IP(10)9

Aquaculture, Introductions and Transfers and Transgenics Focus Area Report

EU-France

Aquaculture, Introductions and Transfers, and Transgenics

Focus Area Report

Final Report

31 December 2009

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Ministère de l'Écologie, de l'Énergie, du Développement durable et de la Mer

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
MINISTÈRE DE L'ALIMENTATION DE L'AGRICULTURE ET DE LA PÊCHE

ONEMA
Office national de l'eau et des milieux aquatiques

Authors

Yoann VECCHIO
Chargé de mission pour la restauration du saumon atlantique
Office National de l'Eau et des Milieux Aquatiques
yoann.vecchio@onema.fr
« Le Nadar », Hall C
5 square Felix Nadar
94300 Vincennes

Benoit BOURBON
Chargé de mission
Direction des pêches maritimes et de l'aquaculture
benoit.bourbon@agriculture.gouv.fr
3, place Fontenoy
75007 Paris

Bénédicte VALADOU
Chargé d'Etudes « plans migrateurs »
Office National de l'Eau et des Milieux Aquatiques
benedicte.valadou@onema.fr
« Le Nadar », Hall C
5 square Felix Nadar
94300 Vincennes

Contacts :

Yoann VECCHIO, ONEMA, yoann.vecchio@onema.fr
Bénédicte VALADOU, ONEMA, benedicte.valadou@onema.fr
Benoit BOURBON, DPMA, benoit.bourbon@agriculture.gouv.fr

Usage Rights :	*Unrestricted access*
Geographic Coverage :	*France*
Geographic Level	*North Atlantic*
Readership :	*NASCO participants*
Nature of Document :	*Study report*

Contents

List of Annexes

Part 1: Introduction

I.1: Overview of aquaculture related activities

There are two fields of salmon aquaculture and related activities in France. It is therefore possible to distinguish between salmon farming for stocking purposes, in order to restore populations, and the production of fish for commercial consumption.

I.1.1: Salmon farming for stocking purposes

Stocking is carried out in order to meet three different objectives in France. These are:

- The restoration of wild populations which have disappeared;
- To sustain wild populations;
- To maintain professional, sporting or recreational fisheries.

Since the 1980s, many programmes to restore salmon populations have been carried out, leading to a dramatic increase in the number and development of salmon farms for stocking purposes.

Almost 10 large basins or watercourses in France are subject to stocking programmes today (annex 1), each requiring fish from at least one of the 15 major salmon production facilities in mainland France (Table 1).

I.1.1.1- The situation with regard to individual basins

I.1.1.1.a – The Rhine Basin
In this basin, production is based on the Loire-Allier strain and relies on two main facilities, one at Obenheim (Bas-Rhin) and the other at Huningue (Haut-Rhin). The Saumon-Rhin Association commissions the service providers who operate these facilities to produce fry (ASR, 2009).

Mainly unfed fry and fed fry of 3 to 5 months old are produced. Therefore, the salmon farm at Obenheim (including the gravel beds at Friesenheim) produces approximately 300,000 unfed fry and 250,000 fed fry. The Huningue salmon farm produces around 200,000 fed fry, 150,000 unfed fry and 15,000 parr each year.

Table 1 : The principle salmon production sites used for stocking purposes

Basin	**Production Facility**	**Annual Production Capacity (approximate)**	**Managed by**
Rhine	Obenheim + connected site at Friesenheim (Bas-Rhin)	300,000 unfed fry; 250,000 fed fry	FDPPMA 67
	Huningue (Haut-Rhin)	200,000 fed fry; 150,000 unfed fry; 15,000 parr	The Petite Camargue Nature Reserve
Adour-Garonne	Cauterets (Hautes-Pyrénées)	1,500,000 eggs	FDPPMA 65
	Bergerac (Dordogne)	500,000 eggs	MIGADO
	Castels (Dordogne)	300,000 fry (200,000 fed fry and 100 to 150,000 parr); 20,000 smolts	MIGADO
	Pont Crouzet (Tarn)	500,000 fry; 40,000 parr	MIGADO
	Médous (Hautes-Pyrénées)	900,000 eggs of Cauterets origin hatched	FDPPMA 65
	Arcizans (Hautes-Pyrénées)		FDPPMA 65
	Sassis (Hautes-Pyrénées)		FDPPMA 65
	Aragnouet (Hautes-Pyrénées)		AAPPMA
Loire	Chanteuges (Haute-Loire)	1,100,000 eggs; 600,000 fry; 200,000 smolts	CNSS
	Verger (Creuse)	Fry production from 300,000 eggs of Chanteuges origin	
	Talbat (Vienne)		
Brittany	Favot (Finistère)	200,000 parr and smolts	FDPPMA 29
	The AAPPMA de l' Elorn salmon farm (Finistère)	8,000 to 12,000 smolts	AAPPMA de l'Elorn

I.1.1.1.b - The Adour-Garonne Basin
There are approximately 10 fish farms in this basin which are used for salmon stocking. Some of these will restock the Adour basin and others will restock the Garonne and Dordogne basins.

In the Adour basin, four main facilities are involved in a complex production process. Individual adult salmon are trapped in the Gaves (a French term for certain rivers in the Pyrenees region) and are reared until they are spawned at the Osserain facility. The eggs produced are then sent to the Cauterets site in the Hautes-Pyrénées. Here, the F1 generation are reared to produce almost 1,500,000 eggs. Of these, approximately 900,000 will be sent to hatcheries at Médous, Arcizans, Sassis and Aragnouet (Hautes-Pyrénées) where they will hatch and develop.

In the Dordogne, the production network is managed by the Garonne Dordogne Migratory Fish Association (MIGADO) and uses wild spawners at the Bergerac fish farm. This site produces around 300,000 eggs, some of which will hatch at the Castels facility, which has a production capacity of 300,000 fry and 20,000 smolts.

The Garonne stock is restored by stock from the Gaves and individual fish of Garonne-Dordogne origin caught at the Cauterets site.

In reality, the Bergerac fish farm supplies the Pont Crouzet site with eggs, thus ensuring the production of all juvenile salmon in the Garonne basin (Haffray and Rault, 2008).

I.1.1.1.c – The Loire Basin
Restocking in the Loire depends mainly on the CNSS (National Wild Salmon Conservancy) salmon farm at Chanteuges (Haut-Allier), which was created under the first Loire Plan (1994 – 2003). Wild spawners from the Loire are stripped at this site to produce over one million eggs, 600,000 fry and 200,000 smolts. Although most production is at this facility, the connected sites at Verger (Creuse) and Talbat (Vienne) also contribute to restocking programmes as around 300,000 eggs are sent there each year (Haffray and Rault, 2008).

