RESTOCKING TO SAVE THE EUROPEAN EEL:

A national commitment that is bearing its first fruits

Ten years of commitment by professional fishermen within the Association for Eel Restocking in France, in the service of the eel, biodiversity and living rivers

ARA France
Association Repeuplement Anguille

Conapped

COMITÉ NATIONAL DES PÊCHES MARITIMES ET DES ÉLEVAGES MARINS

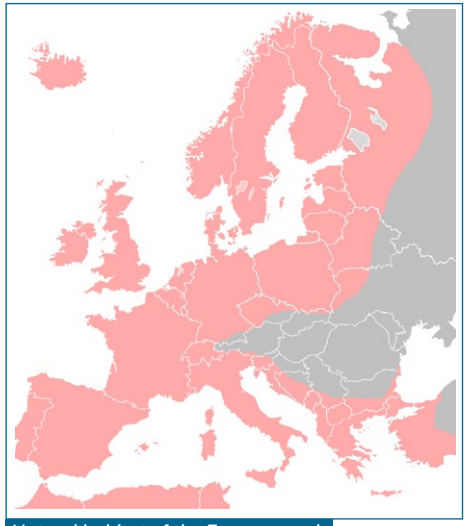
THE EEL, AN EXTRAORDINARY MIGRATORY FISH, A «SENTINEL SPECIES»

The European eel (Anguilla anguilla) is a **diadromous fish**[1] that appeared 10 million years ago. A great traveller, his life cycle still remains mysterious. **European eels are born in the warm waters of the West Atlantic, near the Sargasso Sea** near the **Bahamas** and then cross the **6000 km of the Atlantic ocean** in the form of larvae (**leptocephali**) carried by currents and the **Gulf Stream**.

As they approach the coast, the leptocephali take the form of small transparent eels: **the glass eels**, which will gradually move up the **rivers and settle in the rivers where they will remain for several years.**

This is the **yellow eel** stage, the longest in the eel's life. It can **last from 15 to 20 years for females**.

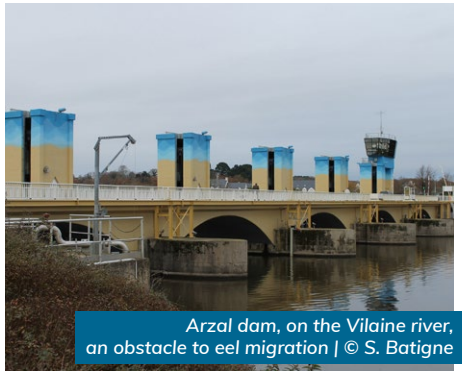
When the yellow eel has accumulated enough reserves, it transforms into a **silver eel**. Its eyes grow larger to get used to the low light of the abyss, their skin becomes darker. Silver eels travel down rivers, reaching their birthplace where they **will reproduce only once before dying**. This last migration remains unknown and **reproduction has never been observed before.**



Natural habitat of the European eel

Glass eel | © Logrami

Yellow eel | © G. Garritan



Arzal dam, on the Vilaine river, an obstacle to eel migration | © S. Batigne

THE DECLINE OF THE EEL: A COMBINATION OF FACTORS

For several decades, the number of eels in **European waterways has fallen dramatically.** According to the **UICN**[2], **the main causes are the degradation of natural environments and the construction of dams** that compromise the migratory journey. The eel is also threatened as a result of the **disappearance of wetlands, the significant withdrawals of professional fishing until the 90s, the malfunctioning of purification stations**, chemical pollutants: **endocrine disruptors, pesticides from conventional agriculture including the dreaded neonicotinoid**[3] and **parasitism** (Anguillicoloïdes crassus[4]).

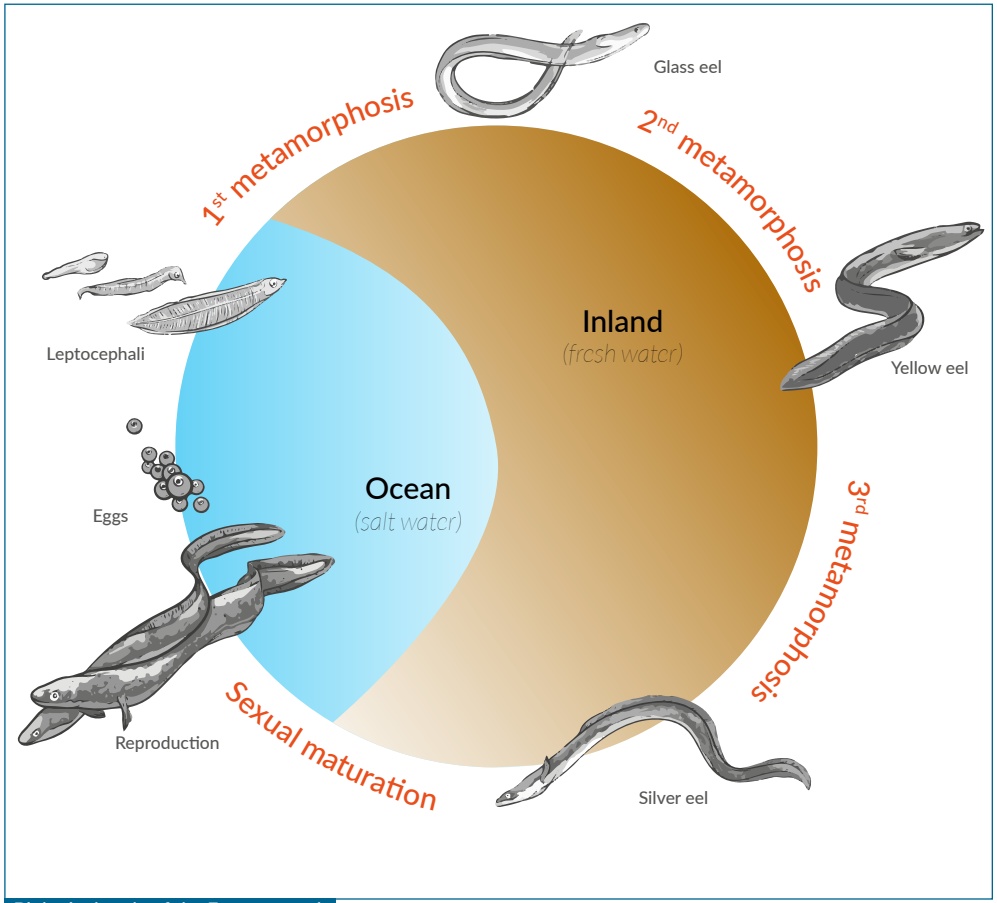
Predation **by invasive species** (cormorants, catfish) and **poaching of glass eels** sold in Asia are other pressures. Finally, this decline is aggravated by **climate change,** which is **changing ocean currents and warming fresh water**. And in France, **the eel was long considered «harmful» by the Superior Council of Fisheries** and was the subject of destruction fishing until 1984[5].

