below their contribution to the return upstream of the adult populations.

Table 1. Weight of salmon (in tons) caught in France in coastal, estuary and river zones from 1995 to 2005.

	Captures estimées						
	Zone côtière [1]		Estuaire		Rivière		Total
Année	Poids	%	Poids	%	Poids	%	Poids
1995 [2]	-	-	2,0	20%	8,0	80%	10,0
1996	-	-	4,0	31%	9,0	69%	13,0
1997	-	-	3,0	38%	5,0	63%	8,0
1998	1,0	13%	2,0	25%	5,0	63%	8,0
1999	-	0%	3,8	35%	7,2	65%	11,0
2000	0,4	4%	3,9	35%	6,7	61%	11,0
2001	0,4	4%	5,0	44%	6,0	53%	11,4
2002	1,6	14%	3,5	30%	6,4	56%	11,4
2003	-	-	5,9	44%	7,4	56%	13,2
2004	-	-	9,8	51%	9,4	49%	19,2
2005	-	-	4,1	38%	6,8	62%	10,9
Moyenne 2000-2004	-	-	4,4	38%	6,7	58%	11,6

[1] Capture côtières illégales inconnues, sauf certaines années
(comme dans la Baie du Mont St-Michel, Basse-Normandie, en 2002).

[2] Pêcherie illégale de 1995 à 1998, captures non connues lors des 3 premières années
mais probablement en augmentation. Pêcherie arrêtée en 1999, qui a repris en 2000.

TRANSLATION OF TABLE 1

HEADINGS
Captures estimées: estimated catches, Zone côtière: coastal zone, Estuaire: estuary, Rivière: River, Total: Total, Année: Year, Poids: Weight, Moyenne: Average

FOOTNOTES TO TABLE
1. Illegal coastal catches are unknown, with the exception of some years (such as in the Bay of Mont St-Michel, Lower Normandy, in 2002).
2. Illegal fishery from 1996 to 1998; catches unknown during the first three years, but probably on the increase. Fishery stopped in1999 and restarted in 2000.

There are, apart from these statistics, by-catches (accidental or directed) taking place at sea. However these are not known.

[1] The French text reads literally drifting gill net, but maybe they refer to gill nets and drift nets?

Since 1985, salmons are caught every year in the Bay of Saint-Jean de Luz in the Basque Country (where the salmons destined to return to the Nivelle gather). Furthermore, poaching takes place in the Bay of Mont Saint-Michel (into which le Couesnon, la Sée and la Sélune flow) despite the fact that it has been classified as a fishing reserve since 1999. Poaching also occurs near the mouths of the Normandy and Artois rivers (Bresles, Arques…), which are fishing reserves for 500m. Regarding the latter cases, the reserves target not only salmon but sea trout also as these are the predominant species in the large salmonid migrators' runs.

Coastal trawl and net fisheries are also known to catch salmons, although for most years no information is available on this subject. Two campaigns have nonetheless been undertaken in 1999 and 2000 among the *fileyeurs*[2] of Capbreton, near the Adour and Nivelle estuaries. For five *fileyeurs*, salmons represented 1 % of their total catch. However, two «specialists» together contributed 50 % of the salmon catches in the coastal zone. Catches amounted to 600 kg in 1999 and 400 kg en 2000. In this type of fishery, salmons are not sold by auction, which makes all assessment of the quantities difficult outside this type of study.

A follow up carried out between 1984 and 1998, among the amateur coastal fishermen using fixed net at the mouth of la Bresle (Artois-Picardy), has demonstrated a ratio of exploitation/escapees of 30%, which dropped to 9% after 1991 thanks to the imposed increased distance of these nets. By adding the professional fishermen, the total catches at sea reached 50 to 65% of the effective runs, depending on the year. Thus, for the entire length of the High Normandy coast, around 500kg of salmons originating from both the Bresle and the Arques, two river "sources", were taken each year between 1980 and 1995. This exploitation is therefore very significant with regard to the concerned stocks.

The rates of fishing exploitation are only known in a few cases. In the Rhine basin, the Loire-Allier system, the Dordogne and the Garonne, salmon fishing is forbidden but some by-catches in gear fishing have occurred. In the Nivelle, whilst angling catches are very low and could give the impression that the exploitation is close to zero, catches by nets do occur in its maritime zone. These catches have only been estimated in 2003 (exploitation rate nearing 50 %). In the Scorff angling fishery (Brittany), the rate of grilses exploitation varies from 5 to 14 % and that of the Spring salmon from 3 % to 29 %, with the exception of an unusual year where it reached 59 %. Whilst the Scorff is not representative of the other rivers of Brittany, due to a very low number of fishermen, the greater pressure on the large salmons is nevertheless indicative of a general pattern.

The TAC consumption in Brittany and Lower-Normandy reflects the rates of exploitation. The global TAC per river is generally only partly used, amounting to roughly 30 % to 50 %. On the other hand, the Spring salmon TAC is normally reached, and, in the case of some rivers, exceeded some years by 50 % to 100 %. Traditionally, the angling fishing effort and pressure is greater on the large salmons, although the grilses exploitation, which was very low before 1994, has increased through the implementation of autumnal fishing periods.

In the Adour-Gaves basin, the total exploitation rate of the grilse (by angling and nets) varies from 2 to 29 %, and that of the large salmons from 24 to 54 %. The leisure fishery takes almost exclusively large salmons. Although the professional net fishery is less discriminating, there remains nonetheless a proportionally greater pressure on the large salmons than on the grilses.

2.2. Previous programmes concerning the Atlantic salmon

In France, specific programmes in favour of the salmon were implemented for the first time in 1976, with the "Salmon programme" (« *Plan saumon* ») of the Ministry of the Environment (1976-1980). This programme, drawn up by the services of the Ministry and the National Fishing Council (*Conseil Supérieur de la Pêche*), considered specific actions with regard to removing migration obstacles and to the stocking with salmon juveniles raised in fish farms. This initiative related both to water courses still hosting salmon stocks as well as to other water courses where it was a matter of reintroducing this species.

Following the "Salmon programme", a second national programme, the "Migratory fishes programme", came into force (1981-1985). Apart from the Atlantic salmon, this included the other migratory amphihalin species: twaid shads, lampreys, European eels. This "Migratory fishes programme", together with that which followed (1986-1990), were integrated into the institutional system of state-region plan agreements, which allowed for multipartite funding.

In 1992, the Ministry of the Environment published the contract "Back to the origins" ("*Retour aux sources*"), which had been developed by the National Fishing Council *(Conseil Supérieur de la Pêche)*. This agreement

[2] type of fishing boat which tends to use gill nets.

planned specific measures, targeting each catchment basin and each type of great migratory fish, from the Rhine in the North-East (border with Germany), the delta of which, located in Holland, flows into the North Sea and as far as the Rhône and small coastal rivers that flow into the Mediterranean. Actions connected to five different themes were planned for each of the basins: free circulation, habitat restoration, biological monitorings, stocking with juveniles and information-communication.

2.3. Current migratory fishes management method

The management of migratory fishes has been modified greatly since 1994. It is now organized by reference to large catchment basins, with greater emphasis at the regional level. This resulted from the decree known as "amphihalin" dating from 1994, which sets up the Management Committees for Migratory Fishes (acronym: Cogepomi). The mandate of these committees only extends to the river and estuary zones, as the maritime domain remains distinct. Their task is to propose measures connected to the exploitation of migratory fishes, where such an exploitation exists. They must also establish five-year management programmes on the exploitation and protection of the migratory species and of their habitat. The Regional Prefect adopts these programmes formally by decree, whereas measures concerning biotopes are implemented through state-region project agreements or through regional programmes at the level of regions or of drainage basins (for instance: the programmes "Loire Grandeur Nature").

Since salmon does not exist naturally in the water courses which flow into the Mediterranean, it is only the coastal regions of the Atlantic Ocean in the South (Golfe de Gascogne) and of the Channel in the North which are concerned by this species. These correspond, from North to South, to the seven Management Committees (Cogepomi) listed in table 2.

Table 2. Migratory fishes Management Committees and progress in the implementation of the Management Programmes

Catchment basin	**Management Programmes – implementation Progress**
Rhine-Meuse	Development of the 2008-2012 management Programme
Artois Picardy	2008-2012 Management Programme in place (adopted in July 2007)
Seine-Normandy	2006-2010 Management Programme in place
Bretagne	2005-2009 Management Programme in place
Loire, Sèvre Niortaise and côtiers vendéens	Development of the 2008-2012 management Programme
Garonne-Dordogne, Charente, Leyre et Seudre	Development of the 2008-2012 management Programme
Adour	Development of the 2008-2012 management Programme

The Management Committees must be composed of: Government representatives, amateur and professional fresh water and sea fishermen, riverside land owners and four elected members of the *collectivités territoriales*[3]. These members have power of deliberation. The committees also include representatives from scientific and technical marine and freshwater aquatic environments institutions. However these members only have a consultative role. Nature conservation associations' representatives can also take part. Furthermore, the Management programmes in progress are accessible from the Environment Regional Offices' internet site and are therefore in the public domain.