I.1.1.1.d – The Brittany Basin
In the Brittany basin, restocking programmes are carried out to sustain wild populations on the Aulne (and its estuarine tributary the Douffine), the Couesnon, and the Elorn.

The Favot fish farm, operated by the FDPPMA du Finistere, has a production capacity of around 200,000 parr and smolts and provides for the restocking of the Aulne and the Coeuesnon (Haffray and Rault, 2008). The AAPPMA de l'Elorn site is capable of producing between 8,000 and 12,000 smolts and stocks the Elorn watercourse.

I.1.2: Commercial salmon farming

French commercial marine salmon production is about 1,500 tonnes. It is carried out at two sites in the North West of France. The first, in the large harbour at Cherbourg in Basse-Normandie, produces about $^{2}/_{3}$ of the total. The smolts used are of a selected Scottish strain.

The second site is in Brittany (Finistere) at Aber Vrac'h and uses a local French strain.

I.2: Aquaculture Related Policies and Management Structures

I.2.1: Aquaculture Planning

The Ministry for Food, Agriculture and Fisheries (MAAP) and the Ministry for Ecology, Energy, Sustainable Development and the Sea (MEEDDM) are responsible for aquaculture in France.

Two departments are involved in aquaculture at MAAP. These are:

- The Directorate for Marine Fish and Aquaculture (DPMA), responsible for the organisation and economic management of the industry; and
- The Directorate-General for Food (DGAL); responsible for health issues.

MEEDDM is responsible for introducing policies to protect the environment and is therefore charged in particular with procedures for the authorisation and declaration of facilities.

I.2.2: Aquaculture Organisations and Institutions

Aquaculture is based around four main organisations in France, which bring together various institutions, ensuring coherency of practices, and provide technical support. Among these are:

The French Aquaculture Federation (FFA)
The French Aquaculture Federation is an industry association, which brings together fish farmers and County producers organisations. It represents the industry's interests to the supervisory administrations (MAAP, MEEDDM) on issues regarding both assessing the impacts of aquaculture, and stock health control issues and fighting the risk of pathogens.

The Inter-Industry Committee for Aquaculture Products (CIPA)
Aquaculture professionals in France have adopted a federal policy by creating the Inter-Industry Committee for Aquaculture Products.

By establishing a 'Sustainable Aquaculture' Commission in 2002, the CIPA has committed to introduce self-agreed, published regulations which can be monitored for control purposes. These guarantee both consumers and the supervisory authorities that French aquaculture uses methods which produce a safe and healthy product, whilst respecting the natural environment.

Clear work plans have been defined in order to clarify the industry's position on health issues (antibiotics, vaccinations, health security), and genetic issues (triploid, genetically modified organisms, selection, broodstock for restocking).
Best practice guidelines on health issues have been drawn up as a result of this commission.

Charter Society for Salmonids for Restocking (CCSR)
A joint venture between the French National Fishing Union and the French Aquaculture Federation resulted in the creation of the Salmonids for Restocking Charter in 1995. Supported by the ministries responsible for agriculture and the environment, the French Charter aims to unite, on a voluntary basis, fish farmers who rear fish to restock French watercourses. The signatories commit to respect various best practice guidance, including health guarantees.

The French Fish and Poultry Farmers Union (SYSAAF)

The French salmon farming industry has recourse to the expertise available at a technical support centre, which specialises in improving the brood stock's genetic and health conditions - the French Fish and Poultry Farmers Union.

In addition to providing support for genetic selection and reproduction, this organisation, in close collaboration with the French National Institute for Agricultural Research (INRA), also brings expertise in terms of both staff training and improving the health conditions of the stock and facilities.

Part 2 – Implementation of the Williamsburg Resolution

II.1: Actions to improve cooperation

France, through the FFA, is one of the founding members of the Federation of European Aquaculture Producers (FEAP). This institution, which aims to develop and establish a common policy on the production and commercialisation of aquaculture species, is considerably involved in the issues affecting the development of sustainable aquaculture. This highlights French involvement at the heart of joint approaches to aquaculture.

It appears that collaboration with research institutions in connection with aquaculture for restocking purposes is rare and limited both in France and abroad. Furthermore, these limited interactions are seen as a hindrance to the development of collective know-how and improved practices. (Haffray and Rault, 2008).

II.2: Procedures to demonstrate the absence of negative impacts on wild salmon stocks.

In France, the inclusion of fish farming in nomenclature related to Classified Installations for the Protection of the Environment (ICPE) makes them subject to specific regulations. Therefore freshwater and marine salmon farms whose production is over 20 tonnes *per annum* are subject to an authorisation procedure which requires a comprehensive dossier, including an environmental impact study, before they can begin to operate (annex 2).

This study includes a chapter on the direct and indirect effects of the facility on the environment. It focuses particularly on the area and landscape, flora and fauna, natural environment and biological balance as well as on the impacts on the surrounding area (noise, vibrations, smells, light emission) and on agriculture, hygiene, health, public health and safety, the protection of material goods and cultural heritage.

However, it must be noted that the impact study does not deal directly with problems related to the negative impacts on wild fish stocks. Large-scale ecological impacts appear to be hidden from the study, to the extent that farmers are not obliged to prove that their activity has no impact on wild salmon stocks.

This loophole is, however, compensated for by the introduction of fish enclosure devices (nets, grilles) whose efficiency is checked during site inspections by the Inspector of Classified Installations.

II.3: Risk assessment procedures

There appear to be no risk assessment procedures in place in France, as these processes are the responsibility of the farmer. The farmer is, however, obliged to include a risk study in his impact study. This must:

- Highlight any threat the facility could pose in case of incident;
- Provide a description of any accidents which are likely to occur; and
- Describe the nature of the consequences which could occur in the event of such an accident.

In addition to this information, the study explains the measures to reduce the likelihood and effects of any accident. This should particularly stress the nature and organisation of measures intended to combat the effects of such an accident.

II.4: Measures to minimise escapes of farmed salmon

The problem of escaped farmed salmon differs according to the environment. Freshwater fish farming is carried out in tanks enclosed by grilles at the outflow points of the farm, which theoretically prevent any escapement.

On the other hand, marine fish farms are at greater risk, which is why specific precautions are taken, particularly in connection with the choice of site location. The likelihood of storms is taken into account, so only well-sheltered locations are considered. Moreover, all cages are examined to ensure that salmon cannot leap out of them, in the interest of both the farmer and wild stocks.

The aforementioned impact study must include information on conformity with navigation safety requirements, with an explicit description of the measures taken to avoid collisions with boats.