This decline affects all living things: the **IPBES**[6] indicated in its **2019 report on the global biodiversity crisis** that **one million animal and plant species, or 1 in 8 species**, were at risk of disappearing from the surface of the Earth or the oceans.

1 *A species that spends its life alternately in fresh and salt water.*
2 *International Union for Conservation of Nature. Founded in 1946 in Fontainebleau, it draws up the Red List of Threatened Species. Due to its scarcity, the eel is classified as "critically endangered" by the IUCN.*
3 *Imidachlopride study Matsumi Yamamuro et al, November 2019, Science, University of Tokyo.*
4 *A marine nematode worm, native to Asia.*
5 *Decree 58.874 of 16 September 1958 "are recognised as particularly harmful, in particular for the application of the provisions of Article 439-1 of the Rural Code, hotu, eel"...*
6 *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.*

May God keep you happy, beautiful fishmongers! I have made a brother's share with you: I have eaten your largest herrings and I am taking away your best eels; but I leave the greatest number.

Reynard the Fox (12th century)



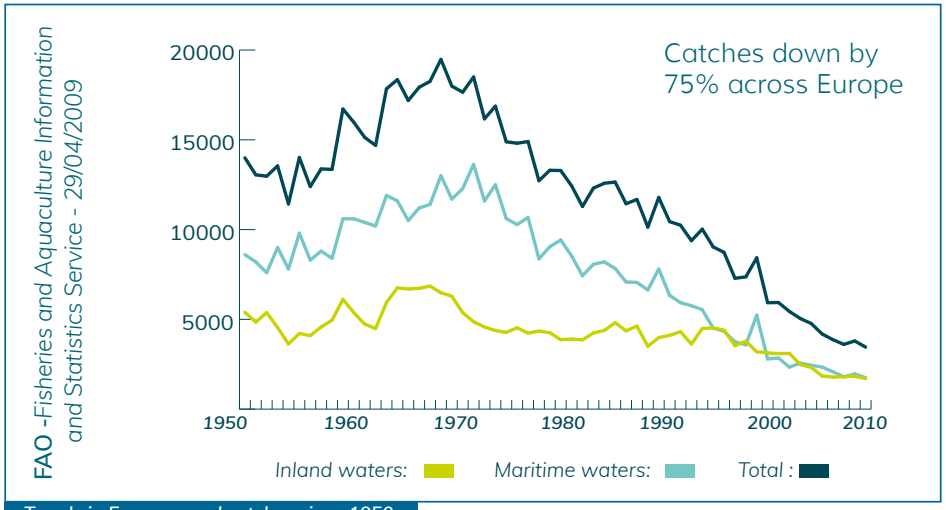
Biological cycle of the European eel

THE ILLUSION OF INEXHAUSTIBLE ABUNDANCE

Eels at all stages were **abundant in all rivers until the mid-twentieth century.**

The glass eel, also called **pibale** in the South-West, was returning by **billions** in the rivers of Europe. As with **cod**, men have long believed that **abundance was limitless, and the resource infinite**. It was an illusion.

The rivers were almost emptied. In the Loire estuary, **526 tonnes of glass eels were caught in 1980, or about half a billion fish. By 2018,** this figure had fallen to **28 tons**[7].



Trends in European eel catches since 1950

7 *Of course, there is a regulatory constraint on the limits of catches by professional fishermen.*

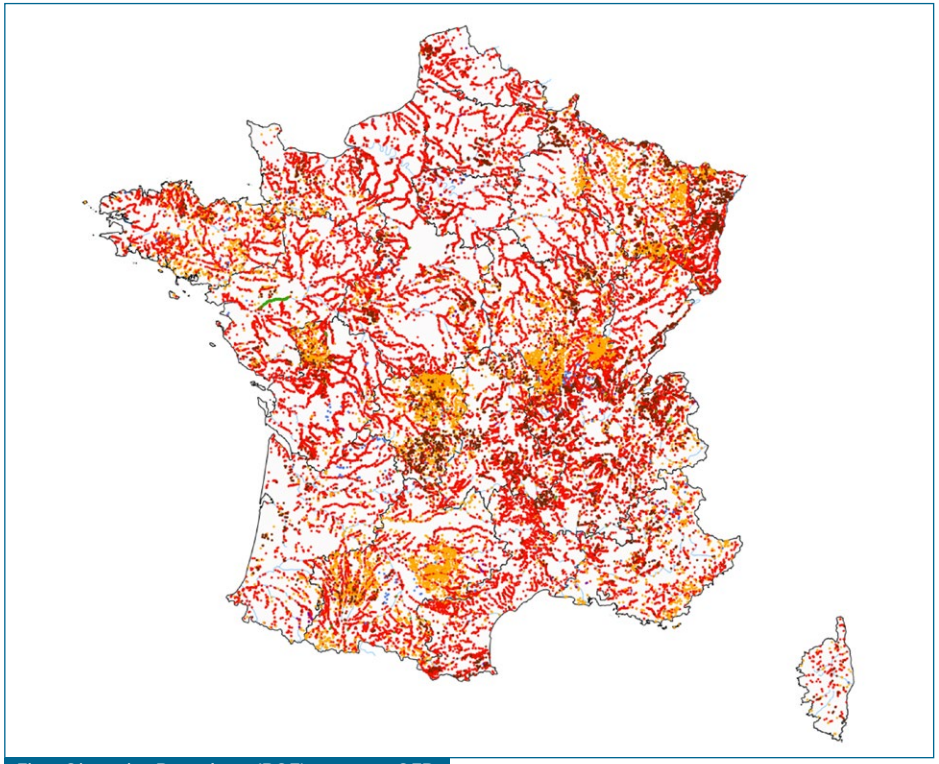
OUR FRAGMENTED WATERWAYS : A NEGATIVE IMPACT ON EELS,

Following centuries of development, the waterways have been « **fragmented** » by works of all kinds, from the ford to the large dam and the mills.

The **European Amber programme** has identified at least **1.2 million obstacles on a European river network of 1.65 million kilometres, or an average of 0.74 structures per kilometre**[8].