Measures defined by the cogepomi on the subject of exploitation of migratory fishes and decreed by the Prefect are enforceable. On the other hand, actions relating to habitats, as listed in the Management programmes, are merely recommendations as such actions involve finding contracting authorities and the funds to carry them out, which is not easy.

[3] collectivité territoriale is a region with a measure of autonomy

The majority of the measures are obligations under law and, aiming to protect or restore the environments and conditions of migration (clearing of obstacles), are included in the Code for the environment. This code includes the various laws passed over time with regard to water. More detailed management directives, specific to local contexts are also incorporated in the Water Development and Management Master Plans (*Schémas Directeurs d'Aménagement et de Gestion des eaux* [SDAGE]) which are adopted in each of the six large French hydrographical districts[4]. These SDAGE define principles for the protection of water courses and catchments basins for a period of six years. They also deal with humid zones, man-made lakes, water courses and underground waters, as well as with fish farming fauna and migratory fishes. As from 2010, the SDAGE will serve as District management programmes, in agreement with the Water Framework Directive (DCE) of the European Union. Each one of these will be supplemented by a programme of measures set for the period of 2010-2015. It is expected that, in the context of achieving a healthy state for the water masses in 2015 (or in 2021 or 2027), as requested by the DCE, the increased freedom of movement that the Atlantic salmon (and other migratory types of fishes) will be able to enjoy will, in the main, be attributed to the application of these programmes of action.

2.4. Actions implemented concerning the salmon

Programmes in favour of migratory fishes and of their biotopes are implemented by various stakeholders. The implementation of specific actions comes about in the main from "migratory fishes" associations, originating from the world of fishing associations (anglers), created in 1990 with this aim in mind. These organizations are supported on all technical subjects by public bodies[5] linked to the Ministry for Ecology, Sustainable Planning and Development (MEDAD). In all cases, the effective implementation of the actions depends on multiple funding sources (regional councils, conseils généraux[6], public corporations, European Union for some of the projects, and at least 20 % from the contracting authority). This funding is agreed either annually, or on a multiyear basis (3 to 5 years in general). On the whole, funds from the pubic sector, whilst decreasing, remain preponderant (table 3).

[4] Each of these six districts operates a Water Agency (*Agence de l'Eau*): Rhine-Meuse, Artois-Picardy, Seine-Normandy, Loire-Brittany, Adour-Garonne, Rhône-Mediterranean-Corse. The latter has no stake in salmon.
[5] In particular the National Office for Water and Aquatic Environments *l'Office National de l'Eau et des Milieux Aquatique*s or ONEMA (formerly the National Fishing Council, *Conseil Supérieur de la Pêche*)
[6] Conseil Général: Council of a French department

Table 3. List of stakeholders participating in actions benefiting migratory fishes

Type of action	Instigative Body	Contracting authority	Project manager	Funding
Free movement of fishes in fish farms	Government and its public bodies, environmental associations	Weir / Dam owners, public bodies	Research Departments, ONEMA, civil engineers	Various (the majority from public funding)
Habitat improvement (hydro-morphology)	Government and its public bodies	Managers of the concerned watercourse sections	Research Departments and civil engineers	Various (the majority from public funding)
Water quality (non specific to migratory fishes)	Government and its public bodies, environmental associations	Businesses or collectivités publiques[7]	Various	Various (the majority from public funding)
Follow up – stock assessment (adults, juveniles, spawning grounds)	Government and its public bodies, "migratory fishes" associations	"Migratory fishes" associations, ONEMA, Research organisms	"Migratory fishes" associations, ONEMA, Research organisms	Various (the majority from public funding)
Fish farming and stocking	Government, ONEMA, "migratory fishes" associations Fishermen and salmon fish farmers	"Migratory fishes" associations, fishermen and salmon fish farmers, Collectivités territoriales[8]	Fishermen and "Migratory fishes" associations	Various (the majority from public funding)
Communication	Public bodies, Collectivités territoriales[9], environmental associations	Public bodies, "Migratory fishes" associations	Public bodies, "Migratory fishes" associations	Various (the majority from public funding)
Exploitation management	Government	Government and migratory fishes management committees	Government and its public bodies (Police department)	Government and its public bodies

3. French salmon stocks status

3.1. Abundance

The catchment basins inhabited by the Atlantic salmon in France display three distinct salmon population statuses:

- natural stocks **with no significant danger as to their sustainability** in the immediate future. This is the case for the majority of the water courses in Brittany and in the Gave d'Oloron in the south-west. One must nonetheless note that the exact status of these populations is not precisely known and can differ from one basin to another. In the same way, the level of knowledge on the condition of these different populations is mainly measured via angling catch declarations;

- stocks with **low numbers**, **disrupted** or running the **risk of extinction** in the short or mid term: majority of the rivers of the North-West (Normandy, Artois, Picardy), the Aulne and the Couesnon in Brittany, the Allier (the Loire basin), the Nivelle (South-West);

- extinguished stocks subjected to a **programme of reintroduction** of salmons and other types of fishes: the Rhine (and its tributaries and sub-tributaries Ill, Bruche, Giessen, Fecht), the Garonne, the Dordogne

[7] collectivités publiques are the state, regional and local authorities
[8] collectivité territoriale is a region with a measure of autonomy
[9] as note 8

and some of their tributaries and many rivers from the Loire basin with biotopes adapted to salmonids (Gartempe, Arroux and tributaries of the Allier), the Gave de Pau.

To these three categories, one must add the specific case of the Sée-Sélune population complex. These two rivers, in Lower-Normandy, share a common estuary in the Bay of Mont St-Michel. The Sélune, obstructed by two big hydroelectric dams located 14km away from the sea, receives adult salmons from the neighbouring Sée which, on the other hand, is practically bereft of obstacles and has good quality spawning grounds and nursery areas.

Different criteria are used to decide which of the above three types of status a particular stock should be assigned to, amongst which: the deposition of eggs, the total or partial assessment of the adult numbers, the adult catches in the river zone, the abundance of juveniles in autumn (distinguishing the native parrs from those introduced), the numbers of smolts, the inventory of the spawning nests and of the accessible habitat areas. For most of the rivers inhabited by salmons, the only data available is the information concerning catches and the inventory of the parr habitats. However for the 4 rivers identified as “monitored/study” rivers for the Atlantic salmon, a maximum of information is collected. These rivers are the Nivelle, the Scorff, the Oir (tributary of the Sélune) and the Bresle.

3.2. Diversity (composition per sea-age, genetic characteristics)

Sea-age

The catchment basins, which contain salmon populations, are geographically very diverse in France. This is due to the variety of their sizes, geological substrate and main hydrological regimes.

This impacts particularly on the structure of the sea-age. Small water courses in Brittany and in the North-West do not exceed, in the main, 60 km in length in their main course (catchment basin approximating 500 km2). They show a dominance of grilses (1 SW salmons), which represent more than 90 % of the yearly returns. The same applies to the Nivelle. This proportion has clearly increased during the last twenty years, given that the Spring salmons are getting rarer.

Inversely, in the Allier, where the spawning grounds are located about 800 km from the estuary of the Loire, are found 33 to 66 % of 3SW salmons depending on the year, the remaining salmons being 2SW salmons. This composition is exceptional in France and in the whole of Western Europe. The large rivers from where salmon disappeared, such as the Rhine, the Seine and the Dordogne, also had populations of large salmons (2 to 3 SW). For the rivers subjected to a reintroduction, the current composition of the salmons returning differs from their previous situation, with a preponderance of grilses.

Finally, the Adour-Gaves basin (South West) exhibits a balanced proportion of grilses and 2SW salmons, with an increase in the last ten years or so of the proportion and of the numbers of Spring salmons. This results from the restoration of the access to new spawning grounds (Gave de Mauléon). Three Sea Winter salmons are still present, but only as a residual entity.

Structure and genetic diversity

With regard to the genetic diversity, three studies are currently taking place and will soon provide a better general overview of the salmon populations’ genetic structure and of the risks of genetic deterioration connected to stock enhancement practices:

- Project ASAP 2 aims to analyse and compare the genetic structure of salmons in about sixty rivers in Western Europe, including about ten French water courses (end of the programme: July 2008) ;

- Project GENESALM is a national project. It includes the genetic mapping of salmons used in fish farming for releases in rivers and an assessment of the genetic practices of these fish farming establishments. This project deals simultaneously with the common trout as it is also the subject of much stocking in France (end of the programme: September 2008);

- A genetic study of salmons in 10 rivers of Lower-Normandy to define a possible structure and to clarify the status of some of these rivers in terms of the practices in salmon stocking.