Finally, it should be highlighted that, whatever the environment, authorisation to use any Classified Installation obliges the user to record and notify the control services of all farming escape incidents.

II.5: Measures to minimise the impacts of farmed Salmon

Stripping and stocking policy has greatly evolved in France. Originally based on importing eggs from abroad (Scotland, Iceland, Ireland, Sweden, Norway, Canada), stocking programmes have progressed to the use of native strains.

Today, only the Rhine basin is stocked with a non-indigenous strain, as the juveniles used are of a Loire-Allier strain. However, since 2008 a small number of spawners returning to the Rhine are being stripped so they can be used for artificial reproduction.

Generally, it has been shown that stripping spawners with the aim of renewing the broodstock is not sufficient to meet the recommendations of the French National Institute for Agricultural Research (INRA).

In fact, the very limited number of spawners caught, combined with the imbalance in the sex ratio of those spawners, is leading to a reduction in genetic diversity, essential for healthy salmon populations (Haffray and Rault, 2008). However, this problem is linked to the low number of spawners returning to the watercourses, and therefore the low proportion of fish authorised for stripping so as not to further impact on the wild stocks.

II.6: Measures to minimise adverse genetic and biological impacts from enhancement activities

As genetic concerns have been at the heart of debate in France recently, measures have been introduced, little by little, to limit any adverse interactions caused by stocking programmes. An example of a change in practice is that fish are stocked at an earlier stage now so that natural selection can commence as soon as possible.

II.7: Measures to minimise the risk of disease transmission

Council directive 2006/88/EC of 24 October 2006 on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals, was adopted as national law in the 4 November 2008 Decree (annex 3). As such, farms are subject to risk analyses and the results dictate the frequency of inspections and monitoring for viruses at the farm.

Today, monitoring shows that all farms are free from notifiable salmonid diseases, such as Viral Hemorrhagic Septicaemia (VHS), Infectious Hematopoietic Necrosis Virus (IHN) and Infectious Salmon Anaemia (ISA).

It should also be noted that the Fish Health Association (GDSA) brings County producers together in order to facilitate screening and disease monitoring at fish farms. The assistance these organisations provide to producers who are subject to health requirements following notification of a regulated disease, can limit the risk of the disease spreading.

II.8: Measures to prohibit the transfer of salmon between Commission Areas

Today, there is no law in France to prohibit the stocking of salmon from outwith the North-East Atlantic Commission Area. However, non-native stock has not been used for years.

II.9: Measures to prohibit the introduction of non-indigenous salmonids.

Today, there is no law in France to prohibit the stocking of salmonids from outwith the North-East Atlantic Commission Area.

II.10: Measures to prohibit the introduction of non-native fish into rivers containing Atlantic salmon

In France, the legal framework concerning methods of introducing fish species into freshwater is established in the 'Fish' Law of 29 June 1984, of the Environment Code.

Article L.432.10 states that introducing fish species likely to cause biological imbalance is forbidden (annex 4). Sun perch and cat fish being two examples given.

Moreover, this article states that it is forbidden to introduce, without authorisation, fish not present in French watercourses. Species which do not require authorisation are listed in the

17 December 1985 Order (annex 5). It should be noted however, that this list includes those fish present in France in 1985. Therefore, alien species introduced before that date are included in the list, and, as such, the introduction of fish species listed at a national level cannot be prevented in some regions despite the fact that they are not locally present.

Finally, it should be noted that the last paragraph of this article states that the introduction of carnivorous fish such as pike, perch, zander and black-bass is prohibited in Fish Category 1 watercourses (those supporting salmon populations).

II.11: Guidelines on transgenic salmon

In France, as in the rest of the European Union, the farming of transgenic salmon is not permitted, nor is it planned to permit it. Therefore there is no production of transgenic salmon in French territory.

Additionally, it is forbidden to import or sell transgenic fish in Europe, which means that there are no transgenic fish destined for consumption in the European Union.

II.12: The development and application of river classification and zoning systems.

Under Article L.214-17 of the Environment Code (annex 6), a new classification system should be in place in France by 2014. It will supercede the current system i.e. Article 2 of the 16 October 1919 Law and Article L.432-6 of the Environment Code (annex 7).

This new system will involve creating two lists of watercourses in each basin. The first list will include those watercouses:

- Of high ecological status;
- Identified by the Water Planning and Management Development Plan (SDAGE) as being a biological pool necessary to maintain or reach good ecological status;
- In which total protection of diadromous migratory fish is deemed necessary.

No authorisation or concession to build new facilities will be given on these watercourses if the proposed installation is deemed to be an obstacle to ecological continuity. Moreover, renewal of any authorisation or concession for existing facilities in compliance with legislation, will be subject to limitations to ensure that high ecological status is maintained, good ecological status is maintained or reached or that migratory diadromous fish are protected.

The second list will index those watercourses, parts of watercourses or canals where it is necessary to ensure sufficient sedimentary transport and the passage of migratory fish.

It should be noted that the revision of the classification system does not deal with aquaculture or transfers. However, these are covered under legislation requiring authorisation to be granted for the construction of any new fish production facilities. Classification can, in effect, serve as a reason to refuse authorisation for a classified facility.

II.13: Initiation of corrective measures

An audit of the genetic and reproduction practices of fish farms designed to increase the number of wild salmonid stocks was recently carried out by the SYSAAF (Haffray and Rault, 2008). While the study concluded that the hatcheries had a good command of the technical aspects, information traceability and health practices, there were problems identified in relation to genetic and reproduction practices (annex 8).

Among the points which could be improved, the following were considered necessary:

- the number of subjects which may be caught. The current authorised level could lead to a fall in the genetic diversity of the broodstock used for reproduction;
- the male/female ratio which would result in better protection of genetic diversity;
- establishing management strategies and the distribution of wild spawners and their progeny, while taking the latest scientific and technical advances into account;
- Broodstock management plans in order to protect the genetic diversity of the stock;
- genetic assessment of the efficiency of stocking (or not stocking) practices, through genetic identification techniques;
- implementation of quarantine facilities to classify the health status of wild spawners that have been caught and to reach European Heath Certification.

These reports lead to the conclusion that the implementation of stocking strategies, adapted to and in line with advances in understanding (ecology, genetics, molecular etc.) cannot rely solely on the development of genetic and reproductive collective know-how.

As a result, in 2008 the SYSAAF proposed the creation of a specialist technical service. This service would provide advice to hatcheries and those organisations responsible for re-stocking programmes in collaboration with the administrative and technical departments of the relevant ministries (ONEMA, INRA and CNRS) and associated organisations (FNPF, CIPA, CCSR, Nature Protection Association). If this new body is created, it will protect wild salmon stocks from the majority of potentially negative effects

II.14 – Development and dissemination of educational material

Today, there is very little educational material to increase awareness of the problems wild salmon stocks could face as a result of introductions and transfers of aquatic species. However, discussions are underway regarding the production of best practice guidelines for stocking.