As of January 3, 2019, **99,003 obstacles to flow were identified in France by the French Office for Biodiversity. Of the 430 000 km of waterways in our country,** there is **an average of one obstacle every 6 km**[9].

Fortunately, many actions are being taken to **restore the ecological continuity and connectivity of watercourses.**



Flow Obstacles Repository (ROE) - source : OFB

AND FOR ALL MIGRATORY FISH POPULATIONS

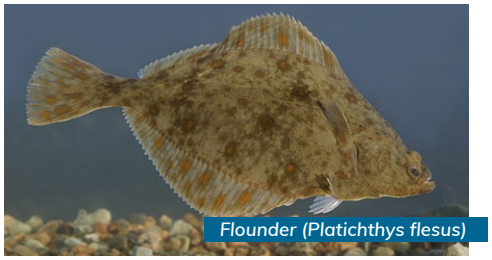
All populations of diadromous fish are now declining. Atlantic **salmon, shad, eel, lamprey, sea trout, mullet and flounder** with a **decline estimated at up to 93% in Europe between 1970 and 2016**[10].

To curb it, **the French Office for Biodiversity** is developing a new **National Plan for diadromous fish** in order to strengthen the first programs launched in the 80s.

Defined by scientists in consultation with the State, fishermen, and NGOs. This plan emphasizes **the need to restore natural habitats**.

Atlantic salmon (Salmo salar)

Shad (Alosa alosa)



Flounder (Platichthys flesus)

Sea Trout (Salmo trutta morpha trutta)

Lamprey (Lampetra fluviatilis)

Mullet (Chelon labrosus)

8 *Amber. Adaptive Management of Barriers in European Rivers World Fish Migration Foundation May 2020.*
9 *National Biodiversity Observatory.*

10 *Living Planet Index Report 2020 WWF / UICN / ZSL, World Fish Migration Foundation. Page 17 Reg. Fig 6 Study on 408 populations, 49 species.*

WHAT IS RESTOCKING?

Restocking aims to **increase the number of healthy broodstock** capable of participating in reproduction and thus **accelerate the recovery of the stock**.

It allows live wild specimens of selected species to be released into waters where they naturally evolve, in order to **take advantage of the natural production** to increase recruitment.

It consists in **reseeding environments in good ecological condition** where the **under-utilized hosting and growth potential will** allow a **better survival rate**. Glass eels are taken from **environments that are abundant** but have **difficult living conditions and reduced carrying capacities**, i.e. the **majority of French catchment areas**.

By releasing glass eels in environments selected for their good environmental conditions and where eels are less naturally present, restocking should **allow a greater benefit than natural colonization**.

Elver dumping operations organized by Ara France. ©AraFrance

6 IMPORTANT STEPS

Step 1 : the choice of site, a key element

The sites are chosen after a long process led by the "**Migratory Fish Management Committees", COGEPOMI**. These bodies created in 1994[11] bring together **State services, professional and recreational fishermen, elected officials, associations for the preservation of amphihalins, and representatives of the OFB**[12].

They suggest watercourses withwith the best habitat providing the **highest biological gains for the species**, ensuring **good growth, survival and optimal escape to the breeding area**.

Step 2 : Excellent glass eel quality

The good general physical, physiological and sanitary condition of the glass eels is essential for success. It depends mainly on the conditions of capture. **The vessel's slow speed** (between 3 and 4 knots) and **the short duration of the "fishing trip"** (10 to 15 minutes) are required to limit injuries and mortality, both for glass eels and for by-catch species[13].

Parasite testing[14] is conducted for each batch and **virological testing**[15] occurs under surveillance in areas that are disease-free.

11 *Amphihaline Decree of 16 February 1994. The Cogepomi are responsible for the implementation of the Plagepomi, the Migratory Fish Management Plans.*
12 *INRAE - the French National Research Institute for Agriculture and the Environment and Ifremer - the French Research Institute for the Exploitation of the Sea - can participate in the work.*

13 *To this end, see the "Guide to good practices for glass eel fishing", Conapped, 2011.*
14 *Anguillicoloides crassus, Pseudodactylogyrus sp. Ichthyophtirius multifiliis.*
15 *Virus EVEX, NHI and SHV.*

Step 3 : Marking, an important action for monitoring restocking

In order to **monitor the glass eels**, the batch will be partially (30%) or fully marked with a dye. This harmless alizarin-based dye **impregnates the bony parts of glass eels located at the level of the head: the otoliths**.

Fishmongers and biologists play an essential role in this step.

Step 4 : Quality packaging and transport

The "**conditioning**" of the glass eels are packed in boxes ans **kept in a humid atmosphere, saturated with oxygen and at a low temperature (2 to 3°C).** They are transported by **refrigerated truck** to the restocking area, which avoids any handling. Trucks can be **sealed by sworn officers** from packing to the release site. A **detailed register of traceability is sent to the COGEPOMI**, including the origin of the glass eels, the invoices of the fishmongers, the stage of development and the size/weight characteristics of the released individuals.

Styrofoam crates for transportation ©ARA France

Spilling of glass eels ©ARA France

Alizarin glass eels marking ©ARA France

Glass eels follow-up ©ARA France

Step 5 : Spilling at suitable sites

In order to avoid any thermal shock, particular attention is paid to the **temperature difference between the water in the transport boxes and that of the habitats**, which are made up of **suitable sediments** with well-present food resources, **aquatic plants to provide shelter and a minimum of predators.** The **glass eels are gently released, several times throughout** the watercourse to disperse the individuals in **areas of lower population density.** Environmental measurements are made at each discharge point (**temperature, salinity, oxygenation rate of the water**, etc.). Finally, survival tests make it possible to monitor and compare the results of the operating procedures and to evaluate the immediate success of the spill.

Step 6 : A 3-years follow-up

The effectiveness of the restocking is evaluated through the search for glass eels in the natural environment, marked or not, during **three sampling campaigns, at 6 months, 1 and 3 years by electrofishing** at the release sites, using the **Abundance Spot Sampling (EPA) method**.

These fisheries shall be combined, where possible, with fishing operations **for fine mesh fyke nets**[16] and other gear.

The principle is to recapture individuals whose size/age corresponds to eels from restocking through the study of otoliths impregnated with alizarin.

16 *A conical fishing net mounted on rings.*

INTERNATIONAL INSTITUTIONS, EUROPE AT THE BEDSIDE OF BIODIVERSITY

Awareness of the **urgency of halting the erosion of biodiversity** is growing. **The UN** wants to protect **30 % of the earth's surface by 2030**.