A multiyear study will start in 2008 in the Gironde, Garonne Dordogne basin in order to establish the genetic variability of the adult salmons returning to the basin and to determine, through parental assignation, the origin of these individuals (wild or from stocking). On a more general note, apart from the use of classic quantitative tools (number of adults and juveniles) which they will complement, studies of this type are

required for each population of salmon whose status is recognised as poor and which are subjected to juvenile stockings, in order to establish their protection status.

3.3. Situation of threatened or endangered stocks

There are four water courses in which the survival of stocks looks uncertain in the short or mid term: the Couesnon (Brittany), the Aulne (Brittany), the Allier (the Loire Basin) and the Nivelle (South-West).

The Couesnon is a small coastal river flowing into the Bay of Mont Saint-Michel. It suffers, in the main part of its course, from intensive agriculture practised in its basin. There are rectification problems, diffuse agricultural pollution and deposit of fines (hydraulic regime and ground erosion) all of which are hostile to the survival of salmons. However, the river's natural salmon population is recovering thanks to its small tributaries, one of which having benefited from a restoration programme in the 1980s and 1990s, with restocking. However, this productive system, on such a small scale, begs the question of autonomy (individualised stock or metapopulations). It could also be jeopardized by further potential modifications of its catchment basin.

The Aulne is one of the three major water courses of Brittany (145 km long, catchment basin of 1495 km2). 70 km of its downstream course is canalized, having remained so for more than a century and a half (28 navigation levels). Despite the existence of fishways for the majority of obstacles, the current management practice in a « barred » configuration brings about great difficulty of access for salmons in the upper reaches of the course, where the majority of the parr habitats and of the spawning grounds are located. Less than 8 % of the migrating adults manage to access these areas. There are also probably some serious problems with the downstream migration of the smolts, although this has not yet been investigated. This river is subjected to substantial stocking of juveniles, including stockings of salmons at the stage of smolts. We do not know how the recorded population (video counting and catches) is split between farm individuals and native salmons. This uncertain status remains to be clarified.

The Allier is a tributary of the Loire which is distinct in presenting very few obstacles to the upstream migration (despite the great distance to arrive to the spawning grounds, the first being located 800km from the Loire estuary). It is the last water course of the basin that can boast a "natural" population, as the salmon has been eradicated from the other auspicious tributaries because of impassable dams. On the other hand, the hydroelectric dam of Poutès-Monistrol, situated in the upper reaches of the Allier upstream of 60 % of known parr habitats in this river, presents serious clearing difficulties, upstream and downstream, despite the existence of a lift and of a downstream run system built, in the main, to the rule book. Other negative factors have also recently been noted, including a reduction in salmon numbers close to the spawning grounds and a deterioration in health of the adult salmons filmed at the fish ladders of the Vichy dam which means that the replenishing of the population is at risk. Adult salmons total about 600 per year since 1996, which represent, at the most, 30 % of the minimum quantity expected according to the listed parr habitats areas. The incremental increase of the quantities of juveniles added to the river, since 1995 and particularly after the first year of production by the Chanteuges salmon fish farm in 2003, has not for the time being translated into an increase of the adult numbers. Indeed the rate of returns of smolts-adults is around 0.1 %. Finally, as the breakdown between fish from stocking and native salmon has not been completed yet, it is not possible to estimate the true status of the population. There is recognition of the heritage value presented by the residual population of the Allier salmons. However a scientific assessment made in 2004 pointed to the inadequacies of the LIFE programme entitled "Conservation of the Loire large salmon" and to its over emphasis on stockings, which obscured other badly defined environmental problems. A second appraisal of the impact of the Poutès dam proposed, as a preferred option, its removal so as to minimise the risk of the salmon disappearing from this basin. An official decision still remains to be made at the beginning of 2008, with regard to the renewing of the hydroelectric concession or to the removal of this dam.

La **Nivelle** is a small coastal river, in the Basque Country. It is 39 km long and its basin covers 238 km2. It is the most southerly of the French salmon rivers. Its salmon population is restricted because of a lack of access to the upper reaches of its course, and the section of the course accessible to reproduction (18 km) has, in part, been spoiled by agricultural practices. Also in some years, the river is subjected to excessive temperatures which results in a very low average survival rate of juveniles at the stage between egg and parrs 0+ (0,97 %). Net catches in the maritime zone (Bay of Saint-Jean de Luz) can also decrease the number of salmons returning. Since 2003 these have not amounted to more than 100 individuals, with a drop in the return of the autumnal parrs as adults to less than 1 % since 2001. The population is chronically under its conservation limit and appears to be at the mercy of climatic changes and of anthropic impacts, whilst still presenting a scientific interest acknowledged by its CIEM status of the most southerly "monitored river" in the whole of the North-East Atlantic zone.

3.4. **Evolution of extinct salmon stocks subjected to a reintroduction programme**

The reintroduction of salmons in the Rhine and in some of its tributaries is a multinational initiative (Holland, Luxembourg, Germany, France and Switzerland) which started at the end of the 1980s. The coordination of this initiative is undertaken by the International Commission for the Protection of the Rhine (*Commission Internationale pour la Protection du Rhin* [CIPR]), although each country remains autonomous in terms of the measures concerning its respective territory. The main difficulties in reintroducing the salmon in the Rhine in Alsace arise, first of all, from the impassable obstacles which have not been equipped to allow the passage of migratory species. This is the case in the Rhine (2 major hydroelectric dams fitted with upstream fishways, and 4 without any equipment) and in the Vosges tributaries of the Ill, obstructed by dozens of "seuils"[10] that prevent access to the known spawning grounds. A second type of problems takes place in the Rhine delta, in Holland. The delta is indeed complex and its various branches are equipped with numerous sluice gates which hinder the migrations upstream and downstream of the Atlantic salmon and other species (improvements expected for 2008). Furthermore, various types of gear fishing take place (the impact of which is in the process of being assessed). This probably has an impact on the migrating numbers. Since 2000, countings have taken place of the adult salmons in the Franco-German Rhine near Strasbourg (between 50 and 90 individuals per year), but access further upstream has not been sufficiently re-established, which means that the natural reproduction cannot take place in the most adequate areas of the river.

The second large basin which has benefited from reintroduction efforts, begun in the early 1980s, is that of the Garonne and of the Dordogne. In these two rivers, several hundred salmons return each year, thanks to stockings with juveniles, but the natural reproduction is only constant in the Dordogne. The obstacles presented by dams in the middle course of the rivers, have recently been reassessed (in both rivers), despite the existence of fishways which have, until now, been considered as consistent with the technical design criteria. These difficulties have been judged to be more significant than expected, particularly where three hydroelectric dams (of mid capacity) are located in the downstream course of the Dordogne; It would indeed appear that hardly one in two migrating salmons makes it through to reach the effective reproduction zones. Similarly in the Garonne axis, radio-telemetry studies are revealing that only 30% of fishes, on average, manage to reach the *a priori* functional spawning grounds. On the higher reaches of the Dordogne, the existence of a chain of large hydroelectric dams presents problems of flow management (lockage water) with regard to, for instance, natural reproduction (removal of flooding water from spawning grounds, fry mortality). These dams could potentially compromise the whole (or part) of the natural reproduction. They, however, also present the opportunity for an adapted form of management, one which could support the salmon, if the demands for electricity production were to take into account these environmental considerations. Furthermore, excessive water temperatures in spring and summer have, in some years, reduced the numbers of adults in the Garonne.

Until now, the reintroduction of salmons has not been successful in any of these basins, due the problems encountered not being dealt with thoroughly enough. As far as the present knowledge goes, the adult runs occur exclusively, or in the main at least, due to stocking with fishes which have originated from fish farms.

4. Threats on the stocks and current management measures

4.1 Impacts from all fisheries carrying out by-catch or direct catches of juveniles or adults

Anglers, fishing for trout in fresh water, using natural baits or flies, will inevitably – if unwittingly – catch some native or reared parrs in areas of natural production. Whilst this occurs in all basins, this cause of direct or differed mortality remains limited, except where disrespectful fishermen may, from time to time, meet a high density of juveniles originating from a stocking programme and which are therefore easier to catch.