Conclusion

This report has highlighted many aquaculture black spots, and as a result, the progress which remains to be made in France for better management of aquaculture practices.

This information could be generalised for the management of all diadromous migratory fish species and is the beginning of a project to draw-up a National Strategy, the first discussions for which are underway. Through this strategy, guidelines are going to be established and French policy on migratory fish will become more coherent. Aquaculture aspects (mainly with regard to stocking) should be widely debated, so that new guidance will soon be drawn-up.

BIBLIOGRAPHY

ASR, 2009, Réimplantation durable du saumon atlantique, suivi des espèces piscicoles migratrices et actions de communication sur le bassin rhénan alsacien : Bilan des activités 2008.

Haffray P., Rault P., 2008, GENESALM, Audit des pratiques génétiques et de reproduction des piscicultures pratiquant la multiplication de salmonidés sauvages, 58p.

List of abbreviations

AAPPMA: Association Agréée pour la Pêche et la Protection des Milieux Aquatiques
Registered Association for Fish and the Protection of Aquatic Environments

CCSR: Club de la Charte des Salmonidés de Repeuplement
Charter Society for Salmonids for Restocking

CIPA: Comité Interprofessionnel des Produits de l'Aquaculture
The Inter-Industry Committee for Aquaculture Products

CNRS: Centre National de la Recherche Scientifique
National Centre for Scientific Research

CNSS: Conservatoire National du Saumon Sauvage
National Wild Salmon Conservancy

DGAL: Direction Générale de l'Alimentation
Directorate-General for Food

DPMA: Direction des Pêches Maritimes et de l'Aquaculture
Department for Marine Fish and Aquaculture

FDPPMA: Fédération Départementale de Pêche et de Protection des Milieux Aquatiques
County Federation for Fish and the Protection of the Aquatic Environment

FEAP: Fédération Européenne des Producteurs Aquacoles
Federation of European Aquaculture Producers

FFA: Fédération Française d'Aquaculture
French Aquaculture Federation

FNPF: Fédération Nationale de la Pêche en France
National Fishing Federation of France

GDSA: Groupement de Défense Sanitaire Aquacole
Fish Health Association

ICPE: Installations Classées pour la Protection de l'Environnement
Classified Installations for the Protection of the Environment

INRA: Institut National de Recherche Agronomique
French National Institute for Agricultural Research

MAAP: Ministère de l'Alimentation, de l'Agriculture et de la Pêche
Ministry for Food, Agriculture and Fisheries

MEEDDM: Ministère de l'Ecologie, de l'Energie, du Développement Durable et de la Mer
Ministry for Ecology, Energy, Sustainable Development and the Sea

MIGADO: Association Migrateurs Garonne-Dordogne
Garonne Dordogne Migratory Fish Association

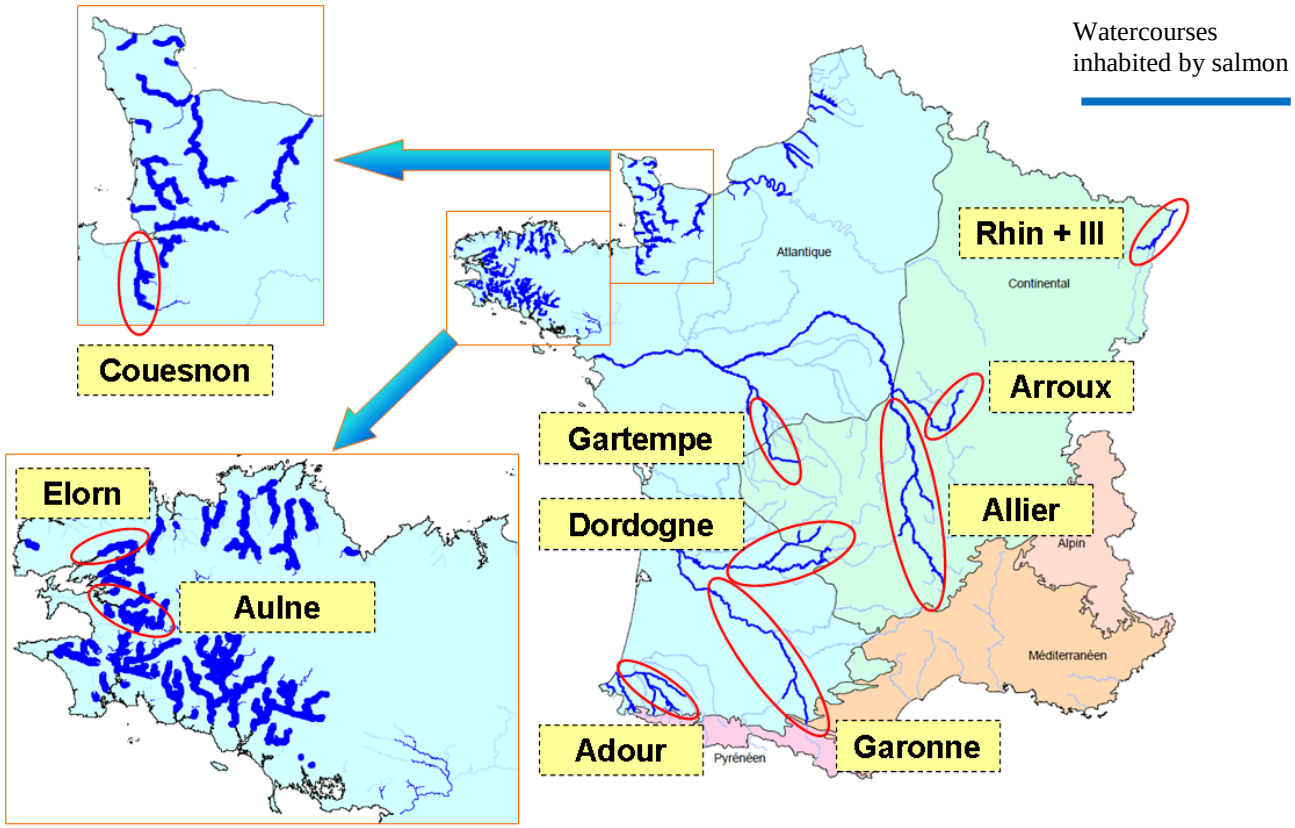
ONEMA: Office National de l'Eau et des Milieux Aquatiques
French National Agency for Water and Aquatic Environments

SDAGE: Schémas Directeurs d'Aménagement et de Gestion des Eaux
Water Planning and Management Development Plan

SYSAAF: Syndicat des Sélectionneurs Avicoles et Aquacoles Français
The French Fish and Poultry Farmers Union

Annexes

Annex 1: Areas of France restocked in 2008



Source: Y. VECCHIO, ONEMA

Annex 2: Extract from 21 September 1977 Order regarding the content of impact studies

The impact study is established by the following clauses. The content of the impact study will relate to the size and extent of the planned installation and its foreseeable impacts on the environment.