The "**Nature-based Solutions**" led by UICN[17], **Unesco** and other major players are gaining ground. With the **Water Framework Directive (WFD) of 2000, Europe has accelerated the restoration of water quality and aquatic environments but has not achieved the objectives set.**

WFD[18] has launched an **encouraging dynamic** and aims for **the «good ecological and chemical status» of water bodies** by 2027. France transcribed it in **2006 with its Law on Water and Aquatic Environments** (LEMA).

The **2016 Law on the Reconquest of Biodiversity, Nature and Landscapes** is a further step in the right direction.

THE EUROPEAN EEL REGULATION OF 2007 TO HALT THE DECLINE OF THE POPULATION

It is within this framework that **Europe is acting**. As the eel is a **unique population colonising European waters, a Community approach** was needed. **In 2007, in response to the decline of the species, the Union enacted the "Eel Regulation"**[19], which requires each Member State to have a **management plan to act on all causes of mortality.**

This regulation requires Member States authorizing elver fishing to **reserve 60% of the quantities fished for restocking** and a gradual reduction in fishing effort at all stages of development[20]**.**

The recent evaluation of this innovative regulation has shown that it is appropriate. However, further efforts are needed to ensure that States respect their commitments, particularly on non-fisheries measures, such as habitat restoration and ecological continuity.

Silver eel | © Nevit Dilmen

THE FRENCH EEL MANAGEMENT PLAN (PGA): A BALANCED PLAN IN ITS INTENTIONS

In 2009, France implemented an **Eel Management Plan (EGP), approved by the European Union in 2010**. The PGA covers the entire territory and includes measures to **reduce the causes of anthropogenic mortality**.

These are mainly:
1. The **strengthening of the supervision of professional fisheries** and the **reduction of fishing mortality** ;
2. The reservation of 60% of glass eels for restocking, the rest going for consumption.
3. Identification and management of priority obstacles for eel.

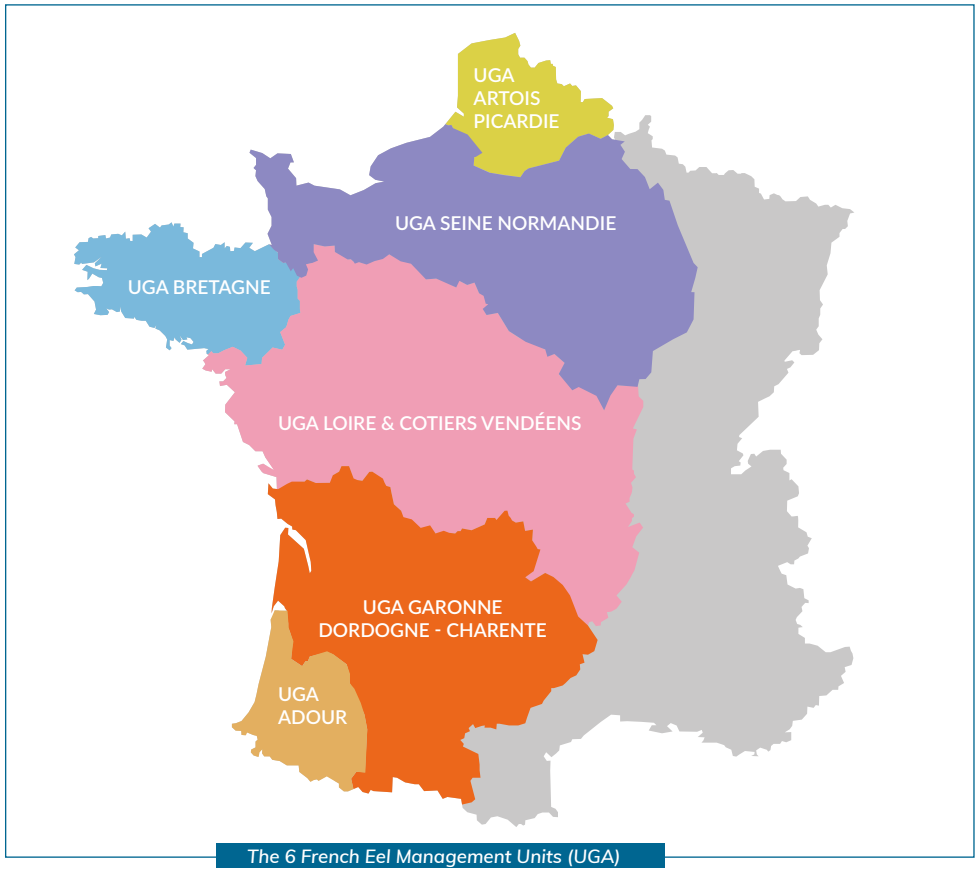
The strict and exemplary supervision of professional fishing is reflected in the implementation of **catch quotas, daily declarations, quotas for fishing licenses, closing periods and the limitation of the size and power of vessels.** France is thus the **only European country** to have set up a **consumption quota (40%) and a restocking quota (60%) with full traceability**. Eel fishing is thus the **most regulated fishery**.

17 *International Union for Conservation of Nature, founded in 1948 in Fontainebleau.*
18 *The WFD is complemented by the MSFD, the 2008 Marine Strategy Framework Directive, with it also the sustainable use of the seas and the conservation of marine ecosystems in 2021.*

19 *Regulation (EC) No 1100/2007.*
20 *Saving the eel. The French management plan. Onema, Ministry of Ecology, Ministry of Food, agriculture and fisheries. October 2010.*

SINCE 2010, ARA FRANCE'S STRONG CONTRIBUTION TO THE PGA AND TO THE COORDINATION OF THE ACTORS.

To make the Eel Management Plan a success and involve **professionals, scientists, civil society and companies**, including **hydroelectricians**, the Government has chosen to create **the association Repeuplement Anguille-France**. Its activity is subsidized by **public funds**, a contribution from **professional fishermen** and a small amount of support from companies such as **EDF**. It is supervised by a **board of directors of 8 members**, professional fishermen of the waterways of the Atlantic coast and the English Channel, representing **the six Eel Management Units (UGA)**. Ara France, chaired since July 2023 by **Eric Blanc, a fisherman,** coordinates the program with an employee based at the **National Committee for Maritime Fishing and Marine Farming**.



The 6 French Eel Management Units (UGA)

Ara France ensures compliance **with the restocking specifications, participates in the financing of field actions, carries out annual summaries and proposes adjustments to the protocol implemented with the French Office for Biodiversity, the MNHN[21], the Water and Biodiversity Directorate of the Ministry of Ecological Transition and Territorial Cohesion, the Directorate of Fisheries and Aquaculture (DGAMPA) under the supervision of the Secretary of State for the Sea and Biodiversity.**

PROFESSIONAL FISHERS CLOSELY INVOLVED IN DATA COLLECTION

Professional marine and river fishermen are closely involved in the production of scientific and empirical data through their daily observations of the environment.