There is neither information, nor data, on the by-catch or direct catches of post-smolts at sea. The unconvincing results from the research studies, or from the study of professional catches reported by the CIEM Working Group on the Atlantic Salmon, does not entice to carry out any specific investigations on the mortality related to fishing of this stage in salmon development.

Catches of adult salmons in trawls and in nets on the continental plateau and at the proximity of the coasts by professional fishermen, amateur fishermen and amateur sailors are, generally, little documented. There are local data however, such as the study on the fileyeurs of Capbreton and the multiyear follow up study carried out near the mouth of the Bresle, (see paragraph 2.1). Possible methods of further investigation

[10] This in effect means “raised up river bed level”

include: study of the on-board log book data[11], survey of the landings for fish auction (where salmonids are classified under the category “various”), boarding of professional vessels to observe the catches or research fishing campaigns. Due to the variety of vessels and the high number of ships and gears involved, the tendency is, on the whole, to check landings at fish auctions, even if part of the salmonids catches never actually materialise.

The by-catches of salmons in the Bay of St-Jean de Luz (Nivelle), confirmed since 2003, and the frequent targeted poaching in the Bay of Mont St-Michel (Sée-Sélune and Couesnon) has reduced the salmon populations and reduced the rigorousness of management by TAC. Occasional bouts of poaching by anglers in the estuary area of some of Brittany’s rivers (Léguer, Trieux) have added to the problems, although the impact of this is more limited. These problems can only be resolved by the enforcement of the regulations through an increased collaboration with the Maritime Affairs Department who has jurisdiction in these zones.

Given the fishing seasons (spring) and the non selective gear used to catch other types of migratory fishes, by-catches of brood fishes take place in a number of basins during their return in estuaries and rivers. This has led to some doubts regarding the Loire[12] and the river system of Gironde-Garonne-Dordogne. Similarly, a great number of gear fishermen are operating in the Rhine delta in Holland, although the level of by-catches here remains unknown. Following the issue being tabled during a symposium held by the International Commission for the Protection of the Rhine (*Commission Internationale pour la Protection du Rhin*), in November 2005, the effect of this activity is in the process of being examined,.

The TAC for the Spring salmon (angling) in the river zones, can sometimes be exceeded in Lower-Normandy as well as in some of Brittany’s rivers, due to the disregard by some of the regulations currently in place.

4.2 Factors impacting on the salmon habitat in the estuaries and in fresh water

The various types of dams, which present major obstacles for migrating fishes are, by far, the greatest cause of the disappearance of salmon from many French basins and sub-basins. These obstacles are also one of the principle reasons for the stagnation of existing populations (in the case of rehabilitations), as well as for the provisional failure of various attempts at reintroduction. However, in the last two decades, two specific regions have, in fact, benefited from initiatives to improve salmon movements:

- Brittany, where a good proportion of the water courses have had the majority of their "seuils"[13] reduced or properly fitted with fish ladders, even though these were of moderate scale (1 to 2 m high);

- the Adour-Gaves basin, where, in less than 10 years, the increased colonisation of the Gaves d’Oloron and de Mauléon has resulted in a corresponding increase in the numbers of juveniles and adult salmons.

In the Garonne and Dordogne, which were amongst the first of the major French rivers to have benefited from the installation of modern fish passes (or lifts) for upstream runs in the 1980s, some new developments are now demonstrating the insufficiency of these initial efforts. Radio-telemetry operations and new video migration controls have revealed low rates of crossing: 47% on three dams of the middle section of the Dordogne and 30% for two dams in mid Garonne.

Estuarine pollution has also proved, or can at times prove to be, a factor which has limited fish numbers in two major basins: the Loire and the Gironde. In the Loire, the estuarine muddy plug caused serious problems in the 1990s (with high mortalities in fish farming) but, since 2000, this has clearly diminished thanks to progress made in the purification of the basin waters. Continuous measurement of the sensitive parameters has been in place since 2007. In Gironde, a similar monitoring will enable an assessment of the critical periods for the migratory fishes. Both environmental and migrations records are in the process of being combined in the framework of the Water Development and Management Plans (*Schémas d’Aménagement et de Gestion des eaux*) for the Gironde estuary.

[11] the analysis of which falls on the Regional Centres of statistical processing (*Centres régionaux de traitement statistique* [CRTS]) who answer to the Maritime Affairs Department (*services des affaires maritimes*)
[12] where the numbers of salmons in the Allier are low and where there have been sightings of very high percentages of damaged salmons since 2005 in the lower part of the Allier at the video checking system of the Vichy ladders, although no new precise reason for this has been offered.
[13] raised up river bed levels

In the case of rivers subjected to significant water abstraction and to hot summers, the water temperatures sometimes exceeds 28°C, lasting for several days or even weeks, limiting the migration course. These problems have become particularly evident in the Garonne and Dordogne (downstream and middle course), where the flow is greatly lessened by water usage. This is also likely to have some impact in the Loire. The situation is probably exasperated by the negative synergy with other physic-chemical pollutions. One must also note that the longer and more pronounced low water levels which have been experienced in the last twenty years have tended both to increase the rate and the duration of the retention of the migratory fishes at the level of the obstacles, all the more so when the obstacles are numerous (cumulative effect). Several radio-telemetric studies have proven this to be the case for the Aulne, the Loire, the Garonne and the Gave de Pau. These adverse effects occur because of modifications to the catchment basin hydrological system, highlighted by the more frequent periods of dryness and extreme heat experienced over these last few years (for instance the summer of 2003).

4.3 Impacts from Aquaculture, introduction, transfers and transgenics (including diseases and parasites)

In terms of marine salmon aquaculture, there is one active commercial concern in France (*Saumon France Cherbourg*), operating since 2001 within the roadstead of Cherbourg (Lower-Normandy). It has a farm capacity of a maximum of 2,200 tons per year, for about 400,000 to a maximum of 900,000 captive salmons. On the basis of the annual worldwide escapement percentages (0.5 to 1.6 %), there is likely to be roughly 2,000 to 6,000 escapees per year, a significant number in relation to the natural populations of salmon in the rivers of Brittany and of the North-West of France. These normally total a few hundred to a few thousand adult salmons. It is therefore likely that any accident resulting in salmon escapement would have an impact on the neighbouring water courses.

Salmon Aquaculture in freshwater is primarily intended for the natural population rehabilitation and restoration. Stocking with salmonids from farms, which is a common practice, has lead to many transfers of fishes of various origins. One of the most important potential dangers against which precautions must be taken is the accidental introduction of the *Gyrodactylus salaris* parasite. A study has shown that it remains absent from the country's water courses and salmon farming establishments. To keep it so and avoid potential problems in the future, it is necessary to register the country as a parasite-free zone and to implement protection measures.

Stocking with salmon juveniles, in order to restore or reintroduce natural populations is one of the most established and obvious management tools (in the broad sense of the term) that have been implemented. This practice has diminished in regions where the salmon populations have been assessed as auto-sufficient, particularly in Brittany, where stocking now occurs only in two rivers (Aulne and Couesnon) out of a total of about twenty. Similarly, there is no stocking of salmons in Lower-Normandy, nor in Normandy or in Artois Picardy. Since 1991, it is no longer practiced in the Nivelle and gradually much less in the Gave d'Oloron. Everywhere else, a proper assessment of the validity, efficiency and good practices of salmon stockings must be carried out, with particular regard to Annex 4 of the Williamsburg Resolution.

5. Management approach

5.1. General measures and migratory fish management programmes

In recent years, no formal strategy has been implemented at national level in connection with the wild salmon. The last national document relating to this species is the "Back to the origins Contract" ("*Contrat retour aux sources*") published in 1992, as mentioned above.

Nevertheless, there are different actions in progress in the continental zone. These have been initiated by the Regional management committees and the associations involved in programmes for the migratory fishes. In the main, such initiatives are consistent with the principles stated by the CIEM Working Group on the North Atlantic Salmon (WGNAS) with regard to exploitation as well as by NASCO, in connection with the majority of questions connected to the Atlantic salmon:

- management of the exploitation based on a precise knowledge of the stocks (if possible based on the relationship between stock and recruitment) and by avoiding fisheries of mixed stocks so as to protect potential populations in difficulty when combined with more robust stocks.

- maintenance and increasing of the salmon productive capacity by restoring the habitats, where necessary.

- restoration of stock where the level has been assessed as weak or when it has disappeared.