The impact study will successively set out:

a) an analysis of the initial state of the site and its environment, stressing its natural wealth and agricultural, forestry, maritime or leisure areas, as well as the material goods and cultural heritage likely to be affected by the project;

b) an analysis of the direct and indirect effects, both temporary and permanent, of the installation on the environment, particularly on the area and landscape, flora and fauna, natural environment and biological balance, on neighbouring amenities (noise, vibrations, smells, light emission) or on agriculture, hygiene, health, and public health and safety, the protection of material goods and cultural heritage; this analysis will focus, as a requirement, on both the origin, nature and severity of air, water and soil pollution, the volume and pollutant character of waste, the acoustic level of the machinery to be used and the vibration levels it may cause, as well as the method and conditions of water supply and usage;

c) the reasons, primarily from an environmental point of view, the proposed project was retained from the possibilities considered;
d) the measures considered by the applicant to eliminate, limit and if possible to compensate for the disadvantages of the installation and an estimate of the related costs. "Specifications of these measures will be given, stating the predicted development and operational arrangements and their detailed characteristics. These documents will indicate anticipated performance, especially in connection with the protection of subterranean waters, treatment and drainage of residual water and gas emissions in addition to monitoring thereof, operational waste disposal, how materials will be brought to the facility for treatment, transportation of produced goods, and rational use of energy.";
e) conditions for returning the site to its original state once exploitation has ceased;
f) in the case of those installations in categories established by decree, an analysis of methods used to assess the installation's impact on the environment, stating the possible technical or scientific difficulties noted in forming this assessment.

In order to improve public knowledge of the contents of the study, a non-technical summary will be produced.

<u>Annex 3:</u> Extracts from the 4 November 2008 Decree concerning animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals.

Article 4

Fish farms which sell aquaculture animals or products thereof, and those processing establishments slaughtering aquaculture animals for disease control purposes established under this Decree, should be in possession of an animal health certificate in accordance with the clauses contained in the aforementioned Decree of 8 June 2006.

Achieving certification will require, in particular, the implementation of an animal health surveillance scheme in all fish farms.

Article 7.

2. The movement of aquaculture animals must only be between zones or compartments of the same health status, or to a zone or compartment of a lower health status, where appropriate. Detailed rules on the movement of aquaculture animals are laid out in the annex to this article.

Article 8

1. Aquaculture animals should be transported as quickly as possible to their destination, and, where appropriate, transit sites, with transport means that have been cleaned and disinfected with an authorised disinfectant beforehand.

   Where aquaculture animals are transported by land:
   a) Vehicles should be equipped in such a way that the water used for transportation cannot drain out of the vehicle during transportation;
   b) the water used in transport should be of a quality that will not affect the health status of the transported animals and which will not endanger the health status of the destination or transit sites;
   c) renewing the transportation water should be carried out in facilities which have been authorised by the Prefect and in which:

- the clean water is unlikely to spread disease;
- the waste water is disinfected or disposed of in such a way that it is impossible for it to pour directly into natural water;

Detailed rules on certification and renewal are laid out in instructions from the Minister responsible for agriculture and fisheries.

2. The person responsible for the transportation of aquatic animals must have a statement of:
   - mortality during transport, in accordance with the type of transport and species transported;
   - the fish farm or mollusc farming area and processing establishments where the transportation vehicle has been, stating, where appropriate, whether the animals were placed in water at that establishment.

   The note of the records stated in this article must be kept for 5 years and be available to monitoring agents.

Article 9

1. Aquaculture animals for farming or restocking or for further processing before human consumption should have been certified as healthy in accordance with Article 14 of Council Directive 2006/88/EC, where they are to be introduced:
   a) into a zone or compartment free of disease, or;
   b) into a zone or compartment that is subject to surveillance or an eradication programme approved by the European Commission where this may be the case.

Unless:
- as regards fish, they are slaughtered and eviscerated before dispatch;
- as regards molluscs and crustaceans, they are dispatched as unprocessed products, as long as they are not put into the water at the destination, or processed.

2. Aquaculture animals allowed to leave an area subject to the control provisions laid out in Articles 20 to 24 should have health certification in accordance with Article 14 of Council Directive 2006/88/EC.

   This paragraph shall also apply to diseases not listed as exotic or non-exotic and the species susceptible thereto.

Article 10

1. Aquaculture animals placed on the market for farming must:
   a) be clinically healthy
   b) not come from a farm or mollusc farming area where there is any unresolved increased mortality

   This paragraph shall also apply to diseases not listed as exotic or non-exotic and the species susceptible thereto.

2. By way of derogation from paragraph 1(b), the County Director of Veterinary Services or the Regional Director of Maritime Affairs, whichever is the competent authority, can allow aquaculture animals to be placed on the market, based on an assessment of risk, provided that the animals originate from a part of the farm or mollusc farming area independent of the epidemiological unit where the increased mortality has occurred.

3. Aquaculture animals intended for destruction or slaughter in accordance with the disease control measures provided for in Chapter III must not be placed on the market for farming and restocking purposes.
4. Aquaculture animals may only be released into the wild for restocking purposes or into put and take fisheries if they:
   a) comply with the requirements in paragraph 1; and
   b) come from a farm or mollusc farming area with a health status, as provided for in the annex to this Article, at least equivalent to the health status of the waters in which they are to be released.

Article 11

1. To be introduced, for farming or restocking purposes, into a zone or compartment declared free of an exotic or non-exotic disease, aquaculture animals of species susceptible to the disease in question must originate from another zone or compartment which has also been declared free of that specific disease.

Article 12

When a list of vector species has been developed, these species cannot be introduced for farming or restocking purposes into a zone or compartment declared free of an exotic or non-exotic disease unless they:

   a) originate from another zone or compartment which is free of that specific disease; or
   b) are subject to quarantine, under the supervision of the County Director of Veterinary Services or the Regional Director of Maritime Affairs, whichever is the competent authority, in appropriate facilities wherein the water is free of the pathogen in question. The duration and specific conditions of the quarantine should be sufficient to reduce the risk of transmission of the disease.