Data from professional fisheries are used for the assessment of **eel stocks** in rivers and at sea by the **Eel Working Group of the International Council for the Exploration of the Sea[22]**.

RESPONSIBLE PROFESSIONAL FISHERMEN, «WHISTLEBLOWERS»

Professional river fishermen watch over the environments and are often the first to warn of their degradation. Yet, despite their efforts, they remain scapegoats. As "Sentinels of the environment", they fish responsibly. Their numbers have shrunk by 50% with the withdrawal of 400 river fishermen from the fleet between 1997 and 2020.

*There are only **6 professional fishermen left on the Rhône, 3 on the Seine and yet the migratory species do not return to these damaged rivers.***
*There is an urgent need **for the ecological footprint of other uses (conventional agriculture, hydroelectricity, urbanization, recreational fishing) to be reduced.***

Who can believe that actors who depend on the productivity of rivers would not be aware of the importance of their protection?

*And have we forgotten that **they feed our communities with a local resource ?***

21 *National Museum of Natural History*
22 *Created in 1902, ICES is the oldest research organization on the sea and oceans. It is based in Copenhagen and gives opinions on the Common Fisheries Policy, marine pollution and the management of the world's fisheries resources.*

A STRONG MOBILIZATION OF ALL THE PLAYERS IN THE FISHING SECTOR

In the field, restocking programmes are carried out by the **Regional Maritime Fisheries Committees**[23], which ensure the organisation of the operations developed within the **COGEPOMI**. With the help of **OFB**, scientists, the committees define the **quantities of glass eels** for restocking **in each basin, and professional sea and river fishermen are mobilized during the winter** to catch them.

Fishing practices have improved, and in 10 years, **elver mortality has decreased to only 7.4%**[24]. The glass eels are then entrusted to a **fishmonger**, who is in charge of their storage and the **essential animal health tests**.

The **OFB** or the **ULAM (Coastal Maritime Affairs Unit) ensure that operations run smoothly**. So there is a **chain of operation that benefits the natural biodiversity as well as local livelihood.**

Elver fishing vessels with their sieves | © Guillaume Le Priellec

"**Glass eels' restocking** is the only way for professionals to contribute to putting eels back in places where they could no longer colonize naturally due to a **lack of suitable migratory access** (dams, locks, ladders, turbines, power plants, hydraulic defects). They can **help maintain broodstock and we are the only ones** to take this approach.
Restocking is one of the most direct ways to ensure the renewal of the species and **to open the awareness that good water quality ensures the continuity of life**. Since the Eel Management Plan was put in place, we have made good progress collectively, fishermen, the State, water agencies, institutions, the scientific world. We must go further, faster, the urgency is there".

Eric Blanc, President
Estuarine fisherman of the Gironde & Pertuis-Charentais area

Jacqueline Rabic has been the president of Ara-France since its creation. Coming from a long line of river fishermen, having mainly worked on the **Dordogne**, she has always insisted on **the importance of close cooperation with the scientific world** in order to know the environments well in order to protect them and to adapt the overall fishing effort.
She affirmed with **with strength and passion**, in national and basin bodies, **the decisive role of professional fishermen** in watching over rivers, collecting data and supporting good **European and French public policies** such as eel restocking. **A whistleblower before her time**, a living memory of fishing, a unifier, Jacqueline Rabic, a member of the Adour Garonne Basin Committee, was elevated to the rank of **Commander of Maritime Merit** in July 2022.

Jacqueline Rabic
A committed former president

23 *Regional Committees for Marine Fisheries are the regional organizations of professional fishermen, linked to the National Committee for Professional Fishing and Marine Farming.*

24 *Simon.J, Charrier.F, Dekker.W, Belhamiti.N, 2021 : The commercial push net fisheries for glass eels in France and its handling mortality.*

10 YEARS OF RESTOCKING: 70 OPERATIONS UNDERTAKEN TO HELP THE EEL,

The French restocking, **complementary to the restoration of the environment,** testifies to a real commitment **to halt the decline of this singular animal**.

It is important to understand that, of the contingent of glass eels that come up, it is estimated that between **10 % and 20 % are taken**,the figure varying depending on the estuary. Of this total, **60% is devoted to EU restocking, of which 6 to 8% of the glass eels will go to French restocking sites** : the quantitative impact is therefore very low. **Finally, it must be borne in mind that there is a very high mortality of glass eels in estuaries, for natural causes but also because of the poor quality of water and the degradation of the environments.**

Between 2011 and 2021, 70 restocking operations were carried out in the 6 UGAs from 7 km (Vendée) to 263 km (Loire) to the sea. 19 Rivers and wetlands were restocked.