Let us not forget that four out of seven of the management programmes for the period 2008-2012 are in the process of being developed; the other three being already implemented (Table 2). The main actions which are ongoing and that relate to NASCO's recommendations and guidelines are:

- the protection of the existing resource, **quantitatively**, with regard to its **exploitation**. This has led to exploitation management measures for the currently existing or subsisting salmon populations. Throughout the country, the declaration of salmon catches has been compulsory since 1987. These declarations also require a tag to be fitted on the carcass of each salmon caught and kept. In the water courses of the **Massif Armoricain** (Brittany and Lower-Normandy), since 1996, harvest management has been carried out, according to a TAC calculated on the basis of the relationship between stock and recruitment on the one hand and specific salmon habitats area existing in each river on the other. The targeted egg deposition is that which is equivalent to the conservation limit, as defined at the international level and according to the CIEM and NASCO's recommendations. In the **Loire-Allier** basin, direct salmon fishing has been forbidden since 1994 as a protection measure, as fish numbers have been significantly decreasing over the last twenty years or so. However other types of fishing, using gears likely to catch salmon, continue to be authorized. In the **Adour-Gaves** basin, some fishing effort restrictions have been agreed since 1999 (occasional supplementary lifting of the fishing nets – this concerns professional fishing in the lower part of the Gave d'Oloron and in the Adour estuary) whilst annual catch quotas of 200 or 250 fishes were simultaneously implemented for angling in the Gave d'Oloron. Today, angling is no longer subjected to a quota, as such a restriction proved uncontrollable. Instead, restrictions are now targeting the fishing effort (2 days of closure per week), in line with the professional fishery management.

- the protection of the existing resource, **qualitatively**, with regard to the **exploitation** of its different sea age components, in the water courses of **Brittany** and of the south of **Lower Normandy.** Since 2000, a TAC concerning specifically the Spring salmons (2SW fishes) has been implemented so as not to exceed, in the total catches, the proportion represented by these specific populations (principle of proportional harvesting). In practice, the effect has been limited in some ways, because the regulations have not been respected by a few fishermen in some of the rivers (where no declaration was made or the declarations that were made were transferred to other rivers). It would also be fitting to seek a better balance in the exploitation of the two main sea age categories in the other significant salmon fishing area represented by the Adour-Gaves basin.

- the rehabilitation programme in the Allier and in the Loire, its main migratory axis, given the very low annual numbers of salmons which are well below the productive capacity of the accessible habitats for parrs. To this day, the diagnostic makes no reference to a conservation limit (literally speaking), as it is not known for the Allier. This restoration programme includes the improvement of the conditions for migration (which remains incomplete) and some stocking of juveniles at different stages of their development. Significant coordinated efforts, agreed in the first "Loire programme" (« *Plan Loire* ») (1994-1999), were continued in the second programme (2000-2006), with, especially, the removal of three important dams[14], as well as the cancellation of a dam project on the lower reaches of the Allier. A 2007-2013 Loire programme which includes migratory fishes is currently being implemented.

- the rehabilitation programme of the salmon in the Adour-Gaves basin. Here the colonisation of the production zones upstream of the Gave d'Oloron (Gave d'Ossau and Gave d'Aspe) and in the Gave de Mauléon has been visibly improved, thanks to efficient pass equipment fitted at the level of many "seuils"[15] and obstacles. The restoration also includes stocking with juveniles at different stages of their development, particularly in the Gave de Pau, which continues to suffer from blockage points which hinder the free movement of fishes. Efforts to restore the free movement of fishes are currently under way in the Gave de Pau, in the knowledge that with the very numerous dams in place (about thirty) access to spawning grounds will be difficult for a large enough number of broodfishes (cumulative dwindling effect) if there is no agreement for obstacle removal.

- a reintroduction trial in the many basins where salmon has completely disappeared: in the French section of the Rhine (the upper reaches of its course draws the border between France and Germany on 185 km, out of a total of 1320 km) and in its tributaries in the Ill basin in Alsace, in the Gartempe and in the Arroux (Loire basin), in the Dordogne and in the Garonne. In these large basins, the obstacles to migration remain a major problem, either because the obstacles are significant and the issue regarding migrations is therefore imperfectly resolved (excessive rate of retention and delays) as was proven recently by some radio-

[14] Blois removable dam (Loire), Saint-Etienne du Vigan (upper reaches of the Allier) et Maisons-Rouges (lower reaches of the Vienne)
[15] see note 11

telemetric studies on adult salmons, or because of the succession of smaller "seuils"[16] not fitted, or incompletely fitted, with fish ladders. In some cases (Dordogne), the management of hydro-electrical dams by lockage water diminishes the river carrying capacity for the adult spawning and for the parrs development, as biotopes specific to these activities are periodically drained.

5.2. Actions proposed for the fisheries management

Action 1. To establish the level of catches taking place in estuaries and at sea near the coastline.

This implies setting up, monitoring and operating a system of catch declarations specific to the migratory salmonids. The data will then be processed by the Regional centres of Fishing data statistical analysis (*Centre régionaux de traitement statistique [CRTS] des données de pêche.)*

Action 2. To minimise illegal practices which undermine the protection of Spring salmons in Brittany and Lower Normandy. To adopt, if necessary, complementary or alternative measures of protection.

For these angling fisheries, failing to make declarations, making late declarations or transferring declarations from one river to another so as to avoid a temporary closure of fishing (before the reopening of the fishing for grilse), results in the TAC for Spring salmons being exceeded. The stepping up of controls on the rivers concerned could lessen these behaviour patterns. Failing this, alternative measures (such as the closure of fishing on a fixed date) could reinforce or replace the current management method, at the discretion of the Prefects, following a review by the Brittany and Lower-Normandy Cogepomi.

Action 3. To minimise the illegal exploitation of salmons in the estuarine reserves and in the coastal areas

This measure concerns the Bay of Mont Saint-Michel, where illegal exploitation takes place despite the site being listed as a fishing reserve since 1999. Salmons attempting to return to the Sée, the Sélune and the Couesnon pass through the Bay of Mont Saint Michel. The catches made by anglers undermine the management by TAC of these river populations.

Similarly, the coastal reserves located 500m from one side or the other of the mouths of the Arques and of the Bresle must be respected.

Action 4. To forbid estuarine and coastal fishing for migratory salmonids on all the rivers which contain salmons
This measure concerns the Canche and the Authie (Artois-Picardy) and the Risle (High-Normandy). New fishing reserves need to be set up in these rivers' estuaries as per the article 5 of the 1994 "amphihalin fishes" decree which set up the Cogepomi.

Action 5. To estimate and limit the illegal by-catches of salmons in the estuarine and river gear fisheries of the Gironde and the Loire

These fisheries, targeting twaid shads and other species, are extensive in terms of their effort, and the types of gears used are not selective. This results in a significant pressure on salmon which could be all the more detrimental as the stocks are small. This is the case for the Gironde-Dordogne-Garonne catch basin (reintroduction) and for the axis Loire-Allier (attempt at rehabilitation of a small population).

Action 6. Better assess the exploited stocks (numbers and sea-age composition) so as to adapt the fishing exploitation accordingly

The TAC management in Brittany and Lower-Normandy is consistent with the international management recommendations as it is based on conservation limits, with the harvestable portion being divided in correct proportion between the 2 components of the adult stocks (one SW salmons and two SW salmons). The TAC is fixed globally and a 2SW salmon TAC is also set for each river. There is however no procedure to estimate the populations that contribute to the various biological information collected each year (catches, numbers of adults, juvenile abundance indexes, numbers of spawning grounds, see the table in Annex 1).

Fisheries in the Adour basin are not TAC managed. They specifically target MSW salmons. The knowledge of the runs and of their composition (1SW, MSW) must be improved and conservation limits on each water course set as these will determine the acceptable level of exploitation by sea age.

[16] see note 11

5.3. Actions proposed to protect and restore the salmon habitat

The safeguarding or increasing of the basins' natural productive capacity falls into two areas of equal importance:

- the removal or lessening of obstacles to migrations (actions 5), so as to allow for a spontaneous colonisation of the adequate spawning grounds by the salmon and for the most natural transit of the smolts downstream;
- the improvement of these spawning grounds and of the juveniles living habitats, where they have been damaged, and, as need be, of the more temporary habitats as represented by estuaries and the main course of the rivers (action 6).

Salmon protection and restoration programmes, which take into account the issue of habitats, are now being implemented in every salmon basin. These take the form of five-year migratory fishes management programmes, approved by the Cogepomi. However, for some of the salmon populations in difficulty (Allier), or which are currently subject to reintroductions (Garonne, Dordogne), a new study of the environmental factors must be undertaken to identify the bottlenecks which are preventing these salmon populations from increasing as planned.

Action 7. To allow or improve the migrations: smolts movements downstream and adult salmons' access to their reproduction habitats.