Article 15

Wild aquatic animals of species susceptible to one or more exotic or non-exotic diseases which are caught in a zone or compartment that is not free from disease, and which are destined for introduction into a fish farm or mollusc farming area located in a zone or compartment that is free from that specific disease, shall be placed in quarantine, under the supervision of County Director of Veterinary Services or the Regional Director of Maritime Affairs, whichever is the competent authority, in appropriate facilities wherein the water is free of the pathogen in question. The duration and specific conditions of the quarantine should be sufficient to reduce the risk of transmission of the disease.

Article 16

1. Where there is unresolved increased mortality, or when there are any reasons to suspect the presence of an exotic or non-exotic disease, or the presence of such disease is confirmed in aquatic animals, the Prefect and Veterinarian responsible for monitoring these animals should immediately be notified.

2. In case of unresolved increased mortality, appropriate investigations must, where appropriate, be carried out by a veterinarian in order to make a diagnosis.

Article 17

1. Suspicion of an exotic or non-exotic disease in a zone, compartment, fish farm or mollusc farming area shall result in the implementation of the following measures:
   a) isolation and confinement of the animals;

b) the prohibition of incoming and outgoing aquatic animals;
c) Clinical examinations and any sampling necessary for confirmation of the disease by an approved laboratory;
d) The implementation of an epidemiological enquiry, as provided for in article 18.

These measures should be decreed:
- as regards fish and crustaceans, by the Prefect of the County, based on the proposition of the County Director of Veterinary Services, by way of Order of the Prefect to monitor the farm.

2. If the waters in question are in a large hydromorphological basin or coastal area, the Prefect's decision in relation to the measures laid down in Paragraph 1 may be restricted to a smaller zone around the fish farm or mollusc farming area suspected of being infected, if the disease is deemed to have spread to such an extent that all risk of further spread can be eliminated.

Article 18

The epidemiological enquiry carried out in case of suspicion and confirmation of an exotic or non-exotic disease shall include:

a) the origin and possible means of contamination of the fish farm or mollusc farming area;
b) in respect of the period to be considered prior to the date of notification of the suspected disease:
   - the movements of aquaculture animals, people, vehicles, all material likely to have been used in transporting the disease to or from the fish farms or mollusc farming areas in question;
   - an inventory of other fish farms or mollusc farming areas likely to be infected.

Article 20

1. Confirmation of an exotic disease in aquaculture animals, on a fish farm or mollusc farming area, shall result in an appropriate containment area being set up around the fish farm or mollusc farming area, including a protection zone and surveillance zone, in which the following measures will be applied:
   a) No stocking takes place and no aquatic animals may move into or out of the area without authorisation from the County Director of Veterinary Services or the Regional Director of Maritime Affairs, whichever is the competent authority.
   b) Those aquaculture animals which are dead, alive showing clinical signs of the disease or are under commercial size and which present no sign of disease, should be removed and disposed of as soon as possible, in accordance with the clauses contained in Regulation (EC) No 1774/2002, under the supervision of the County Authority for Veterinary Services or the Regional Authority for Maritime Affairs, whichever is the competent authority.

      In relation to those animals which are under commercial size, these measures can be taken in an appropriate timescale, according to the type of production and the risk the animals pose for further spread of the disease;
   c) Where possible, an appropriate fallow period should be implemented in the fish farm or mollusc farming area, after being emptied and where appropriate cleaned and disinfected.

As regards fish farms and areas of fish production which also rear species not susceptible to the disease in question, fallowing decisions should be made based on a risk-assessment approved by the County Director of Veterinary Services, or the Regional Director of Maritime Affairs, whichever is the competent authority;

d) Any other measure necessary to prevent the spread of the disease.

2. Sampling and surveillance as appropriate for the disease in question and the type of fish farm or mollusc farming area affected can, based on a risk-assessment approved by the County Director of Veterinary Services or the Regional Director of Maritime Affairs, whichever is the competent authority, be carried out in the containment area to prove that the disease has disappeared.

3. Fish farms or mollusc farming areas contained within the protection and surveillance zones will be inventoried and placed under surveillance. Any sign of the disease should immediately be reported in accordance with Article 16 of this Order and, in such instance, the measures provided for in Paragraph 1 will apply.

Article 21

1. Aquaculture animals which have reached commercial size and show no clinical sign of disease may be harvested, under the supervision of the County Authority for Veterinary Services or the Regional Authority for Maritime Affairs, whichever is the competent authority, for human consumption or further processing.

2. Harvesting, introduction into dispatch centres or purification centres, further processing and any other related operations involved in the preparation of the aquaculture animals for entry into the food chain shall be carried out under conditions which prevent the spread of the pathogen responsible for causing the disease.

3. Dispatch centres, purification centres or similar facilities shall be equipped with an effluent treatment system inactivating the pathogen responsible for causing the disease, or the effluent shall be subject to other types of treatment reducing the risk of transmitting diseases to the natural waters.

Article 23

1. If a non-exotic disease is confirmed in a fish farm or mollusc farming area in a zone or compartment free of that disease either:
   - the measures laid down in Articles 20 to 22 shall apply, in order to regain "disease-free status"
   - an eradication programme in accordance with Article 28 shall be implemented;
   - the containment measures provided for in Article 24 shall apply.

2. By way of derogation from Article 20(b), the Prefect may allow clinically healthy aquaculture animals to be raised on site to market size for human consumption or to be moved, under the supervision of the County Authority for Veterinary Services or the County Authority for Maritime Affairs, whichever is the competent authority, to another zone or compartment infected with the same disease. In such cases, measures shall be taken to prevent further spreading of the disease.

Article 24

Confirmation of a non-exotic disease in aquaculture animals, on a fish farm or mollusc farming area located in a zone or compartment not free of that disease will require the following measures to be applied:

1. An appropriate containment area will be set up around the fish farm or mollusc farming area, including a protection zone and surveillance zone, wherein aquaculture animals from the containment area are only:
   - introduced into fish farms or mollusc farming areas infected with the same disease; or
   - harvested for human consumption in accordance with Article 21, Paragraph 1.

2. The removal and disposal of dead aquaculture animals, under the supervision of the County Authority for Veterinary Services or the Regional Authority for Maritime Affairs, whichever is the competent authority, and in accordance with Regulation (EC) No 1774/2002, in an appropriate timeframe taking into account the type of production in question and the risk such dead animals pose for further spread of the disease.

3. Fish farms or mollusc farming areas contained within the protection and surveillance zones will be inventoried and placed under surveillance. Any sign of the disease should be reported in accordance with Article 16 of this Order and, in such instance, the measures provided for in Paragraph 1 will apply.

These measures are by prescribed by Order should infection be declared at a fish farm or mollusc farming area:

- as regards fish and crustaceans, by the Prefect of the County, based on the proposition of the County Director of Veterinary Services.