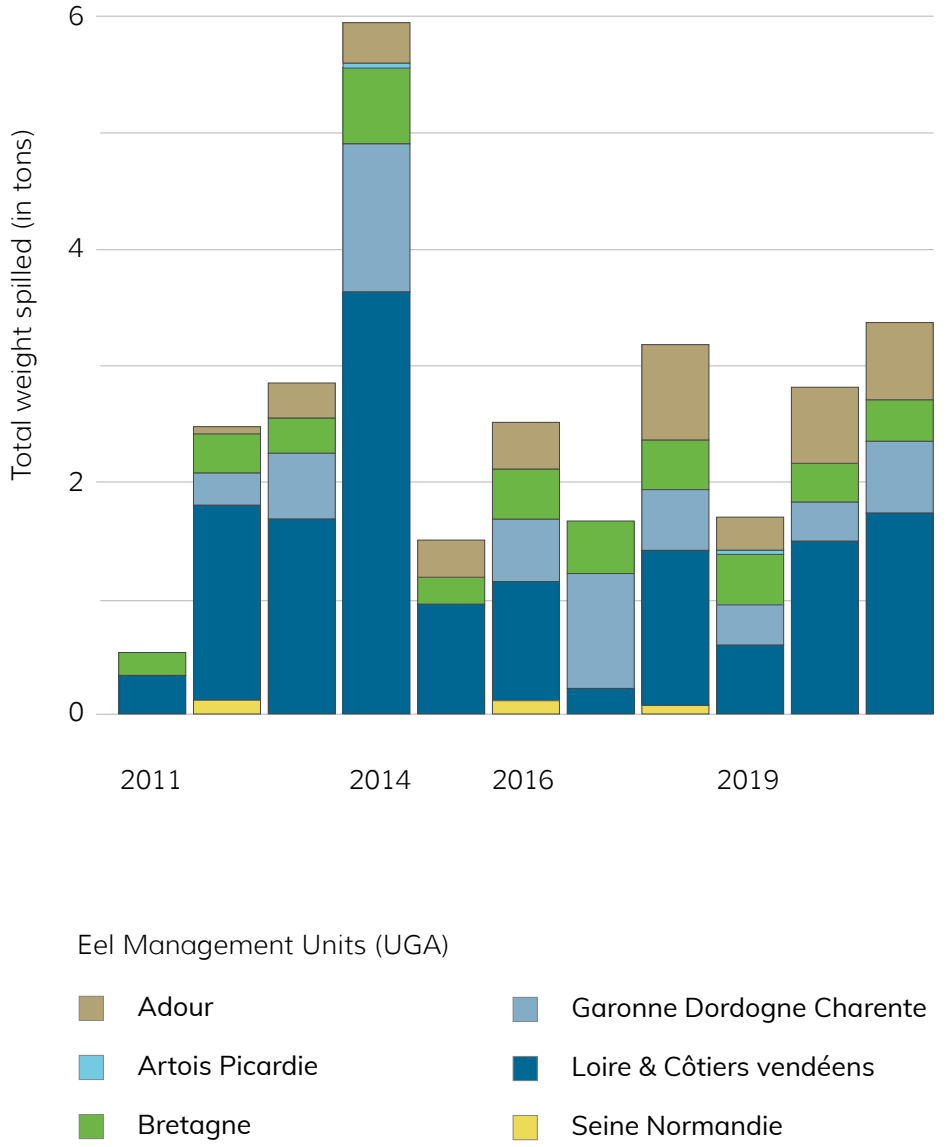
About **28 tons of glass eels** were released, which represents **88 million individuals for an average weight of 0.9 grams**.

The quantity of glass eels spilled varies, from **500 kg in 2011 to nearly 6 tonnes in 2014.**

IN A LONG-TERM SYSTEM THAT WILL BEAR FRUIT.

The success of restocking operations **can only be measured in the long term, since the life cycle of the eel extends over 15 to 25 years. This is not often the timeframe of public policies**, which can weaken as a result of changes in budgetary programming, definition of priorities, national or European political contexts.

We must never forget that **the time it takes to restore nature**, a wild population, is slow and requires **almost infinite patience, unlike the rhythm of today's world.** However, there are early indications of the success of the operation.



Quantities of glass eels released during restocking projects between 2011 and 2021 within different UGAs

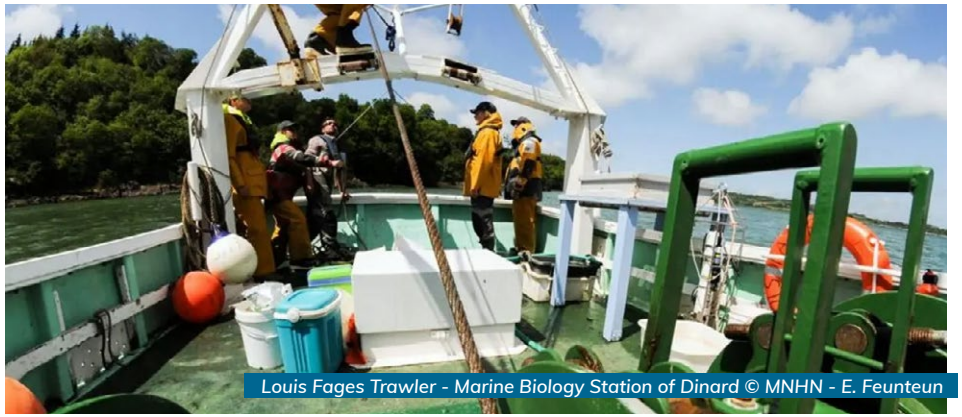
KNOWLEDGE SUPPORT FROM THE NATIONAL MUSEUM OF NATURAL HISTORY AND ITS PARTNERS,

The National Museum of Natural History, founded in 1793, is one of the oldest scientific institutions in the world helping us to understand the **living world**.

It brings together 500 researchers **placed under the supervision of the Ministries of Research and the Environment**. With its **Marine Station in Dinard and the École Pratique des Hautes Etudes**, it has contributed to a study on restocking.

With the support **of the OFB**, **it has estalished** a protocol for monitoring operations **6, 12 and 36 months after translocation**, specifying the modes of scientific fishing (electric and fyke nets). The recapture rate provides information on the fate of elvers discharged, their growth and the abundance of the population[25].

There are already initial indications of the success of the operation.


Louis Fages Trawler - Marine Biology Station of Dinard © MNHN - E. Feunteun

RESTOCKING, AN ESSENTIAL ACTION IN CONSERVATION STRATEGIES

All strategies for the conservation of threatened populations: birds, mammals, amphibians, naiads[26], insects and fish have two components.

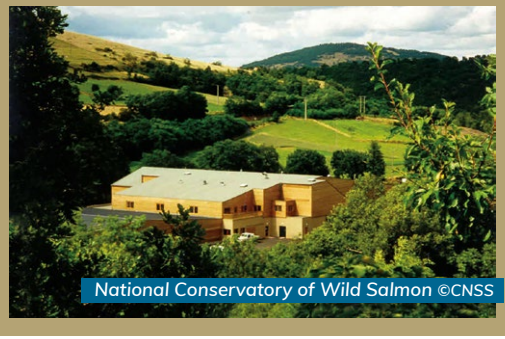
1. Restore degraded habitats, reduce pressures;
2. Temporarily support the population.

Whether for ***the Rhône Apron, the Pearl Mussel, the European Bison, the Golden Tamarind, the Hyacynth Macaw****, the method is identical. For example* ***the European sturgeon*** *(Accipenser sturio) is returning to the Gironde estuary* ***thanks to the successful broodstock breeding programme conducted by INRAE***[27].

To save the population of ***Atlantic salmon*** *(Salmo salar) of the Loire river, le* ***Loire Grandeur Nature Plan*** *has enabled the removal of dams and the* ***reconfiguration of the EDF structure of the Nouveau Poutès on the Haut Allier*** *while the* ***National Conservatory of Wild Salmon in Chanteuges*** *is putting hundreds of thousands of juveniles back into the natural environment to gradually reconstitute a viable population.* ***This patient collective work gives hope.***


Rhône apron | © Erimouche


Golden Tamarin | © Jeroen Kransen


National Conservatory of Wild Salmon ©CNSS


New Poutès dam ©EDF mediatheque

25 *This is estimated following electrofishing by «abundance point sampling», EPA.*
26 *Freshwater molluscs.*
27 *National Research Institute for Agriculture, Food and the Environment.*

FIRST RESULTS CONFIRM THE INTEREST OF RESTOCKING IN A CONTEXT OF POSSIBLE ADDITIONAL RESTRICTIONS FOR PROFESSIONAL FISHING.