Dealing with obstacles to anadromous migrations is an operation which was started more than 25 years ago in France. In many cases, it is however still incomplete. In most of the SDAGE (currently in the process of being drawn up), one of the principles highlighted is that priority be given to the removal of the "seuils"[17] which serve no economic function. This measure alone, however, will not remove a sufficient number of the current obstacles to resolve the problem. Improvements are necessary in every basin, even in some of the main courses where the dams are already fitted with migratory ladders (improving the one in place or building a second migratory pass on a given dam). The hydraulic management of some of the important dams could be adapted to allow or facilitate the movements upstream of the migratory fishes as, for instance, in the mid section of the Dordogne(release of water at the end of Spring).

In some cases, further knowledge of behaviour linked to the different configurations of the obstacles (radio-telemetry) and more effective aids for downstream migrations are necessary to check the efficiency of the installation and make any necessary adaptations. One should note that in-depth radio-telemetry studies of adult salmons, undertaken for the last 10 years or so (Gave de Pau, Garonne, Loire-Allier, Aulne), have all highlighted problems which proved more significant than expected and which have placed the efficiency of the existing obstacle clearing system in doubt.

The difficulty of free movement of smolts have only recently been examined and have been mostly demonstrated to occur at major dams, generally hydro-electric dams, where the retention of calm water is greater than 3 km in extent. Beside the mortality attributable to the transit through turbines, these configurations lead to a disorientation of the smolts, to an increase in predation and to delays in the migration. One can however consider that these difficulties relating to downstream migrations also exist, albeit to a lesser degree, in small water courses with a succession of "seuils" and micro power stations

There is still a need to solve problems of restricted fish movements in:

- the French basin of the Rhine in Alsace (Ill and tributaries), where the access to adequate zones of reproduction has not been re-established at all;
- the coastal rivers in Normandy and Picardy;
- the Sélune (two hydroelectric dams);
- the downstream canalised section of the Aulne;
- the upper reaches of the Allier (dam of Poutès particularly) and its tributaries (Sioule, Dore, Alagnon); the Gartempe, the Arroux;
- the middle Dordogne (dams of Bergerac, Tuilières and Mauzac) and middle Garonne (Golfech and The Bazacle) where the efficiency of the current migratory ladders (some date more than 20 years and are only designed for upstream runs) need improving;
- Adour-Gaves basin, particularly The Gave de Pau;

[17] see note 10

- the middle Nivelle, its upper reaches and its tributary, The Lurgorietta.

Some of these basins are currently classified as important for migratory fishes or, as from 2010, will be classified as basins requiring the guarantee of an adequate transport of sediment and allowing the free movement of migratory fishes. Improvement of migration conditions can therefore be expected on these axes.

Action 8. To analyse the flow, temperature and pollution conditions likely to disturb the upstream and downstream movements

This concerns the Loire, the Allier and the Gironde, Garonne, Dordogne water basin. One must monitor the flow conditions and the water quality (particularly in the estuaries) whilst undertaking some radio-tracking and monitoring of the fish movements to deduct when the environmental conditions could disturb the movements up or downstream by salmons or other migratory species.

Action 9. To improve and assess the fresh water salmon habitats

Improvements in water quality can in general impact on or improve the restoring of salmon populations. As a first step, one can envisage that the implementation of the Water Framework Directive (DCE) and the establishment of a sound ecological context would, in the main, lead to a general improvement of salmon biotopes. These nonetheless present some specific peculiarities with regard to incubation (type of substrate and under gravel oxygenation) and flow requirements during migrations

- the improvement of the hydrological operation of the catchment basins to re-establish a more natural flow system (pumping restrictions, restoration of humid zones, re-planting of hedges, suppression of drainage, and end to waterproofing, winter covering of grounds…);
- decrease in ground erosion and reduction of enrichment from nutrients attributable to intensive agriculture which impact on the survival of the salmonid eggs during incubation. There is not overall knowledge of these problems as far as salmon rivers are concerned, which is something that remains to be organised. Improvements in ground and agricultural management are to be expected in the upstream sections of the basins where the salmon still exists. Under-gravel survival tests will be undertaken on water courses likely to have suffered deterioration (Brittany, Lower-Normandy, Upper reaches of the Allier, Dordogne, Gave d'Oloron…). The dissemination of good management practices for the riverside zones, which aim to limit erosion and agriculture pollutants, must continue apace;
- adaptation of the Dordogne dams' hydraulic management, to avoid the drying up of spawning nests downstream, to diminish the fry mortality and to encourage the Spring adult salmon upstream migrations in the estuary and in the mid section of the Dordogne;
- acknowledgement of the needs of migratory fishes with regards to water extraction for agricultural purposes in the Garonne, so as not to compromise efforts made to restore the salmon;
- restoration of the natural sedimentary charge in pebbles, necessary for spawning, in the Old Rhine downstream of Kembs;
- regaining of free water movement zones through the suppression of "seuils" and dams whenever possible (in keeping with the action 6)

In the context of general actions which would be difficult to only ascribe to salmon and which are not quoted here, is the issue of general reduction of "typical" pollution from domestic or industrial origin. Since the improvement recorded in the 1970s and 1980s, thanks to the general creation of water purification plants, the main characteristic pollution black spots have been reduced. Today, the trend is not to consider chemical pollution as a great factor limiting the maintaining or restoration of salmon. However, given the low water flows in some years, problems could reoccur. Therefore, water quality is monitored in the estuaries of the Loire and of the Gironde as these collect the pollutants from the totality of these large water basins. The aim is to prevent the mud plugs which cause mortalities or block migrations (flow, temperature, oxygen and toxic pollutants). The first results from the modelling of the mud plug undertaken in the Gironde estuary SAGE framework, suggest that serious problems could arise.

5.4. Actions proposed for the stock restoration programmes

According to NASCO's recommendations, programmes are to be implemented for stocks with a status below their conservation limit. This requires to produce the estimation of this limit where one does not exist, to define the source populations where there is a situation of meta population and to pursue the restoration efforts already initiated.

Action 10. To maintain and increase the biological monitoring over the long term and to maintain and improve its quality (monitoring of migrations, juveniles, numbering of spawning grounds...)

Action 11. To complete the genetic specification of salmon stocks

A broad coverage of all the rivers with significant stock must be obtained, thus completing the studies already undertaken or in progress.

Action 12. To describe the functioning in metapopulation of the Bay of Mont Saint-Michel rivers

This action relates to the rivers flowing into the Bay of Mont Saint-Michel: Couesnon, Sée, Sélune and Sienne. A research study will be undertaken to analyse the common operation of the salmon populations of these four rivers.

The genetic analyses will provide a broad view of the structure of the populations, thus adding to the work in progress. Applied to some small coastal rivers in Lower-Normandy, these analyses will allow to demonstrate the cases of metapopulation. This in turn will help define the rivers to preserve in priority ("source" rivers) and those ("well" rivers) where further restoration needs to be carried out. This specific type of functioning has already been demonstrated for the Sée-Sélune. Indeed this duo represents a management unit in so far as the Sée feeds the Sélune and its tributaries with adult salmons.

Action 13. To quantify the proportion of native salmons and of salmons resulting from stockings, in the stocks which are struggling or which show an uncertain status.

This action is a priority for rivers where natural reproduction takes place but which are also stocked each year (Couesnon, Aulne, Allier, Gave d'Oloron…). It could be extended to include rivers where reintroduction brings about a natural reproduction (Gartempe, Dordogne…). A genetic analysis would be one of the most recommended tools for this exercise, along with the various available tagging techniques.

5.5. Aquaculture, introduction and transfer management

Action 14. To analyse the genetic or pathological risks associated to aquaculture (fresh water and sea) and to determine preventative or corrective measures in favour of the wild salmon and its restoration (Williamsburg Resolution).

Action 15. To apply the Williamsburg Resolution with regard to artificial reproduction and to the raising in captivity of salmon juveniles (genetic and health harmlessness).

This deals with the practices of salmon farming in the context of genetics, behaviour and health. In particular, this includes the following principles:

- selection of the most representative brood stock in terms of the natural population structure;
- preservation of the original genetic diversity in the course of rearing in captivity;
- a shorter rearing time (earlier stages of release) so as to allow natural selection to operate the longest possible time;
- harmlessness of the fishes released in terms of the health of the river and its fauna.

Action 16. To apply the Williamsburg Resolution with regard to the removal of adults and to the stocking of rivers with salmon juveniles

This involves:

- checking that the removal of brood stock will not impact significantly on the population from which it has been removed, particularly in the basins which are in the process of being rehabilitated;

- avoiding any interaction between the juveniles raised in farms with those born in the wild (geographical disjunction) and to adjust stocking levels to take account of the carrying capacity of those habitats not taken by the native population;

- identifying the composition of those populations that have been subjected to stocking (Allier, Aulne, Couesnon, Garonne-Dordogne…) so as to clarify their status. To do so, the juveniles would have to be tagged (as in the Dordogne with fluorescent pigments) or genetically categorised to monitor their relative

proportions in the numbers of autumnal parrs, smolts and in returning adults. A sampling programme of these different stages would have to be defined;

- examining the benefit of stocking for salmon populations appearing to be in good health or increasing in numbers (Adour-Gave for example);

- preventing the release in rivers of reared salmons which would have no chance to contribute to a natural cycle (ineffectual brood stock for example).

