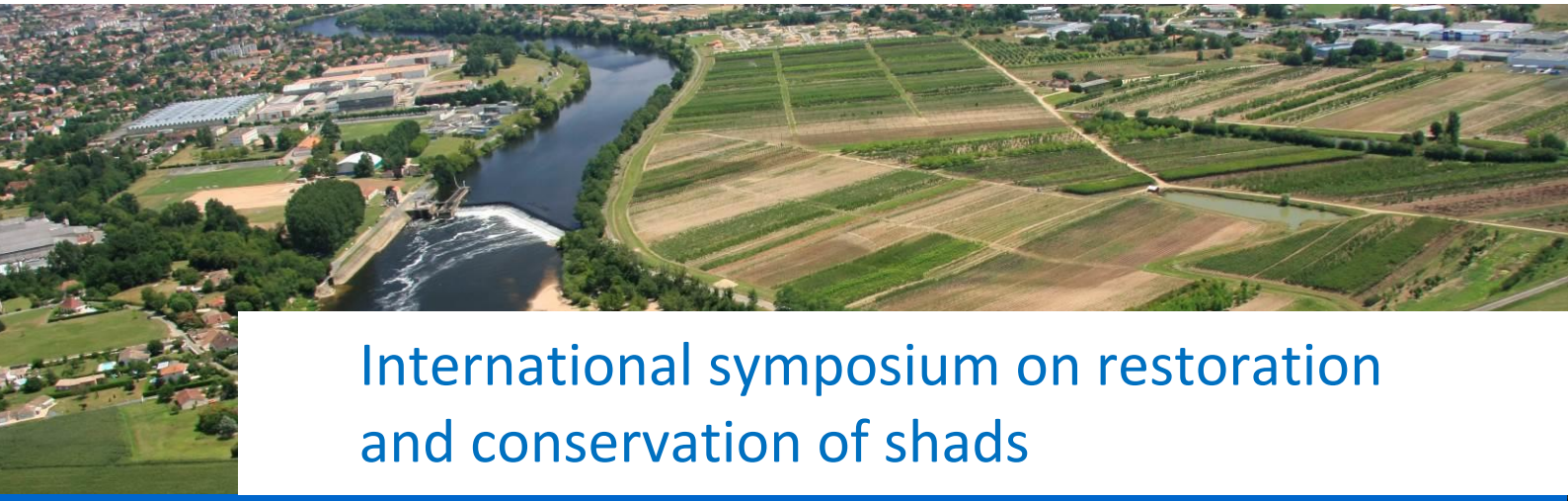
LIFE + Shad project
LIFE09 NAT/DE/000008



International symposium on restoration and conservation of shads

October 14th and 15th, 2015

Auditorium, Espace François Mitterrand, 23 boulevard Henri Sicard

24100 **Bergerac (Dordogne, France)**

The international symposium on study, restoration and management of shads held on October the 14th and 15th 2015, in Bergerac (France). More than a hundred people came to attend the feedback from the LIFE+ project for restoration of the Allis shad on the Rhine (2011-2015), a report on current knowledge about this fascinating species, and also attend the presentation of other research works conducted in the whole world.

Progress report

---

www.lifealose2015.com

Interventions report

Wednesday, October 14th, 2015

Introduction

***Frédéric DELMARES**, Vice-President of the Conseil Départemental de la Dordogne, Vice-President of the Communauté d'Agglomération de Bergerac, Administrator of EPIDOR and representing Germinal PEIRO, President of EPIDOR.*

Bergerac is located in the heart of the Dordogne basin. This territory is identified by UNESCO as a Biosphere Reserve. Here, the reconciliation of Man and Biodiversity, which include shad, is an obvious target. All participants should be thanked for having joined the event, including the partners of the LIFE+ project, experts from abroad and partners of Gironde-Garonne-Dordogne basin. It was important for the Communauté d'Agglomération de Bergerac to host this meeting, because migratory fishes represent strong challenges, as evidenced by the meetings already held here such as the Franco-Quebecers symposium on restoring rivers for migratory fishes in 1985, the Summit Dordogne Valley in 1992 and the States General of the Dordogne basin in 2012. EPIDOR is pleased to have been able to organize this conference with the support of the European Union, the Office National de l'Eau et des Milieux Aquatiques, the Agence de l'Eau Adour Garonne, the Migrateurs Garonne Dordogne association and the Fishing Federation of the Dordogne and thanks all these valuable partners.
Migratory fishes represent an ancestral heritage and an important tourist attraction. But it also represents a real social challenge. All are now in big trouble. Many efforts are needed, particularly in terms of hydropower, agricultural or urban practices and fishing. The future of these fishes depend on the evolution of all these practices.
Today, this symposium is organized on shad because this subject seems important, but remains in line with the broader issues of water management and aquatic environments. The event will consist of three parts : the results of LIFE+ Shad project, a state of knowledge on this species and a review of some examples of management of shads abroad.

***Detlev INGENDAHL**, Ministry of the environment of North Rhine Westphalia.*

On the Rhine, salmon had completely disappeared. His reintroduction is underway and shows that migratory fishes restoration programs are very long and difficult operations. Shad had also disappeared from the Rhine and knowledge on his stocking were much smaller. Rhine Westphalia fishermen brought the project to its reintroduction. They were supported by the European Union, the region of Hesse and the Aquitaine region. In 2008 the first LIFE Shad project was launched. At this time, the Gironde-Garonne-Dordogne basin had the largest population of shad and has produced the first larvae which were released on the Rhine. The results, which will be presented in this conference, are encouraging.

Another very positive result is the success of Franco-German cooperation. This international cooperation is essential for the management of shad, which has disappeared from many countries. It is of course appreciated by Germany, but also by the EU who decided to continue the LIFE.
The holding of this conference in Bergerac, in the Dordogne basin, in the heart of the Biosphere Reserve, perfectly illustrates the spirit of this international cooperation. Unfortunately, here the population has also decreased. It is necessary to work together to safeguard and maintain this population. The LIFE project has already improved our knowledge and must continue.
Across Europe, the situation of migratory fishes is worrying. The actions related to the Framework Directive on Water are in the right direction but are not sufficient. For example it is necessary to take into account what is happening at sea.
This conference promises to be particularly interesting and we hope that it will brings some solutions for the proper management of these species.

1* Shads in the world – State of the Allis shad and conservation issues

Miran APRAHAMIAN (ex Environment Agency, United-Kingdom)

The shads belong to the Alosinae subfamily, of which there are 7 genera and a total of about 30 - 32 species. Alosines occur in the northern and southern hemispheres on all continents except Australia and Antarctica. However, the range of some species has shrunk. The majority of the species are anadromous, some are totally marine with a few that are landlocked and a few that complete their life cycle within the river. The shads have been an important food fish attributable to 1) their edibility, 2) typically high abundances and 3) and 3) the timing of these runs is highly predictable.
Allis shad are mainly anadromous, some landlocked populations have arisen as a result of dam construction. Historically, Allis shad populations extended along the eastern Atlantic coasts from Norway southward to Morocco and into

the western Mediterranean Sea. Today, the range is restricted to the Atlantic coasts of France and Portugal.
The shads are listed in EU Habitat Directive and under Article 11 of the Habitats Directive Member States are required to monitor their status, currently the majority of sites are in "unfavorable" condition. The primary cause is loss of habitat, other causes include pollution, habitat degradation and fisheries either as the target species or part of the by-catch.
To conserve and enhance the Allis shad, priority needs to be given to restoring access; other options include sanctuary areas, reduction in fishing mortality and stocking / translocation. Also needed is further research into 1) ecology of the juvenile stage in fresh water, 2) the degree of homing, 3) the marine phase, 4) population dynamics and 5) fish pass requirements. There is also a need to develop methodologies and collect data to calculate management targets and limits and assess the possibility of using these species in metrics of habitat continuity or quality and integrating them into the Water Framework assessment of Good Ecological Status.