A follow-up study[28] from 2011 to 2021, with the participation of the **Fish Pass** design office, focused on **48 operations** to transfer **29 tons of glass eels** to upstream areas of rivers.

It shows that restocking with eels is an **effective measure to introduce eels into sections of rivers where they are absent**. Eel growth rates increase with distance from the sea, especially in large rivers. The protocol used does not provide information on the survival of individuals. As this is described in the literature as "**density-dependent**", an improvement in average survival in the upstream parts is likely, corroborated by the **higher growth rates** in these areas.

Thus, restocking in low-density habitats **could generate an increase in silver eel production**. The continuation of the analysis of the effectiveness of restocking would consist in estimating the quantity of broodstock resulting from the transfer of the 29 tonnes of glass eels in relation to their production from the **colonisation of the watersheds by their own means**.

Initial evaluations currently being finalized indicate that restocking would allow a **substantial gain in silver eel production**. It is essential to carry out an **in-depth, consensual research** to set a model integrating survival gain, growth rate, sexing, size and age at silvering as well as an analysis of the proportions of silver eels resulting from restocking.

The first silver eels from restocking began to roll down in 2018 in the Loire and ongoing studiess **indicate that they could contribute to 5 to 10% of the silver eel flow.**

WHY IS THERE NO RESTOCKING IN THE MEDITERRANEAN?

Until the 2000s, professional and recreational fishermen carried out ***eel hatcheries*** *in the Rhône-Mediterranean basin. With the launch of the* ***Eel Management Plan in 2009 on the Rhône-Mediterranean UGA, the COGEPOMI****, is against it, due to the absence of glass eel fishing, the fear* ***of increasing fishing pressure on eels****, and the spread of parasites. There is also a risk of blurring the knowledge of densities due to natural colonization following the decompartmentalization of rivers and the* ***significant mortality due to downstream migration with turbines : many hydroelectric structures***[29] ***disrupt the proper functioning of the Rhône****. However, since 2012, professional fishermen on the Mediterranean coast have been releasing silver eels. They allow the escape of a greater proportion of eels that may be blocked by migration barriers while helping to improve scientific knowledge.*

Donzère-Mondragon dam on the Rhône

Camargue | ©Jac. Jannsen

28 *ADRAF study (Analysis of data from 10 years of Eel Restocking in France Bastien Bourillon et al. MNHN, Center for Research and Education on Coastal Systems, Marine Biology Station of Dinard, 2020.*

29 *There are 21 structures on the main course of the river, 19 of which were built by the Compagnie Nationale du Rhône and two in Switzerland.*

SHARED AMBITIONS: ACCELERATING THE RESTORATION OF NATURAL ENVIRONMENTS,

The common ambition is vast. Ecological continuity **must be restored for the 162 priority structures of the Loire**[30] **including 15 black spot structures in the Priority Action Zone of the Eel Management Plan**.

This is all the more necessary as young eels have **low swimming skills on the way up**. Half of the structures have been treated in ten years, but in **Nantes, the problems of continuity of the lock of Saint-Félix-sur-l'Erdre have not been solved for 30 years!**

It is also necessary **to implement the cessation of turbines** during the nocturnal devastation of silver eels; to better manage the hydrology linked to the operation of large dams and **to restore wetlands**, 50% of which disappeared in France during the twentieth century.

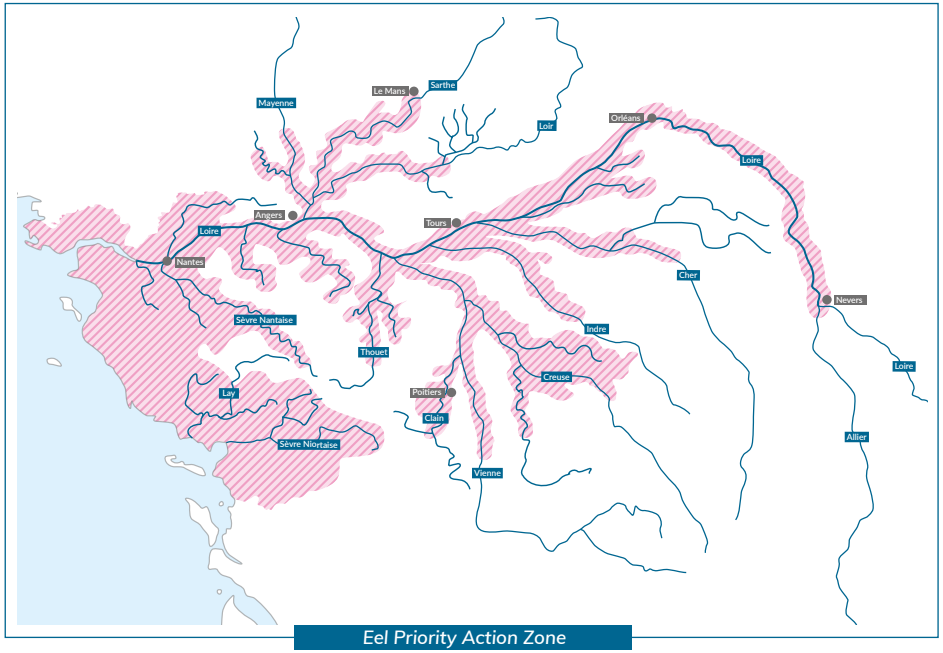
The **Poitevin marshlands have lost 50.000 hectares of wet meadows in 15 years**. We must also change, **in conjunction with the profession, agricultural practices** by reducing the surface area of irrigated maize, protecting grasslands, stopping drainage, reducing the use of pesticides: **agro-ecology is good for the eel**.

We must also restore the habitats of the lower parts of the rivers, **the alluvial forests and the mudflats of the Loire estuary**[31] where a **National Natural Reserve project has been stalled for 25 years.**

CONTAIN INVASIVE SPECIES, SUCH AS CATFISH,

The populations of **catfish** (Silurus glanis)**, introduced into France in the Doubs in 1857** have become an invasice species.