Action 17. To reinstate France to the zone declared exempt of *Gyrodactylus salaris* and to adopt adequate protection measures.

An epidemiological study (1998-2000) in the salmon basins and in the main French salmon aquacultures has proven the existence of a new endemic species of gyrodactylus. This however is not virulent for salmons. The study has also indicated the absence of the *G. salaris*. Salmon populations must, therefore, be protected against the risk of such an introduction which could decimate them.

5.6 Actions proposed with regard to the knowledge and exchange of information

Action 18. To establish conservation limits for all salmon rivers where none exists. To update the salmon rivers inventory for France

Conservation limits will be set for rivers where none exists at the moment, targeting as a priority the basins where salmon is subjected to a fishing exploitation.

Thus, the inventory of salmon rivers will be completed. It will include in addition a catalogue of the rivers' strengths and weaknesses, their classification in categories (from I to III) as per Annex 4 of the Williamsburg resolution, as well as the status of the salmon populations inhabiting them, taking into account the impact of climatic changes.

Action 19. To organise a national technical conference on the salmon and its management, on a biannual basis.

Coordinated by the Ministry of Ecology, Sustainable Planning and Development (MEDAD), this symposium will encourage the exchange of information between the various basins regarding the progress in the restoration programmes, the assessment and improvement of habitats and migration conditions for the salmons and other major migratory fishes.

Action 20. To disseminate NASCO's recommendations and resolutions throughout France

An official dissemination of NASCO's recommendations and resolutions (original documents, translations, summaries) together with this current implementation programme will be carried out among the organisations and individuals concerned with the programmes of salmon restoration and reintroduction (public bodies, individuals in charge of reintroduction programmes, salmon farming managers, and migratory fishes regional management programmes publishers …).

6. Evaluation of the actions

The above-mentioned actions are summarised in Tables 4 to 8 which also include evaluators or achievement indicators.

Table 4. Actions relating to Fishing management

Actions	Regions or basins	Rivers	Period	Evaluators and indicators (non restrictive list)
Action 1. To establish the level of catches in estuaries and at sea along the coasts	All regions		> 2010	Setting up, implementing and monitoring a declarations system. Data to be synthesised by the Regional centre of statistical analysis (Centre régional de traitement statistique (CRTS))
Action 2. To limit illegal practices compromising the current Spring salmon protection. To adopt, if need be, further measures or alternatives	Brittany Lower-Normandy	Everyone Sée, Sélune	2008-2010	Brittany and Lower-Normandy monitoring annual report (police effort, number of fines…). If need be, new and more restrictive fishing regulations.
Action 3. To minimise illegal exploitation of salmons in the estuarine reserves and coastal areas	Bay of Mont Saint-Michel High-Normandy Artois-Picardy	Sée, Sélune, Couesnon Yères, Scie, Saane, Durdent… Arques, Bresles	2008 - 2012	Monitoring-control to stop illegal fishing Annual report on the implementation of the regulation.
Action 4. To forbid estuarine and coastal fishing of migratory salmonids on all the rivers containing salmons	Artois-Picardy High-Normandy	Canche et Authie, Risle		New fishing reserves to be established in the estuaries of these rivers. Application of these measures.
Action 5. To estimate and limit the salmon by-catches in the gear estuarine and river fisheries of the Gironde and the Loire	Loire Gironde	Loire Gironde, Garonne and Dordogne	2008-2012	Studies of the catches estimates Regulation implementation and/or adaptation; monitoring time; recorded offences $\Rightarrow$ biannual report on the monitoring implemented by basin
Action 6. To better evaluate the exploited stocks (numbers and sea-age composition) so as to modify the fishing exploitation accordingly	Brittany Lower-Normandy Adour-Gaves	Brittany Lower-Normandy Gave d'Oloron + tributaries	2008-2012	A better estimation of the runs and the setting up of provisional exploitation levels.

Table 5. Actions relating to the protection and restoration of salmon habitat

Actions	Regions or basins	Rivers	Period	Evaluators and indicators (non restrictive list)
Action 7. To allow or to improve the migrations: smolts movements downstream and adult salmons' access to the reproduction habitats	Every basin	Every basin	2008-2012	Several removal of obstacles and of migratory ladders on each river
Action 8. To analyse the situation with regard to flow conditions, temperature and pollution which could disturb the migrations upstream and downstream	Loire Gironde	Loire et Allier Gironde, Garonne and Dordogne	2008-2012	Flow and water quality monitoring (particularly in the estuaries) along with radio-tracking and migration monitoring
Action 9. To improve and assess fresh water salmon habitats		Various basins		
9.1. Increase of natural sedimentary charge from erosion of the verges	Rhine	Old Rhine Franco-German	2010-2012	Implementation of the re-charge from river erosion. Study of the obtained sedimentary re-charge
9.2. Monitoring and reduction of the impact from agricultural runoffs (solid charge and relationship rain – flow – charge monitorings)	Artois-Picardy, High-Normandy, Brittany, Aquitaine	Sample of rivers to be established		% of basins dealt with thus : modifications of agriculture practices, creation of retention basins, fascines on thalwegs, etc…
9.3. Under gravel salmonid survival tests	Various basins	Normandy, Brittany, Haut-Allier, Dordogne, Gave d'Oloron	2009-2011	Results from under gravel survival studies.
9.4. Hydraulic management and water removal adapted to salmon	South-West	Dordogne, Garonne	2010	Increase of the reserved flows and new methods for reinstating adopted flows

Table 6. Actions relating to salmon stocks restoration programmes

Actions	Regions or basins	Rivers	Period	Evaluators and indicators (non restrictive list)
Action 10. To maintain and increase the biological monitoring over the long term and to maintain and improve its quality (monitoring of migrations, juveniles, numbering of spawning grounds...)	Every basin		2008-2012	Allocation of financial and technical means. Reports of biological monitoring per basin
Action 11. To complete the genetic specification of salmon stocks	Every basin		2009-2012	The number of rivers submitted to genetic analyses. Study reports
Action 12. To describe the operation in metapopulation of the Bay of Mont Saint-Michel rivers	Bay of Mont saint-Michel	Couesnon, Sée, Sélune and Sienne	2009-2011	Thesis and publications
Action 13. To quantify the proportions of native salmons and of salmons resulting from stockings in the stocks which are struggling or which show an uncertain status	Lower-Normandy Brittany, Loire-Allier, South-West	Couesnon, Aulne, Allier, Garonne and Dordogne, Gaves	2008-2012 2009-2012	Number of monitored rivers. Annual report showing percentage of salmons by type of origin (geographical origin, natives, resulting from stocking activities)

Table 7. Actions relating to aquaculture, introductions and transfers

Actions	Regions or basins	Rivers	Period	Evaluators and indicators (non restrictive list)
Action 14. To analyse genetic and pathological dangers linked to aquaculture (fresh water and sea) and to define preventative or corrective measures in favour of the wild salmon and its restoration (Williamsburg Resolution)	France	Various	2008-2010	Analysis report. Measures taken.
Action 15. To apply the resolution of Williamsburg with regard to artificial reproduction and to the raising in captivity of salmon juveniles (genetic and health harmlessness)	Various basins	Rhine, Couesnon, Aulne, Loire-Allier, Garone-Dordogne, Adour-Gaves	2008-2012	The sharing and implementation of good practices
Action 16. To apply the resolution of Williamsburg with regard to the removal of adults and to the stocking of rivers with salmon juveniles	Various basins	Rhine, Couesnon, Aulne, Loire-Allier, Garone-Dordogne, Adour-Gaves	2008-2012	Health inspection report, eco-genetic audit on products sampled from nature, having been raised and released; corrective measures taken.
Action 17. To add France to the zone exempt of *Gyrodactylus salaris* and to adopt adequate protection measures	In the whole of the territory	All rivers	2008-2010	Inscription in the exempt zone. Salmon juveniles imports forbidden.