Session 1 : Results of the LIFE+ Allis shad project

2* General presentation of the LIFE+ project

Andreas SCHARBERT (Rhenish Fisheries Federation, Germany)

In the Franco-German LIFE+ project "Conservation and restoration if the Allis shad in the Rhine and Gironde watersheds" actions have been implemented that aim on improving the conservation status of the Allis shad in two large European river basins. After the once great and economically important population in the Rhine, like in many other systems, has become extinct at the beginning of the 20th century, a reintroduction project with LIFE support was launched in 2007 in order to reintroduce the species to the Rhine basin. Mass production and marking techniques were developed which allowed to obtaining millions of larvae bred from genitor fish out of the GGD population. At the same time this donor population, so far most important decreased sharply. In the LIFE+ project explanations for this decreasing except fisheries are addressed, i.e. the efficiency of fish ways at obstructions in the basin, the monitoring of the YOY in the rivers and the potential of ex situ stocks for conservation projects, however the situation of the population is increasingly concerning. In parallel the stocking operations in the Rhine basin were continued and monitoring measures indicate first signs of success.

Part 1 : Report of the stocking operation in the Rhine

3* Larvae production on the Garonne–Dordogne basin and releasing in the Rhine

David CLAVE (MIGADO, France)

Since 2008, the hatchery of Bruch (Lot-et-Garonne, Aquitaine) is the only Allis shad's fish farm in Europe. Wild spawners are trapped in the wild and reproduce in the farm with hormonal induction, eggs produced incubate and hatch quickly to give small larvae whom first feeding should be rapid and made off alive preys. The genitor resource being less abundant in the Gironde catchment, an improvement of the production rate of larvae per adult was necessary. A suitable management of genitor allowed an enhancing of the production rate from a factor 3 to 4. In 8 years (2008 to 2015), 1017 genitors were captured (435 are female) and produced 236 kg of eggs and nearly 11 million larvae were released into the Rhine.

4* Survey in the Rhine watershed

Andreas SCHARBERT (Rhenish Fisheries Federation, Germany)

In order to reintroduce the Allis shad to the river Rhine, which housed a great population until the beginning of the 20th century, a LIFE supported stocking project was started in 2008 after the availability and suitability of essential habitats for a sustainable re-colonization in the heavily modified river have been ensured. After refining the stocking procedure about 11 Mio Allis shad larvae have been obtained from a hatchery in the Aquitaine (Gironde-Garonne-Dordogne population) and released in selected habitats from 2008 to 2015. Accompanying monitoring studies aimed to assess post-releasing behavior of the larvae, which dispersed and stocking efficiency. The larvae were found to disperse downstream and to prefer pelagic habitats and thus difficult to track. Detections of juvenile YOY by means of stow-net fisheries and monitoring of cooling water withdrawal stations of power plants proofed the survival and the emigration from the rivers. Numerous returning adults five years after the first substantial releasing and natural reproduction in the Rhine channel are first signs of success with regard to the prospects of re-establishing Allis shad populations sustainably.

5* Ex situ stock in Aquarium La Rochelle – Rearing and sexual maturation results

P. JATTEAU (IRSTEA, France), S. DUFOUR (MNHN, France)

The final objective of this action is to reduce the amount of adults collected for larvae production. In the framework of this action, a batch of Allis shad larvae was

reared in Aquarium La Rochelle facilities to test the feasibility and to follow the sexual maturation process.
Mortality was high during the first 4 months, and the survival rate was stabilized at 22%. At the end of the experiment survival was 12%. From 1 month old larvae, the feeding sequence was made of artificial feed and frozen zooplankton.
After a 4 year rearing, mean total length was 35 ± 1 cm, and mean weight was 387 ± 34 g. Two main pathologies were observed: mouth malformation during the first weeks of rearing and renal nodules in 3 years old fish. In June 2015 the first mature fish were observed (males). The first Allis shad ex situ rearing from larvae until 4 years old fish has been realized in Aquarium La Rochelle. Some recommendations are listed.

Partie 2 : Studies on the Gironde-Garonne-Dordogne Allis shad population

6* Young of the year survey on Garonne and Dordogne

Aline CHAUMEL (SMEAG, France)

To acquire a better knowledge on Allis shad juveniles, sampling campaigns were conducted in the Garonne and Dordogne with the participation of professional fishermen.
Nearly 150 Young of the Year (YOY) in downstream migration have been caught. The main conclusions are:
- Sampling is optimal, with a drift net or seine net, during the evening and downstream of the river.
- The downstream migration could be observed during the entire monitoring period (mid-June to mid-September) with a preponderance in August, a potential period of hypoxia in the mud plug.
- A size heterogeneity have been observed. The YOY measure mostly between 80 and 110 mm (min 60 – max 150). In 2014 large YOY, between 90 and 150 mm, were caught, also at beginning of period.
- The otolith analysis determined that the caught YOY were aged between 1.8 and 4 months. The large YOY captured in 2014 are between 4 and 8 months, which would indicate a birth at the end of winter

These are important elements in the knowledge of the downstream migration of YOY. Studies are to be continued to try to better know the stage "before downstream migration", better understand the impact of mud plug during the downstream migration and deepen the question of early alosons.

7* Behavior of shad migrating upstream at the obstacles of Golfech, Bergerac and Tuilières on the Garonne and Dordogne

Pascal VERDEYROUX (EPIDOR, France)

On the Garonne-Dordogne watershed, the majority of potential spawning grounds for Allis shad are upstream of four dams. The dams of Golfech (Garonne), Bergerac, Tuilières and Mauzac (Dordogne) are all equipped with fish ladders, but this devices are not efficient enough. To understand why, a study of migrating shads by radio-tracking was conducted from 2011 to 2014. A total of 222 shads were tagged and released. A low number went at the dams and tried to pass upstream (24 different shads, for a total duration of 75 days), but some aspects concerning the use of the fish ladders could be observed. A Golfech, it seems that the elevator entrances are attractive and shad manage to get inside relatively easily (though this facility has come seems very variable depending on the days). By cons, they all get out very quickly of the device, often from entrance 2 to entrance 1. It could not be determined if the problem is at the intersection of channels or if it is at the constriction of the elevator trap, but the progression of fish inside this device seems to be the point to study. A Bergerac, the entrance looks attractive (in terms of time spent close to it), but the shad seem not very mobile on this site and rarely get into the device. The attractivity and facility to enter must be the priority work path. A Tuilières, the attractivity of the elevator appeared very variable (dependent on the management of the dam), but generally low. Moreover, it does not seem easy for fish to get inside this device, no shad followed get inside. The attractivity of the entrance must be the path to improve on this site. No information could be obtained on Mauzac because no marked shad has been released downstream, because of the lack of sufficient shad.