Article 25

Where wild aquatic animals are infected or suspected of being infected with a non-exotic disease in a zone or compartment free of that disease, or with an exotic disease, the County Authority for Veterinary Services, or the Regional Authority for Maritime Affairs, whichever is the competent authority, shall monitor the situation, and take any measures to prevent the further spread of the disease.

The measures to be taken will be specified in instruction from the Minister responsible for agriculture and fisheries.

Article 26

Where a disease situation is emerging, or is suspected of emerging, in wild aquatic or aquaculture animals, appropriate control measures to prevent the spread of the disease should be taken by the County Authority for Veterinary Services, or the Regional Authority for Maritime Affairs, whichever is the competent authority, if the emerging disease in question has the potential to jeopardise the health situation of aquatic animals.

These measures will be specified in instruction from the Minister responsible for agriculture and fisheries.

Article 27

When a non-listed disease, either exotic or non-exotic, poses a significant risk to the health of wild or aquaculture animals, or, in the case of listed diseases, the measures provided for in this Chapter are deemed unsuitable for the epizootic situation, or it is shown that the disease in question is spreading despite the measures taken under this Chapter, the Minister

responsible for agriculture and fisheries will, by Order, take appropriate measures to prevent the introduction of the disease or to combat it.

Article 30

1. Vaccination against exotic diseases in forbidden.
2. Vaccination against non-exotic diseases is forbidden in all areas of the territory free from the disease in question, or included a surveillance zone approved in accordance with Article 28 of this Order, if such a zone has been established.
3. By way of derogation to Paragraphs 1 and 2 of this Article, the vaccination may be authorised by Order of the Minister responsible for aquaculture and fisheries in some parts of the territory not free from the diseases in question, or in which the vaccination is part of an eradication programme approved by the European Commission, if such a programme has been established.
4. Paragraphs 1 and 2 do not apply to scientific studies to develop and test vaccines under control conditions. Appropriate measures should be taken throughout these studies to protect other aquaculture animals from any undesirable effects of the vaccination given during these studies.

Annex 4: **Article L432-10 relating to the introduction of fish** species

(Order No 2000-916 of 19 September 2000 art. 3 Journal Officiel of 22 September 2000 in force 1st January 2002)

The following are subject to a fine of 9,000 euro:

1. The introduction, into those waters mentioned in this Heading, of fish species which are likely to cause biological imbalance, the list of which is established by Decree;
2. The unauthorised introduction of fish which are not currently present into those waters mentioned in this Heading. The list of fish present is established by the Minister responsible for freshwater fisheries;
3. The introduction of the following fish species: pike, perch, zander and black-bass, into those watercourses classed as Category 1 watercourses under section 10 of Article L.436-5. However, this clause is not applicable to Leman Lake, Annecy Lake and Bourget Lake.

Annex 5: 17 December 1985 Order establishing the list of species which do not require authorisation for introduction

17 December 1985 Order establishing the list of fish, crustacean and frog species present in waters provided for in Article 413 of the Rural Code.

The Minister for the Environment,

Having regard to Law No 84-512 of 29 June 1984 regarding freshwater fisheries and the management of fish resources;

Having regard to Heading II of Book III of the Rural Code, and in particular, Articles 406, 413 thereof;

Having regard to the advice of the Superior Council on Fisheries on 22 May 1985;

And having regard to the advice of the National Council for the Protection of Nature on 20 June 1985;

Orders:

Article 1: In application of Article 413(2) of the Rural Code, it is forbidden to introduce, without authorisation, into those waters provided for in this Article, fish, frog and crustacean species which are not present therein. The list of species which are present is established as:

FISH
The Family Acipenseridae:
Acipenser sturio
The Clupeids Family:
Alosa alosa
Alosa fallax
The Salmonid Family
Salmo salar
Salmo trutta f.fario
Salmo trutta f.trutta
Salmo trutta f.lacustris
Salmo trutta macrostigma
Salmo gairdneri
Hucho hucho
Salvelinus fontinalis
Salvelinus namaycush
Thymallus Thymallus
coregonus spp
The Family Esocidae
Esox lucius
The Umbridae Family
Umbra pygmea
The Cyprinid Family
Cyprinus carpio
Carassius carassius
Carassius auratus
Barbus barbus
Barbus meridionalis
Gobio gobio
Tinca tinca
Chondrostoma nasus
Chondrostoma toxostoma
Abramis brama
Blicca bjoerkna
Rutilus rutilus
Scardinius erythophalmus
Rhodeus sericeus
Alburnoides bipunctatus
Alburnus alburnus
Leucaspius delineatus
Leuciscus cephalus
Leuciscus cephalus cabeda
leuciscus leuciscus
Leuciscus leuciscus burdigalnesis
Leuciscus (Telester) soufia
Leuciscus (Idus) idus
Phoxinus phoxinus
The Cobitidae Family
Misgurnus fossilis
Nemacheilus barbatulus
Cobitis taenia
The Siluridae Family
Silurus glanis
The Ictaluridae Family
Ictalurus melas
The Anguillidae Family
Anguilla anguilla
The Gasterosteidae Family
Gasterosteus aculeatus
Pungitius pungitius
The Cyprinodontidae Family
Aphanius iberus
Valencia hispanica
The Poeciliidae Family
Gambusia affinis
The Mugilidae Family
Mugil cephlus
Liza ramada
Liza aurata
Chelon labrosus
The Atherinidae Family
Atherina boyeri
Atherina presbyter
The Gadidae Family
Lota lota
The Centrarchidae Family
Lepomis gibbosus
Ambloplites rupestris
Micropterus salmoides
Micropterus dolomieu
The Percidae Family
Gymnocephalus cernua
Perca fluviatilis
Stizostedian lucioperca
Zingel asper
The Blenniidae Family
Blennius fluviatilis
The Cottidae Family
Cottus gobio
The Pleuronectidae Family
Platichthys flesus
The Serranidae Family
Dicentrarchus labrax
The Osmeridae Family
Osmerus eperlanus
The Cyclostome Family
Lampetra fluviatilis
Lampetra planeri
Petromyzon Marinus

FROGS
The Ranidae Family
Rana arvalis
Rana dalmatina
Rana iberica
Rana honnorati
Rana esculenta
Rana lessonae
Rana perezi
Rana ridibunda
Rana temporaria
Rana esculenta Group

EDIBLE CRUSTACEANS
The Astacidae Family
Astacus astacus
Astacus leptodactylus
Astacus torrentium
Austropotamobius pallipes
Pacifastacus leniusculus
The Cambaridae Family
Orconectes limosus
The Palaemon Family
Crangon crangon
Palaemon longirostris