Reaching **2.7 metres in length and weighing 170 kilos, this opportunistic carnivorous fish**[32] with **no natural predators** exerts very strong pressure on the populations of migratory fishes, **salmon, shad, eels, lampreys, sea trout, mullets. The study of 2023 GLANISPOMI**[33] **shows they sit in wait for their prey at the bottom of the dams even when equipped with fish passes.**



Eel Priority Action Zone


Saint-Félix lock in Nantes | ©Llann Wé²


Fish ladder on the Meuse river | ©Jpcuvelie


Loire estuary | ©500px


Catfish | ©J.S. Müller

30 *Of the 1200 priority structures identified in the Action Plan for the Restoration of Ecological Continuity in France (PARCE).*
31 *In the Loire estuary, the number of mudflats has risen from 14,000 ha in 1962 to 7,000 ha in the 1990s.*
32 *Invasive Alien Species Resource Centre. IUCN OFB Data Sheet.*
33 *Global study of the predation of diadromous fish by catfish in the Loire basin, 2023. (t. Tracart, E. Robin, & É. Feuteun, Eds).*

STRENGTHENING COOPERATION BETWEEN VARIOUS ACTORS, PROMOTING THE RIGHTS OF NATURE,

To accelerate the **global ecological transition,** to strengthen the **National Plan for Amphihaline Migratory species**[34] **led by the OFB,** it is necessary to strengthen the dynamics with other public and private actors: **UICN, Regions, NGOs, FNPF**[35]**, institutions, foundations, companies, in particular EDF.**

Let us also reflect on **the Rights of Nature,** let us re-enchant our relationship to rivers, drawing inspiration from the work done by the **Loire Parliament**[36].

AND EXPORTING A FRENCH MODEL OF RESTOCKING.

Eel restocking is a renewed ambition. **In the 19th century**, various countries in Europe, both northern and southern, concerned about an initial decline in fisheries , what was then called the "**Eel problem**", had embarked on **programmes to repopulate and support the population**, in particular with the imperial fish farm of Huningue in the small Alsatian Camargue. Optimism was the order of the day.

Professor Victor Coste considered in 1849 "that the abundance of the return of glass eels to the Loire would make it possible to repopulate all the waters of the earth[37]".

Our country then made a first attempt, which was not followed up. 27 million glass eels were used for restocking in 1880[37].

European restocking is practiced **from Ireland, as well as the countries bordering the North Sea, to the Baltic Sea**. The French Eel Management Plan seeks to set an example and allows **total traceability between glass eels intended for breeding farms and those intended for French and European restocking operations.** For now, this traceability system **does not last once we have crossed our borders and does not allow sufficient monitoring of restocking glass eels.**

Why not extend it **to all Member States?**

Loire in Orléans | ©Nono vlf

Loire near Tours | © 500px

34 *Draft National Plan for Amphihaline Migrants. OFB, INRAE, Nasco, February 2022.*
35 *National Fishing Federation in France.*
36 *POLAU - arts and urban planning centre, University of Tours, 2021. Wild Legal is also involved in the work, an organization founded in 2019. Wild Legal France. www.wildlegal*
37 *Climbing back up what slippery hope ? Dynamics of the European eel stock and its management in historical perspective. Same study. William Dekker et Laurent Beaulaton ICES Marine Science 2016.*

MIGRATORY FISH THAT NOURISH OUR BODIES, OUR CULTURE...

What would our world be without migratory fish ? Without professional fishermen who fished them for millennia, before industrial societies impoverish our rivers?

Will we be more humane when these fish and these age-old professions have disappeared? The eel has intrigued us since **Aristotle, 4 centuries before Christ**. Its abundance and vitality have left their mark on imagination and literature, including the irreplaceable **Reynard the Fox** tale. Who remembers that, in medieval England, the eel was used as currency, especially to pay rent[38] ?

Salmon inspired **Caesar** in the **Gallic wars** and honored French gastronomy, the **tables of Kings and presidents of the Republic**. Are we happier since the European sturgeon deserted our shores and estuaries?

In a country that wants to **reduce its food footprint,** to **regain past abundance** in our rivers and streams is an **exciting collective challenge.**

Small fry on Loire riverbanks | © O. Brestin

Loire professional fishermen | © C. Rives

Pike perch gastronomic dish | © ADT Touraine

Eel emerging from a trap | © F. Douaud

AND TELL A LONG AND RICH STORY ON THE LOIRE.

From the first hermitages, including that of Martin de Tours to the contemporary period, the Loire has always provided for **the various needs of the communities. Sulpicius Severus evokes it in a miraculous account of the end of the fourth century**, during which Martin allows the accomplishment of a miracle: **"With the first sweep of the net the deacon pulled out an enormous salmon".**

Water, fish, animals, fertile soils: **the Loire has abundantly fed its residents.** Excavations carried out in **Tours, Orléans, Rezé** have shown that **its banks have been developed since Antiquity. The remains of old medieval fisheries are attested by the piles that emerge at low water.** They made it possible to capture migrants on the way up. The **lean days (without meat) imposed by the Church** gave pride of place to shad, lampreys, mullets, eels, salmon, in our diets.

The ancients knew a rich and fishy river: **is it not right, in our societies that are restoring their natural and cultural heritage, to desire to regain some of this lost abundance?**

38 *Greenlee, 2020 : Seeing All the Anguilles : Eels in the Cultural Landscape of Medieval and Early Modern England.*

ARA FRANCE: AN ASSOCIATION AT THE SERVICE OF THE EEL AND THE RIVERS OF OUR COUNTRY

Ara France is a non-governmental organization created in 2010 at the initiative of professional fishermen to coordinate restocking actions as part of the **the French Eel Management Plan**. It brings together salt and fresh water professional fishermen, private and public secteurs. It is supervised by **the State (Ministry of Ecological Transition and Territorial Cohesion, Secretary of State for the Sea and Biodiversity, Ministry of Agriculture and Food Sovereignty), and the French Office for Biodiversity**.

It is supported by various NGOs: **North Atlantic Salmon Fund, Chant des Rivières**. It is an associate member of the **Franco-Japanese Oceanographic Society**. This diversity of actors makes it possible to **nourish dialogue and fosters ownership**. Its action is supported by the scientific world, including the **National Museum of Natural History.**

The operation of Ara France is based on **strong values of knowledge acquisition and sharing, cooperation, and the cross-fertilization of approaches and knowledge**. In addition to its action on restocking, Ara France raises awareness among economic actors and institutions on the importance of **restoring running water environments and wetlands. To carry out this bold public policy, the strength of the links between public and private actors is essential.**

ARA France
Association Repeuplement Anguille

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