Session 2 : State of the science

Subjet 1 : Migration issues

8* State of the knowledge on fishways for American shad (*Alosa sapidissima*) in the USA

François GROUX (WSP, Canada),

Fish passes for American shad have been used in the USA for more than 6 decades. Literature review for both the West and East Coasts and site visits in the East Coast were done in 2015. The efficiencies are generally low and vary between close to 0% to up to 70% (transfer rate from one dam to another) on the East Coast and between 22 and 53% on the West Coast. Ten sites with lifts, pool and weir fishways of modified Ice Harbor type and vertical slot types were visited on the Connecticut,

Merrimack and Susquehanna Rivers. Factors modifying the efficiency are numerous and very complex such as: fish ladder length, type of flow (plunging vs surface), entry design and the characteristics of attraction flow (position, quantity). Interesting knowledge has been gathered from the multiple concepts of entrance (position and size, multiple entrances on the face of the dam, entrance further downstream of the dam) and their attractiveness on shad, which led to sometimes unexpected efficiencies.

9* Migration barriers : the french approach and the case of the Dordogne river

Dominique COURRET (Pôle Ecohydraulique ONEMA, France)

Shads move in schools and present both lesser swimming capacity and prospection ability than salmonids. It is necessary to be much more demanding with respect to the size and the siting of the device, the location of the entrance(s) and the quality of the attraction at the obstruction (in terms of velocity, flow discharge and flow pattern at the entrance). Downstream migration is not taken into account as nearly all adults of Allis shad die after spawning and juvenile mortalities are generally limited.

For upstream migration, recommended devices are:

- rough ramps or pre-barrages (preliminary weirs) for drops ≤ 1 m
- rocky ramp with perturbation boulders for drops ≤ 2-3 m,
- single and preferably double vertical slot fishways for higher drop
- fish lifts devices for high drops (8 – 10 m).
- Large navigation locks with specific operating cycles

Baffle fishways are to avoid.

On the Dordogne River, shads face 3 hydropower schemes along 30 km, equipped with upstream devices during the late 1980s: Bergerac with a double vertical slot pool fishways, Tuilières with a fish lift and Mauzac with a single vertical slot pool fishway. From the evaluation of breeding stock on the different reaches between powerplants and the passage counts through the devices, their efficiency can be estimated at approximately 50-60% at Bergerac and Tuilières and at 10-20% at Mauzac. Only 5-10% of shads migrate upstream of Mauzac. Reflections on possible improvements are presented.

10* Migration of the Allis shad in estuary and impact of the Estuarine Turbidity Maximum - Acoustic telemetry in the Loire estuary during 2011 and 2012

Stéphane TETARD (MNHN and EDF, France)

Connectivity in aquatic systems is often related to abundance and permeability of physical barriers such as dams which delay or impede movements of biota with important consequences for aquatic biodiversity. Water quality may, however, also control connectivity between essential habitats. In macrotidal estuaries, Estuarine Turbidity Maximum (ETM) has a strong impact on water quality by leading to low oxygen concentration due to high bacterial and low photosynthetic activities. In this study, we assess Allis shad estuarine spawning migration in 2011 and 2012 in the Loire River (France) where ETM occurs at spring and summer. Using an acoustic telemetry array, we show that trans-estuarine migration is inhibited during hypoxic or anoxic episodes in the middle Estuary. Shad tend to stay in downstream areas and even at sea where conditions are better. Trans-estuarine migration occurs hastily in neap tide when ETM decreases both in terms of spatial extent and intensity inducing a shift in a set of covariates especially dissolved oxygen, which increases, and suspended matter, which decreases. In the context of climate warming, ETM is expected to increase with probable adverse implications for shad and doubtless other diadromous populations.

Subject 2 : Habitats

11* Features and functionality of spawning habitats

Isabelle CAUT (MIGADO, France)

Monitoring of natural reproduction of the Allis shad is conducted since 2003 on the Dordogne. This follow-up is led to evaluate the reproductive stock on the river in order to complete monitoring on video control stations within dams. Then for managing purposes, it is used to analyzing the dam permeability for Allis shad regarding to the percentage of the population which spawn downstream the triptych of the 3 dams, Mauzac, Tuilières, and Bergerac.

Currently, 95% of genitors use less than 30 km of rivers and only 8 spawning sites, all of them can be considered as constraint spawning grounds

Spawning grounds are not occupied with the same intensity every year. Hydraulic Models based on ground measures on the field were designed then crossed to the database of spawning activity within 5 spawning sites. It seems that the choice of spawning site for shad is strongly linked with the current velocity.

The hydraulic models could also give an assessment of the potential landing area for eggs on the bottom of the river, downstream of spawning grounds. An important lack of adapted sediments was observed on most of the sites in regards with the past extractions of aggregates and the blocking of sediments by the triptych dams. It can disturb significantly the eggs survival, which is one of the key phases of the life cycle of the species. Reflections are currently in progress to improve the situation.

12* Oxygen and temperature effects on development of eggs, larvae and young of shad

Philippe JATTEAU (IRSTEA, France)

Recent studies on Allis shad population of the Garonne – Dordogne watershed have highlighted a lack of recruitment and a likely decrease of young stages survival during their stay in freshwater.

This work focused on the study of the effect of 2 main abiotic factors on embryo, larvae and juveniles.

During a first experiment, embryos and larvae were subjected to temperatures ranging from 5 to 35°C. The modelization of survival from hatching until 14 days old larvae allows to define an optimal range (80% of survival) between 16.6 and 24.8°C, and a tolerance range (5% of survival) from 10.8 to 29.8°C.

During a second experiment juveniles were subjected to progressive decrease of oxygen concentration at 2 temperatures (20 and 25°C). Loss of equilibrium appears at 3.8 ± 0.4 mg O2 at 25°C and 2.2 ± 0.1 mg O2 at 20°C. These results show that the hypoxic zone of the mud plug around the city of Bordeaux could have negative effects on the downstream migration of juveniles (mortality or delay).

Subject 3 : News tools for population management

13* Dispersal capacities of Allis Shad (*Alosa alosa*) : insights of innovative otolith microchemistry analysis

Françoise DAVERAT (IRSTEA, France)

Understanding dispersal capacities for migratory species is crucial for their management. By coupling otolith microchemistry and microsatellite genetic analyses, we provided information on snapshot and long-term dispersal capacity of Allis shad, an anadromous clupeid in decline throughout its distribution range. The allocation of natal origin was obtained from water chemistry, signatures in otoliths of juveniles and spawners within a Bayesian model. The majority of adults were assigned to a source river with high degrees of confidence, only 4% were undetermined. Otolith natal origins were used to define a population baseline by grouping individuals from the same natal river and not from the same sampling location as usually done. While Alosa alosa exhibited a high level of natal site fidelity, this species showed weak genetic structure which supported the evidence of a significant flow of strayers between river basins in vicinity or at longer distances. However, long distance straying was probable but not frequent. In a context of global change, straying would be a key mechanism to drive dispersal and allow resilience of Allis shad populations.

14* Genetics tools : state of the science and prospect

Stephen SABATINO (University of Porto, Portugal)

We will present a comparative, range-wide study of population structure and genetic diversity in the Eurasian shad species Alosa alosa and A. fallax. Microsatellite loci were used to study anadromous and landlocked, A. alosa and A. fallax from 14 (N = 637) and 30 locations (N = 776), respectively. Population structure (average FST) among all anadromous A. alosa sampled in different drainages was 0.072 compared to 0.310 in A. fallax. A positive correlation between genetic and geographic distance was found in anadromous A. fallax, but it was unclear if the same pattern exists in anadromous A. alosa. Landlocked populations were more genetically isolated than anadromous ones within each species. Genetic clustering analysis of anadromous and landlocked populations identified five clusters for A. alosa and 17 for A. fallax, each of which was geographically structured. Genetic diversity (heterozygosity and allelic richness) was higher in anadromous populations of each species that spawn near the center of their Atlantic range compared to those in the northern and southern extremes. Genetic diversity in landlocked populations was significantly lower than in anadromous ones in each species. A Mixed Stock Analysis for each species will also be presented. These observations and genetic tools should help in the design and implementation of conservation strategies to protect A. alosa and A. fallax.