Annex 6: Article L.214-17 of the Environment Code

"After consultation with concerned County Councils, the concerned basin's territorial public bodies, the Basin Committee and, in Corsica, the Corsican Assembly, the administrative authority will establish for each basin or sub-basin:

1. Among watercourses or parts of watercourses or canals of high ecological status, identified by the Water Planning and Management Development Plans as being a biological pool necessary to maintain or reach good ecological status in watercourses within a drainage basin, or in which the total protection of diadromous migratory fish is necessary, a list of those watercourses, parts of watercourses or canals in which no authorisation or concession can be given for new installation if they pose an obstacle to ecological continuity. Renewal of concessions or authorisations for existing installations, which are complaint with legislation, on these watercourses, parts of watercourses or canals, is subject to requirements to ensure that high ecological status of waters is maintained, good ecological status of watercourses is maintained or reached in the drainage basin, or total protection of diadromous migratory fish is ensured;

2. A list of watercourses, parts of watercourses or canals in which it is necessary to ensure sufficient sedimentary transport and passage of migratory fish. Any installation must be managed, maintained and equipped according to the rules established by the administrative authority, in collaboration with the owner or, failing that, the user."

Annex 7: Texts relating to the current classification of watercourses

Article L.432-6 of the Environment Code
"In those watercourses, sections of watercourses and canals established by decree, all installations must have systems in place to guarantee passage for migratory fish within six months of consultations with the County Council. The user of the installation is responsible for ensuring that these systems work.

Existing installations must be adapted, with no compensation given, to comply with the clauses contained in this article within five years from the publication of any list of migratory species by basin or sub-basin, established by the Minister responsible for freshwater fisheries, and, where appropriate, by the Minister responsible for the Sea."

Law of 16 October 1919 relating to the use of hydraulic energy

Article 1 (completed by Law 80-531 1980-07-15 ART.24, 26 JORF 16 July 1980)
"No-one can use energy derived from waves, lakes or watercourses, regardless of their classification, without concession or authorisation from the State.

However, no concession or authorisation will be granted without prior notice being given to the County Councils, which represent regional collective interests in the area from which the energy will be derived.

Under Article 18 of this law, any person undertaking hydraulic activity without concession or authorisation, shall be fined between 5, 000 Francs and 120, 000 Francs. This shall be doubled in the event of a repeat offence.

Any person granted authorisation or concession who does not respect the rules applicable to hydraulic usage, or the specifications given, shall be fined between 3,000F and 80,000F. This shall be doubled in the event of a repeat offence. In case of conviction under this article, the Court shall determine, where appropriate, the timescale for removal of the installation or to make it comply with legislation, in addition to a fine of between 500F and 3, 000F per day of additional delay. The physical person or corporate body under civil law not respecting said timescale shall be responsible for paying the fine. The fine is recoverable in the conditions provided for by the clauses relating to the recovery of state products, to benefit the Public Treasury.

This clause shall also apply to users who modify their installations."

Article 2 (Amended by Law 84-512, 1984-06-29 ART.8 III JORF 30 June 1984)
"Installations whose power (the product of the drop height by the maximum flow rate of the diversion) exceeds 4,500 kilowatts, will be regulated by the concession system. All other installations shall be regulated by the authorisation system.

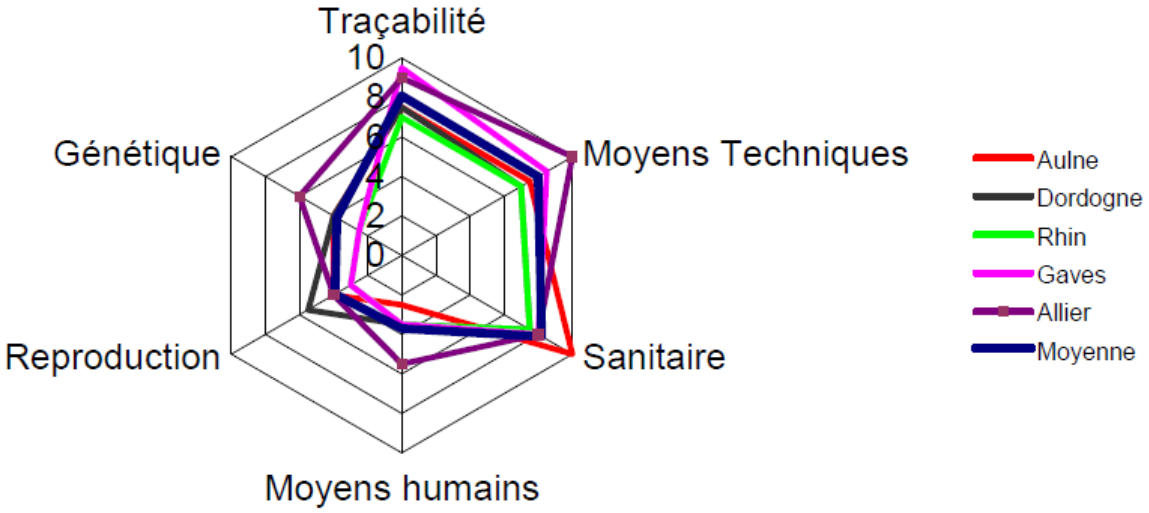
Installations with a maximum power of equal to or less than 4,500 kilowatts for which the public enquiry in relation to an application for concession concluded before the law 80-531 of 15 July 1980 came into effect, will remain negotiable for a period of one year from that date.

In order to protect nature, fauna and flora, statutory clauses will establish the technical conditions for managing and operating power stations. On some watercourses or sections of watercourses, a list of which will be established by State Council decree, no authorisation or concession will be given for new hydraulic activities. For those existing installations in compliance with current legislation at the time law no 80-531 of July 1980 comes into effect, or provided for in Article 27 of that law, a concession or authorisation can be given provided that the height of the obstacle is not altered.

The extension of the authorisation system to include installations whose power is between 500 kilowatts and 4,500 kilowatts, does not undermine the obligations imposed by the concession system regarding the delivery of reserved energy at a preferential tariff.

The procedure by which the Prefect may grant authorisation will include a public enquiry and the publication of an impact study or notice dependent upon the size and extent of the installation. Authorisation obliges the holder to respect water regulations, particularly concerning the amount of water abstracted and reserved flow rates."

Annex 8: **Variations in levels of technical control at salmon hatcheries**



Source: Haffray and Rault, 2008

Traçabilité	Traceability
Moyens Techniques	Technical Methods
Sanitaire	Health
Moyens humains	Human Methods
Reproduction	Reproduction
Génétique	Genetics