Table 8. Actions relating to the knowledge and exchange of information

Actions	Regions or basins	Rivers	Period	Evaluators and indicators (non restrictive list)
Action 18. To establish conservation limits for all salmon rivers which do not have any. To bring the French salmon river inventory up to date	France	Water courses with no CL Every basin	2009 2010	Report on the establishment of conservation limits. Inventory update
Action 19. To organise on a biannual basis a national technical meeting on salmon and its management	France	Every basin	2009 and 2011	Minutes of the two conferences.
Action 20. To disseminate NASCO's recommendations and resolutions in France	France		2008-2009	Translated documents. Various informed organisms

Annex 1. French water courses inhabited by salmons and provisional status of the salmon populations

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*** Not Rel. : not relevant

**** (International Union for Nature Conservation; Union internationale pour la conservation de la nature)

		Available informations									IUCN Status****according to expert		Conservation limit		
River	Tributary	Spawning grounds countings	Under gravel survival	Parr fishing	Numbering of smolts	Numbering of adults	Exploited stock ?	Catches data	Salmon stockings		Category	Reliability of advice (1 to 3)*	CL known ?	Level / CL	Remarks
RHINE-MEUSE Basin															
RHINE		N	N	YES	N	> 1999	?	N	YES		EX	1	Not Rel.	-	reintroduction project
RHINE	Ill + tributaries	YES	N	YES	N	N	?	N	YES		EX	1	Not Rel.	-	reintroduction project
ARTOIS-PICARDY															
CANCHE		N	N	N	N	N	YES	YES	N		EX	-	Not Rel.	-	Sea trout in greater numbers
AUTHIE		N	N	N	N	N	YES	YES	N		EX	-	Not Rel.	-	Sea trout in greater numbers
BRESLE		YES	N	> 2006	> 1987	> 1987	YES	YES	N		VU	1	YES	<	Sea trout in greater numbers. Monitored river for salmons and sea trouts
ARQUES	Eaulne Béthune Varennes	N	N	N	N	N	YES	YES	N		VU	-	N	?	Increase in leisure fishery these last years (several dozens of catches - under-declared)
NORMANDY															
VALMONT		N	N	N	N	N	N	-	N		EX	-	Not Rel.	-	Sea trout in greater numbers. Presence of salmon juveniles (abundance indices 2006-2007)
SEINE		-	-	-	N	> 2007	N	-	N		EX	1	Not Rel.	-	
RISLE		N	N	N	N	N	N	-	N		EX	-	Not Rel.	-	
TOUQUES		N	N	N	N	>2001	-		N		CR	1	N	<	15 to 35 adults per year (1% of the TRM stock)
ORNE		N	N	YES	N	>1981	-		N		EX	-	Not Rel.	-	Extinct in 1980 / last restocking in 1995
VIRE		N	N	YES	N	> 2002	YES	YES	N		VU	1	YES	?	returns since 1998
DOUVE		N	N	N		N	-	-			En		N	?	returns since 1998
SAIRE		N	N	YES	N	N	YES	YES	N		VU	1	N	?	returns since 1998
SIENNE		N	N	YES	N	N	YES	YES	N		En	1	YES	?	
THAR		N	N	YES	N	N	YES	YES	N		CR	1	N	?	
SEE + SELUNE		N	N	YES	N	N	YES	YES	N		LC	1	YES	?	Sée = river of origin
SELUNE	Oir	N	YES	YES	1983	1983	YES	YES	N		VU	1	YES	>	Monitored river for salmon
COUESNON	Loysance	YES	N	>2001	> 1990	> 1990	YES	YES	YES		VU	-	YES	<	

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		Available informations									IUCN Status**** according to expert			Conservation limit		
River	Tributary	Spawning grounds countings	Under gravel survival	Parr fishing	Numbering of smolts	Numbering of adults	Exploited stock ?	Catches data	Salmon stockings		Category	Reliability of advice (1 to 3)*		CL known ?	Level / CL	Remarks
BRITTANY																
GOUET		N	N	N	N	N	N	-	N		En	2		N	?	
LEFF		N	N	>1997	N	N	YES	YES	N		LC	1		YES	>	
TRIEUX		N	N	>1997	N	N	YES	YES	N		LC	1		YES	>	
JAUDY + GUINDY		N	N	>1999	N	N	YES	YES	N		LC	1		YES	>	
LEGUER		N	N	>1997	N	N	YES	YES	N		LC	1		YES	>	
YAR		N	N	>2001	N	N	YES	YES	N		LC	1		YES	>	
DOURON		N	N	>1998	N	N	YES	YES	N		LC	1		YES	>	
QUEFFLEUTH		N	N	N	N	N	YES	YES	N		NT	2		YES	?	
PENZE		N	N	>2007	N	N	YES	YES	N		LC	2		YES	>	
DOURDUFF		N	N	N	N	N	YES	YES	N		VU	3		YES	?	
JARLOT		N	N	N	N	N	YES	YES	N		En	3		YES	?	
FLECHE		N	N	N	N	N	YES	YES	N		En	3		YES	?	
ABER-ILDUT		N	N	N	N	N	YES	YES	N		En	3		YES	?	
ABER-BENOIT		N	N	N	N	N	YES	YES	N		En	3		YES	?	
ABER-WRACH		N	N	N	N	N	YES	YES	N		En	3		YES	?	
ELORN		N	N	>1998	N	>2007	YES	YES	YES		LC	1		YES	>	
MIGNONNE		N	N	N	N	N	YES	YES	N		LC	1		YES	>	
CAMFROUT		N	N	N	N	N	YES	YES	N		LC	1		YES	>	
FAOU		N	N	N	N	N	YES	YES	N		LC	1		YES	>	
AULNE		N	N	>1997	N	> 2000	YES	YES	YES		En	1		YES	<	
GOYEN		N	N	>2002	N	N	YES	YES	N		LC / VU	1		YES	>	
ODET		N	N	>1994	N	N	YES	YES	N		LC / VU	1		YES	>	
AVEN		N	N	>2003	N	N	YES	YES	N		LC / VU	1		YES	>	
ELLE		N	N	>2001	N	N	YES	YES	N		LC / VU	1		YES	>	
SCORFF		N	N	> 1975	> 1995	> 1995	YES	YES	N		LC	1		YES	= LC	Monitored river for salmon
BLAVET		N	N	>1997	N	N	YES	YES	N		LC	1		YES	>	
KERGROIX		N	N	>2001	N	N	N	YES	N		LC	1		YES	>	
VILAINE				N	N	N	N	N			En	1		YES	<	

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		Available informations									IUCN Status**** according to expert		Conservation limit		
River	Tributary	Spawning grounds countings	Under gravel survival	Parr fishing	Numbering of smolts	Numbering of adults	Exploited stock ?	Catches data	Salmon stockings		Category	Reliability of advice (1 to 3)*	CL known ?	Level / CL	Remarks
Bassin LOIRE															
LOIRE	Loire	-	-	-	-	> 1997	?	N	N		EX	1	Not Rel.	-	
LOIRE	Allier	YES	N	> 1990	> 1998	> 1996	?	N	YES		En	2	N	<	
LOIRE	Arroux	YES	N	> 1998	N	> 2005	?	N	YES		EX	1	Not Rel.	-	Reintroduction project
LOIRE	Vienne	-	-	-	-	> 2003	?	N	-		EX	1	Not Rel.	-	
LOIRE	Creuse	-	-	-	-	> 2006	?	N	-		EX	1	Not Rel.	-	
LOIRE	Gartempe	YES	N	YES	N	> 2001	?	N	YES		EX	1	Not Rel.	-	Reintroduction project
GIRONDE, GARONNE, DORDOGNE															
DORDOGNE	Dordogne	YES	N	YES	N	> 1988	?	N	YES		EX	1	Not Rel.	-	Reintroduction project
DORDOGNE	Vézère-Corrèze	YES	N	YES	N	N	?	N	YES		EX	1	Not Rel.	-	Reintroduction project
GARONNE	Garonne	YES	N	YES	N	> 1986	?	N	YES		EX	1	Not Rel.	-	Reintroduction project
GARONNE	Ariège	YES	N	YES	N	N	?	N	YES		EX	1	Not Rel.	-	Reintroduction project
ADOUR-GAVES															
ADOUR	Gave d'Oloron	> 1970	N	> 1987	N	> 1996	YES	YES	> 1983		VU	2	N	?	
ADOUR	Gave de Pau	Occasional	N	> 1999	N	1996-2002 > 2004	YES	YES	> 1983 (x10 > 2004)		EX	1	Not Rel.	-	Reintroduction project (>2004)
NIVE		> 1984	N	> 1987	N	> 1999	YES	YES	1985-1988		VU	-	N	?	
NIVELLE		YES	N	> 1985	N	> 1984	YES	YES	N (>1990)		VU	1	YES	<	Monitored river for salmon
BIDASOA		N	N	N	N	N	N	N			CR	2	N	<	Border with Spain