Conference-dinner

15* Large and small fishes of the Dordogne River - Historical approach of their fishing and consumption

Yan LABORIE (City of Bergerac)

By taking part in the chronology of history and bringing the modest data now available on the old fisheries on the river, it will be tempted to pursue the prospect of addressing both the evolution over the centuries of capture techniques, actors of river fishing, and the place of fishes in the diet. In the course of this presentation, which will take interest from prehistory to our times, each time the documentation enable, we will try to find the shad, this bright and beautiful fish, integrated for over 1500 years in the Aquitaine culinary heritage and, each year, on the banks of the Dordogne, one watches impatiently the inflow of this fish which heralds spring.

Thursday, October 15th, 2015

Session 3 : Other examples of shads management in the world

16* The restoration plan of the American shad of the Susquehanna river : assessment and prospect

Chris FRESE (Kleinschmidt Group, USA)

American shad have been ascending the Susquehanna River (River) to spawn for thousands of years. Three reasons often cited for the decline of shad runs in the River are overfishing, pollution and construction of dams. Overharvesting of shad has been an important factor as shad are vulnerable to overharvesting during their spawning migration. The detrimental effects of pollution on shad are well known and by 1950 included: industrial wastes, sewage and siltation. The earliest dams on the River were mill dams. Canal feeder dams built in the 1830s to supply water to an extensive canal network effectively eliminated shad runs to most of the River.

The first hydroelectric project was the York Haven Dam completed in 1904 at River mile 55. Holtwood Dam was completed in 1910 at River mile 24. Two fishways were built at Holtwood but neither was successful. When Conowingo Dam was under construction, planned fishways were omitted by permission of the State and Federal Authorities. Following the completion of Conowingo Dam in 1928 and continuing through the early 1970s, there were sufficient numbers of shad in the river to sustain a sport and commercial fishery then shad numbers suddenly declined. Safe Harbor Dam, completed in 1932 was the last hydroelectric facility to be built on the River.

In 1969, representatives of the USF&WS, the PF&BC, the NY DEC, and the MD DNR joined to form the Susquehanna Shad Advisory committee. In 1970, these parties agreed to stock the River with shad eggs and to build a fish-trapping facility at Conowingo Dam. In 1972, PECO placed a fish elevator in service at the West side of Conowingo Dam and supported the collection and stocking of over 200 million shad eggs in hatching boxes in the river. In 1976, egg stocking was replaced with the culture and release of shad fry. Also that year, the Shad Advisory Committee was renamed the "Susquehanna River Anadromous fish Restoration Committee". SRAFRC adopted a strategic plan for restoration of migratory fishes to the River. The goals were to reopen the River to natural migrations and to restore annual spawning populations of 2 million shad and 10 million herring within 25 years of fish passage development.

Long term operating licenses for all four hydroelectric projects were renewed by the Federal Energy Regulatory Commission in 1980. Modern day restoration of shad in the River involves a four part approach including: regulating the harvest of adult shad, improving degraded habitat, constructing fish passage facilities and the restocking of prespawned shad upstream of dams. The trap and transport program began at Conowingo Dam in 1972 when the west lift was built to collect fish for transport to upstream spawning areas. The east lift was also used for trap and transport from 1991 to 1996, prior to upstream dam owners providing volitional passage at Holtwood and Safe Harbor Dams in 1997. The York Haven hydroelectric project provided volitional passage at its East Channel Dam in 2000. Fish passage effectiveness between 1997 and 2014 at Holtwood and Safe Harbor has averaged about 29% and 69% and varied annually from 0% to 63% and 38% to 98%, respectively. Since 2000, effectiveness of the York Haven fishway has averaged 9% and has varied from 0% to 22%.

Maryland closed the shad fishery in 1980. Since then, the MD DNR has monitored adult shad in the upper Chesapeake Bay. Besides providing an estimate of the relative abundance of the adult spawning population, this effort also provides length, age, sex and spawning history data. While the number of shad returning has declined to levels not seen since the mid-1990s, the proportion of repeat spawners has been increasing.

Hatchery culture by the PF&BC has resulted in the rearing and stocking of millions of shad fry into the River. Adult shad collected during their spawning migrations in other East Coast Rivers are stripped of their eggs, which are fertilized. After 7 to 21 days of culture, fry are released to the River. Although egg shipments and the number of viable eggs delivered to the Van Dyke hatchery have been reduced, they have been able to release an average of about four million fry annually since 2010. While a slight increase has been observed in the number of juvenile shad collected downstream of Conowingo Dam, in River collection of juvenile shad has declined markedly since 2006.

Tetracycline marking, refined by the PF&BC, is used to evaluate the hatchery stocking program. Evaluation of otoliths from sub-samples of juveniles and returning adults is used to demonstrate the success of restoration activities including hatchery operations, trap and transfer programs and volitional passage. Initially, hatchery marked fish contributed up to 90% of the spawners that return to the River. However, unmarked naturally reproducing shad now dominate the spring run.

Recent relicensing activities have been made or are expected to be finalized in the near future are anticipated to improve upstream (75% to 85%) and downstream (80% for adults and 95% for juveniles) passage of shad at each project. There are several potential long term concerns that could affect shad restoration in the River. Concerns include: the decline of East Coast shad runs which limit egg and brood stock availability, water quality issues (D.O., nutrient loading, siltation, etc.), introduction and expansion of invasive species, and global warming which has been forecast by climatologists to affect ocean currents along the East Coast and to increase H20 temperatures by as much as 5°C in the Bay and River.

17* LIFE Shad Severn project : conservation and restoration of the twaite shad (*Alosa fallax*) on the Severn estuary

Charles CRUNDWELL (Environment Agency, United-Kingdom)

The presentation is an overview of the stages that the partnership has undertaken to prepare a Life bid.

Under Article 17 of the Habitats Directive, the UK Atlantic bio-region conservation status for A. fallax is "unfavourable inadequate - improving". This is because both range and population have been assessed as inadequate due to barriers to migration.

The only breeding population of A. fallax in the UK is found in just one location, the Severn Estuary and the rivers that flow into it (rivers Severn, Wye, Usk and Tywi). This is the most northerly breeding population of this species in Europe.

Historically the shad population was larger enough to support a locally important fishery prior to the mid-19th Century. Within three years of the river becoming navigable the fishery had ceased and the shad population had lost 253km of their previous range.

The objective of the project is to restore connectivity to this lost range and secure favourable conservation status in the Severn Estuary designation while reconnecting communities with the species lost 7 generations ago.

The project will increase the available habitat to spawning A. fallax in the UK by 195% from 265km (2013 length, Article 17) to 518km.

The presentation outlines the solution at each of the seven barriers, the monitoring, community engagement and legacy of the project.

18* The status of shads in Portugal

Pedro RAPOSO DE ALMEIDA (University of Evora, Portugal)

In Portugal, allis shad (Alosa alosa) is classified as Endangered, and twaite shad (A. Fallax) as Vulnerable. After the collapse of the Gironde allis shad population at the beginning of the 2000s, the Minho river population seems to be one of the largest populations in the southern part of the species' distribution, having important commercial and heritage values in this river. Historically the catch was about 300t but declined dramatically (about 90%) after the construction of the first dams in the 1950s. In the last 20 years mean annual catches reached about four tonnes in the River Minho, the river where the total catch mainly comes from. Recently, catches from coastal areas have also became important, especially from the central region of the country, increasing this number to an average of 30 tonnes per year in the last 20 years (10-70 tonnes).

The monitoring of a vertical slot pool-type fish passage at River Mondego, together with independent observations of fishery landings, allowed us to better understand the critical situation of Alosa species in Portugal. In the period 2013-2015 the number of Alosa sp. that passed in the fishway declined dramatically from 7503 individuals (2013) to 3427 and then to 966 in 2014 and 2015, respectively.

Several conservation measures are being implemented in Portugal to protect these imperilled species, namely the construction of six fish passages in River Mondego, which increased the available habitat in 250% in this river basin.

At the same time, efforts are made to change fishing regulations aiming at the sustainability of shads fisheries in Portugal).

19* The Twaite shad in Europe : situation and conservation issues

Miran APRAHAMIAN (ex Environment Agency, United-Kingdom)

Alosa fallax has been reported from as far North as Iceland to Morocco in the south and as far east as Scandinavia and the Baltic Sea, today populations exist in the Elbe, UK & Southern Ireland along the Atlantic coasts of France and Portugal and as far south as the Sebou in Morocco. The majority of the populations are anadromous, with landlocked populations existing in Ireland and Italy. To date, 17 separate genetic groups have been identified; nine along the Atlantic coast, four in the Mediterranean and four of which are landlocked.

The twaite shad is listed in EU Habitat Directive and under Article 11 of the Habitats Directive Member States are required to monitor their status, currently the majority of sites are in "unfavourable" condition. Though, there are encouraging signs in the Baltic where populations have started to improve. This is associated with 1) a reduction in phosphates, nitrates and BOD in the River Nemunas and Curonian Lagoon, 2) the deepening of the Klaipeda Strait improving access to the Nemunas and 3) the ban on catching and landing twaite shad.

In most countries now the species is regarded as either vulnerable or has become extinct - and the main reasons for this have been pollution and / or the creation of barriers. Barriers have not only contributed to loss of habitat but in a number of rivers are thought to have resulted in a reduction in genetic diversity as a result of hybridization with Alosa alosa. To conserve and enhance the twaite shad, priority needs to be given to restoring access; other options include sanctuary areas, reduction in fishing mortality and stocking / translocation. Also needed is further research into 1) ecology of the juvenile stage in fresh water, 2) the degree of homing, 3) the marine phase, 4) population dynamics and 5) fish pass requirements. There is also a need to develop methodologies and collect data to calculate management targets and limits and assess the possibility of using these species in metrics of habitat continuity or quality and integrating them into the Water Framework assessment of Good Ecological Status.

Ending

***Hervé BLUHM**, Director Inter-regional of the ONEMA*

This symposium has shown that the first returns of LIFE Shad projects are very convincing, but they show that much remains to be done. A new LIFE project will be implemented from 2016 and new shares will be specifically devoted to the restoration of the Garonne-Dordogne population.

These meetings also share new essential knowledge for the management of shads in Europe and worldwide. It emerged during this two days that the situation of shads in the world is far from satisfactory. Like all other migratory fishes, shads are facing many problems. The migration barriers and the quality of continental habitats seem to be the main limiting factors, but we also saw that the marine compartment is still poorly understood.

This symposium identified the main strategic guidelines for the restoration and management of shads. Operational levers exist. The population status requires us to act very quickly, especially in terms of migration barriers, quality of habitats, including sediment problems, and also in terms of quality and quantity of water. Concerning the survival at sea, it must be investigated.

On the Dordogne basin, that welcomes us today, the stakes are already well identified. They particularly concern the estuary turbidity maximum, the three Bergerac and the quality of spawning grounds.

For the ONEMA, it appears essential to continue the exchanges involved in these meetings, both at national, European and international level to share experiences in order to act and to manage quickly and better the migratory fishes populations.

***Benoît WIBAUX**, Deputy assistant in Agence de l'Eau Adour-Garonne*

The Agence de l'Eau supports and devotes significant resources for migratory management plans for many years. As the majority of partners in the management of aquatic environments, it is convinced that this policy is bearing results and may have beneficial effects beyond the single migratory species.

This conference has brought many things. It has allowed to compare the situation of shad in different countries. In most cases, shad does not present a satisfactory conservation status, and each time, we find the same factors that led to these situations, namely overfishing, degradation of habitat quality (turbidity maximum in estuaries, sediment at the spawning grounds) and barriers to migration.

On the Dordogne where we are today, some of these subjects are sources of concern for a long time, but the solutions are not obvious to formulate or to implement. Regarding such migration at the Bergerac dams, we need to dial with the needs and abilities of migratory species and the needs and constraints of the French state and the operator.

However, to obtain satisfactory results, it is now necessary to show much more ambition on certain issues. But to implement the solutions approached requires that political choices are made. It might be interesting to appeal to philosophers, political science experts and sociologists in order to facilitate exchanges between scientists, policy makers and managers. The ranking of the Dordogne River Basin as a world biosphere reserve is a strong political signal that should encourage us to pursue this path.

***Detlev INGENDAHL**, Ministry of the environment of North Rhine Westphalia.*

LIFE and LIFE+ Shad projects are a success from a technical point of view but also in terms of dynamics between the different actors and between France and the Germany. We must continue in this direction. That's why a new project, the LIFE 3, is being prepared on the same logic, but going further. Some actions developed for the Rhine will be implemented on the Garonne and Dordogne and vice versa.

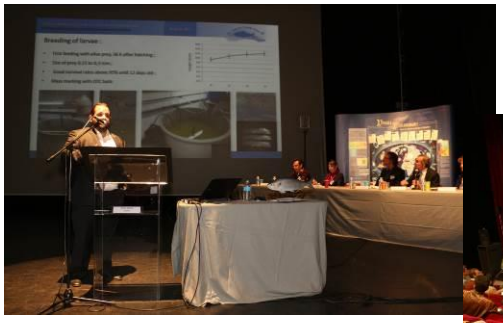
Beyond cooperation Rhine / Garonne-Dordogne, the rich feedback of experience in other European and American watersheds should greatly encourage us to develop cooperation and regular exchanges with foreign countries.

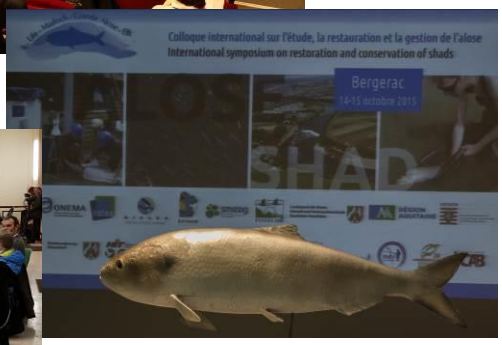
***Frédéric DELMARES**, Vice-President of the Conseil Départemental de la Dordogne, Vice-President of the Communauté d'Agglomération de Bergerac, Administrator of EPIDOR and representing Germinal PEIRO, President of EPIDOR.*

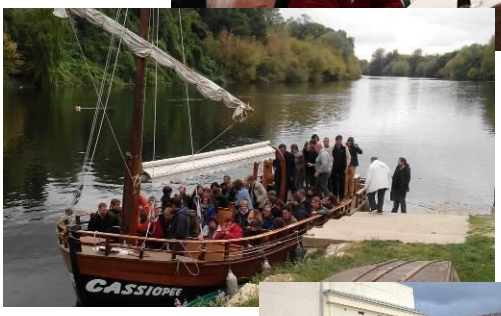
Public policies have considered migratory fishes for many years. Salmon was a locomotive because it is symbolic and its populations were more distressed than other species. Shad, for a long time abundant, collapsed suddenly. The first measure was to stop fishing but it did not solve the other problems and after 7 years of moratorium, the stock was not replenished. It is now necessary to work on the topics discussed at the symposium, such as improved fish passage and restoration of spawning grounds.

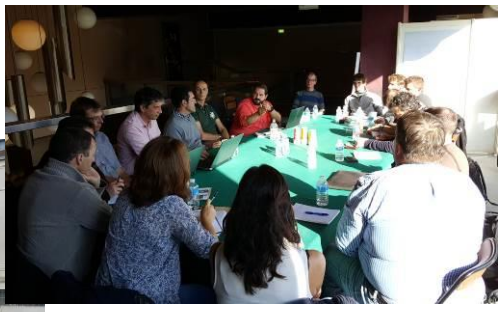
The shock experienced with the collapse of the shad should alert us to possible future changes, particularly in relation to

climate change. To prepare ourselves, we need that biologists identify the good management solutions. Then, the politicians must apply them. But the pressures and constraints are many. Good solutions will not be easy to find, and they will not be simple to implement. Most partners, including politicians, are already aware of these aspects and convinced of their importance. But in these times of financial restraint, it is often difficult to uphold the interests of the environment and investments whose profitability is long-term. Scientists have a great responsibility in mobilizing citizens and elected officials. May this seminar contribute to this mobilization, but it will also and especially depends on the actions of each of us.









Conclusions of the symposium

At the end of this shad international conference, the participating scientists met in order to take stock of the lessons learned during the two days of exchange, on the studies perspectives, and most of all on the actions that need to be undertaken as part of the restoration and the management of the different shad populations.

Population status and problems encountered

In Europe and on the North American east coast, the shad populations have greatly decreased over the past few decades, and have today reached a worrisome conservation status.

Exchanges between scientists and managers from six countries showed that the shads populations were confronted by several problems, which are often the same, although not necessarily having the same relative importance across the different watersheds:

- The overexploitation of the populations and/or mortalities through by-catch at sea and/or in rivers;

- Water quality and quantity, noticeably causing estuary mud plugs;

- A presence of obstacles to migration, which, even equipped with fishways, do not allow a sufficient fraction of the population to reach the best spawning grounds;

- Habitat quality degradation, noticeably of the spawning grounds, with a deficit of sediment favorable grain size (gravels and pebbles) caused by passed extractions of materials in the river bed and/or by obstacles to the sediment transit.

Improvements in knowledge

This conference also allowed the participants to ascertain that progress has been made with regard to knowledge, noticeably on migratory behavior (homing, behavior at the base of obstacles), on the specie requirements in term of water quality (temperature, oxygen), and even in regards to population genetics.

However, it turns out that several domains show a lack of data. In order to better adapt management practices, it seems important to improve the knowledge available on a few points:
- The evaluation and the monitoring of existing fish stocks, which at the present time is often made by professional fisheries whose indicators lack precision and reliability;
- The ecology of certain stages, noticeably the larva development in their natural habitat and food requirements;
- The capacity of the environment to host these species, and noticeably the food availability in the first-feeding larva habitats;
- The effects of plankton consuming invasive species, with questions remaining regarding the Corbicula (*Corbicula sp*) in Europe or the zebra Mussel (*Dreissena polymorpha*) in The United-States;
- The shad marine phase, noticeably regarding mortality factors and survival rates;
- The part of mortality linked to fisheries, noticeably in the case where the shads are not the targeted specie but are victims of accidental captures that are rarely declared or reported;
- The freshwater predation, noticeably since the development of the Wels catfish in Western Europe; and
- The efficacy of fishways, that can be very variable depending on the type of system as well as the specific site configurations in which there are used.

Several of those themes are already the object of reflection and experimentation. For example, on the Garonne-Dordogne, experimental releases of larva tagged at the spawning site is currently in the preparation stage. This should allow to determine whether or not a problem exists during the larva's first days of life in their natural habitat.

However, it has been underlined that, in view of the current situation of the shad populations, this lack of data should not be a reason to postpone the implementation of management practices whose efficacy is proven, or even highly probable.

Actions to implement

Actions susceptible to contributing to the restoration and the preservation of shads populations can be implemented without delay, noticeably in the following areas:

- Overexploitation problems in the context of legal fisheries targeting shads can be solved by the implementation of restrictions (quotas, reduction of the duration of fishing seasons, creation of fish preserves). However, in the case of professional fisheries, one has to take into account the social and economic impact of such restrictions, especially if the fishery is highly dependent on the shad. If it is possible, it is desirable to not completely shut down operations. In all cases, in order to adapt measures concerning the operating of

fisheries, it is indispensable to obtain a minimum of information on the status of the fish stock and of the harvest.

- The problems of the mortality caused by illegal operations can be solved by tightening controls.

- The problems of the mortality caused by by-catch can be solved through an evolution of the regulations of the targeted species fishing modes and/or periods.

- The problems linked to mud plugs can be solved in the short term by limited actions on the estuaries. On the Thames, aerators placed aboard boats have been tested. This project results should be monitored. Another possible measure, in the case of watersheds with large reservoirs which alter hydrological regimes, could be adapting flow management during sensitive periods. On the Dordogne, discussions are being held with the operator of a large chain of hydroelectric dams. The objective concerns the Atlantic Salmon and would consist of a flow increase in June or July to reduce estuarine anoxia right before low flow in order to allow for a maximum of spawners to go upriver before this critical period. Regarding the shad, the period that can be a matter of the greatest concern is the end of low flow (September) when juveniles swim down to the ocean. In all cases, a reflection on the management of sediments feeding the mud plug at the scale of each watershed is desirable. Soil erosion decrease and the restoration of riparian habitat and of water-dependent areas that have the capacity to trap sediments are large scale measures demanding very large resources and the mobilization of many actors, but whose benefits, by large, go beyond the mere diadromous fish.

- The lack of sediment with a favorable grain size (gravels and pebbles) at the spawning grounds can hardly be solved by the management of the structures that block sedimentary transit. As a matter of fact, dam flushing expels mostly fine grained sediments (sand and slit) and not the bigger ones that settle on the upstream part of the structures. At present, the only conceivable solution is to import granulates into the waterway at the spawning grounds. Such an effort has been implemented, noticeably on the Rhine, and a feasibility study of granulate import at the Dordogne shads spawning grounds has been made in 2015. These first actions and reflections show that these measures ask for a great quantity of materials, and therefore are costly and challenging because of the granulate supply difficulty. On the Rhine, gravel quarries located by the river have been used and materials were transported by conveyor belts. In other contexts, it will be even more complicated. When taking into account the difficulty and the cost, this type of input has to present some kind of perenniality. Some stability objective has to be achieved, like designing it to accommodate a 5-year flood event. It is possible to stabilize those granulates by the addition of big blocks. In the context of those projects, hydraulics models have to be used. Artificial substrates have been set in place for the salmon in North-America. But this measure does not seem to be adapted to the shad who lay their eggs on the substrate and not directly in it. Even though, with the help of hydraulics models, the zone where the eggs would be laid is predictable, the spawning grounds remain large in size and this solution would not be any cheaper than importing natural materials.

- The improvements of shads free circulation is a measure that has proven its efficacy. In the context of upstream migration, the only way to completely solve the problem is through the leveling of the obstacles. However, the obstacles shads are confronted with are often very large hydroelectric structures whose presence is generally not challenged. The construction of fishways is therefore the only possible solution. The design adapted to the specie generally consists of large passes, with important attraction flows, some laminar flows, and moderate falls with surface jets. However, each structure comes with its own characteristics and the improvement of fish passing facilities is often quite difficult and can only be achieved progressively by trial and error.
Beyond the mere configuration of the passes, the structures hydraulics management has often a significant effect on the passage rates. Feedbacks are plenty, such as at Lowel dam on the Merrimack river.
Downstream migration has not been much considered in Europe. Very few data are available on the vulnerability of juvenile shads to hydroelectric structures during their downriver journey. On the other hand, in the United States, were the shads can spawn several times, the downstream migration of the spawners is facilitated by specific passes.

- Repopulation is a tool that has to be considered. In the majority of contexts, the collapse of the shads population is quite recent. It is very unlikely that the environment has degraded in a short time. Juveniles hatched in captivity and released in their natural habitat should be able to survive and reinforce natural populations. Results of repopulation efforts along the Rhine initiated by Life Shad are very promising.

- Trapping and transport consists of capturing shads, often at the fish pass of the first downstream obstacle of an axis, and then releasing them upstream, in the zones considered as prime spawning grounds. This solution is technically interesting and has proven successful in the United-States, noticeably on the Susquehanna. However is it a politically dangerous one, for it does not motivate actors to work on the real, underlying problems and on the perennial solutions.

Summary of presentations

To each presentation are associated :

- the symbol ⬇ which allows to download the presentations in PDF (available on lifealose2015.com),
- the number and the title of the presentation,
- the authors of the presentation,
- the references directly associated.

⬇ 1 Shads in the world – State of the Allis shad and conservation issues
Miran APRAHAMIAN (ex Environment Agency, United-Kingdom)

⬇ 2 General presentation of the LIFE+ project
Andreas SCHARBERT (Rhenish Fisheries Federation, Germany)

⬇ 3 Larvae production on the Garonne–Dordogne basin and releasing in the Rhine
David CLAVE (MIGADO, France), Michel DARAGON (Elément5), Ghislaine AVINENT (FDAPPMA 47)

⬇ 4 Survey in the Rhine watershed
Andreas SCHARBERT (Rhenish Fisheries Federation, Germany)

⬇ 5 Ex situ stock in Aquarium La Rochelle – Rearing and sexual maturation results
P. JATTEAU, S. DUFOUR, P. MORINIERE, S. BALOCHE, F. GONNET (IRSTEA and MNHN, France)

📖 Jatteau, Dufour, Morinière, Baloche, Gonnet, 2014, Life+ Alosa alosa Irstea report 3 Actions C1 – D7 July 2013 – June 2014, IRSTEA report n°169, 25p.

⬇ 6 Young of the year survey on Garonne and Dordogne
Aline CHAUMEL (SMEAG, France)

📖 SMEAG, 2015, Summary of the study of young shad in the lower reaches of the rivers Garonne and Dordogne, SMEAG LIFE+ Shad action E4 report, 39p.

⬇ 7 Behavior of shad migrating upstream at Golfech, Bergerac and Tuilières dams on the Garonne and Dordogne
Pascal VERDEYROUX, Olivier GUERRI (EPIDOR, France)

📖 Verdeyroux, Guerri, Chanseau, Cazeaux, Fauvel, Bogun, Desmoulin, Tarrene, Nicole, Dubois, Raynal, 2015, Study by radiotelemetry of the migration of the Allis shad (*Alosa alosa*) at Bergerac and Tuilières on the Dordogne and at Golfech on the Garonne from 2011 to 2014, EPIDOR LIFE+ Shad action A2 report, 46p.

⬇ 8 State of the knowledge on fishways for American shad (*Alosa sapidissima*) in the USA
François GROUX and Jean THERRIEN (WSP, Canada), Matthieu CHANSEAU and Dominique COURRET (ONEMA, France) and Stéphane TETARD (EDF, France)

📖 Groux, Therrien, Chanseau, Courret, Tétard, 2016, Updating of the knowledge on upstream fishways for shad, WSP – ONEMA – EDF report, to be published.

9 Migration barriers : the french approach and the case of the Dordogne river
Dominique COURRET (Pôle Ecohydraulique of the ONEMA, France) and Matthieu CHANSEAU (ONEMA, France)

10 Migration of the Allis shad in estuary and impact of the Estuarine Turbidity Maximum. Acoustic telemetry in the Loire estuary during 2011 and 2012
Stéphane TETARD (MNHN and EDF, France), Eric FEUNTEUN (MNHN), Elise BULTEL (MNHN), Romain GADAIS (MNHN and INRA), Marie-Laure BEGOUT (IFREMER), Thomas TRANCART (MNHN) and Emilien LASNE (MNHN, INRA)

📖 Têtard, Feunteun, Bultel, Gadais, Bégout, Trancart, Lasne, 2016, Poor oxic conditions in a large estuary reduce connectivity from marine to freshwater habitats of a diadromous fish, Estuarine Coastal and Shelf Science n°169.

11 Features and functionality of spawning habitats
Isabelle CAUT (MIGADO, France), Matthieu CHANSEAU (ONEMA, France) and Dominique COURRET (Pôle Ecohydraulique of the ONEMA, France)

12 Oxygen and temperature effects on development of eggs, larvae and youngs of shad
Philippe JATTEAU and Patrick LAMBERT (IRSTEA, France)

13 Dispersal capacities of Allis Shad (*Alosa alosa*) : insights of innovative otolith microchemistry analysis
Françoise DAVERAT (IRSTEA, France)

📖 Martin, Rougemont, Drouineau, Launey, Jatteau, Bareille, Berail, Pécheyran, Feunteun, Roques, Clavé, Nachon, Antunes, Mota, Réveillac, Daverat, 2015, Dispersal capacities of anadromous Allis shad population inferred from a coupled genetic and otolith approach, Can. J. Fish. Aquat. Sci. 72, 13p.

14 Genetics tools : state of the science and prospect
Stephen SABATINO, Paulo ALEXANDRINO (University of Porto, Portugal)

📖 Sabatino, Alexandrino, 2012, Genetic diversity and population structure of the Eurasian shads Alosa alosa and A. fallax, CIBIO and AARC A4 report, 19p.

15 Large and small fishes of the Dordogne River - Historical approach of their fishing and consumption
Yan LABORIE (City of Bergerac, France)

16 The restoration plan of the American shad of the Susquehanna river : assessment and prospect
Chris FRESE (Kleinschmidt Group, USA)

17 LIFE Shad Severn project : conservation and restoration of Alosa fallax on the Severn estuary
Charles CRUNDWELL (Environment Agency, United-Kingdom)

18 The status of shads in Portugal
Pedro RAPOSO DE ALMEIDA (1,2), Bernardo RUIVO QUINTELLA (2,3), Catarina SOFIA MATEUS (2)
[(1) Departamento de Biologia, Escola de Ciências e Tecnologia, Universidade de Évora, Portugal, (2) MARE - Centro de Ciências do Mar e do Ambiente, Universidade de Évora, Portugal, (3) Departamento de Biologia Animal, Faculdade de Ciências, Universidade de Lisboa, Portugal].

19 The Twaite shad in Europe: situation and conservation issues
Miran APRAHAMIAN (ex Environment Agency, United-Kingdom)

Speakers and organizers

Miran APRAHAMIAN (ex Environment Agency, United-Kingdom)

Miran has recently retired as a Technical Advisor to the Environment Agency (U.K.), where he provided technical expertise on fisheries science and its application to stock management, in relation to diadromous fish (eel, salmon, sea trout, shad, lamprey and smelt). He also advised Goverment policy leads on scientific and strategy matters for these species and translated policy into cost-effective operational activity. His recent work areas included; eel to meet the requirement of the EU regulation (1100/2007), sustainable mangement of flow to support fish & fisheries, salmonid stock assessment and Water Framework Directive fisheries classification. He is a Fellow of the Institute of Fisheries management, a Chartered Environmentalist and a Council member of the Fisheries Society of the British Isles. Miran has been involved with the joint EIFAAC / ICES eel working group and has been / is a member of a number of ICES working groups.

Detlev INGENDAHL (Ministry of the environment of North Rhine Westphalia, Germany)

Dr. Detlev INGENDAHL is biology graduate of the University of Cologne. From 1992 to 1994, he participated in studies of the downstream migration of Atlantic salmon at the hydroelectric power stations on the Gave D'Oloron. In 1999 he completed a doctoral thesis on the factors limiting the success of natural reproduction of Atlantic salmon and sea trout in the Rhine basin. From 2003-2010, he was the program manager for the reintroduction of migratory fish in North Rhine-Westphalia. Since 2010, Dr. Detlev Ingendahl is employed by the Ministry of Environment of the North Rhine-Westphalia in charge of setting up the monitoring and measurement of the Framework Directive on water.

Contact : detlev.ingendahl@mkulnv.nrw.de

David CLAVE (Migrateurs Garonne Dordogne, France)

David CLAVE has followed a Master in Aquatic Ecosystem Dynamics (DYNEA) at the University of Pau and Pays de l'Adour. He is now a hydrobiologist engineer for the Migratory fish of Garonne and Dordogne association (MIGADO). He is responsible for operations on the Atlantic salmon restoration plan in the Dordogne and actions in connection with the LIFE + Shad Rhine-Gironde project.

Contact : clave.migado@orange.fr

Andreas SCHARBERT (Rhenish Fisheries Federation, Germany)

Andreas SCHARBERT followed studied in biology and geography in Düsseldorf and Cologne. He achieved a doctorate in fish communities of the Rhine basin. Since 2000 he is an expert in fish and ecology consultant concerning monitoring of migratory fish. Since 2010 he is Director of the LIFE program (LIFE06 NAT / D / 000005) and LIFE + (LIFE09 / NAT / DE / 000008) on the Allis shad.

Contact : scharbert@rhfv.de

Philippe JATTEAU (Institute for Research in Science and Technology for Environment and Agriculture, France)

Philippe JATTEAU is research engineer in the Research Unit Aquatic Ecosystems and Global Changes of IRSTEA. His research are focused on ecology of young stages migratory fish (shad and sturgeon), with studies in natural fields and experimental structures, set up of engineering ecology techniques (allis shad artificial reproduction – mass marking), experimental facilities.

Contact : philippe.jatteau@irstea.fr

Aline CHAUMEL (Syndicat Mixte pour l'Etude et l'Aménagement de la Garonne, France)

Aline CHAUMEL is project manager within the SMEAG (Syndicat Mixte d'Etudes et d'Aménagement de la Garonne), a public structure that aims to promote the balanced management of water resources and aquatic environments, flood prevention and management and preservation of natural environments and wetlands. She is particularly in charge of thematic related to migratory fishes, both as a remarkable biodiversity and indicators of river quality, and also water quality, impacting water uses, human health and migratory fishes.

Contact : aline.chaumel@smeag.fr

Olivier GUERRI (Public Establishment of the Dordogne Basin, France)

Olivier GUERRI, scientific and technical coordinator at EPIDOR public body. Agronomist engineer with a specialization on aquatic environment qualified from Toulouse and Rennes National Superior School of Agronomy. Since 1995, he has been working on sturgeon, salmon and other Dordogne migratory fish recovery plans, as part of the Dordogne's UNESCO Biosphere Reserve project.

Contact : o.guerri@eptb-dordogne.fr

Pascal VERDEYROUX (Public Establishment of the Dordogne Basin, France)

Pascal VERDEYROUX is a biologist specialized in continental aquatic environments and fish, including migratory. He first worked at the ONEMA on the theme of ecological continuity. He is currently project manager for EPIDOR and works especially on local issues of continuity and management of migratory populations, monitoring the downstream migration of eels (Site Index Dronne) and the study of the impact of catfish on the Dordogne. For the LIFE + Shad project, he participated in the study of the behavior of shad during the upstream migration at the obstacles with radiotelemetry.

Contact : p.verdeyroux@eptb-dordogne.fr

François GROUX (WSP, Canada)

François GROUX is an hydraulic engineer specialized in fluvial and environmental hydraulics. After several years of working in France with SOGREAH (presently ARTELIA), he emigrated to Canada in 2012 and work for WSP (formerly GENIVAR) since. François is presently the hydraulics and water resources engineering team leader in Québec. He has developed a solid expertise for design and construction of various river works, especially for projects involving the construction/rehabilitation of dam, fish passes (close-to-nature types and fish ladders) and the restoration of aquatic habitats.

Contact : francois.groux@wspgroup.com

Jean THERRIEN (WSP, Canada)

Jean THERRIEN is a senior biologist with more than 30 years of experience, most of them with WSP and its predecessor GENIVAR. Aquatic biology is his main field of interest, with a speciality in fish migration and ecotoxicology (mostly mercury) in relation with hydroelectric projects (19 overall). He has participated in various Environmental Impact Assessments (EIA), monitoring of fish populations or mercury in fish, development of migration devices, as well as the evaluation of fish mortality and entrainment in turbines.

Contact : jean.therrien@wspgroup.com

Matthieu CHANSEAU (National Office for Water and Aquatic Environments, France)

Matthieu CHANSEAU is a doctor in biology, expert at the Ministry, responsible for thematic ecological continuity, migratory programs and networks within the delegation interregional Southwest of the ONEMA. He worked for many years on the impact of barriers erected on the rivers, fish behavior and plans of management and restoration of migratory fish.

Contact : matthieu.chanseau@onema.fr

Dominique COURRET (National Office for Water and Aquatic Environments, France)

The ONEMA Pôle Ecohydraulique team aim to develop technological solutions to restore fish migration (upstream and downstream movement) at the obstacles on the river and to mitigate the impacts of hydrology perturbations (bypass reach, hydropeaking). My activities are (1) to realize or monitor studies and research to produce methods, criteria and operational tools, (2) to realize technical support and expertise for the territorial services of ONEMA and the administration and (3) to provide training.

Contact : dominique.courret@imft.fr

Stéphane TETARD (Electricité de France)

Stéphane Tétard is a fisheries biologist who earned a fisheries master's degree at Agrocampus Ouest (Rennes, France). Currently he has a research position at EDF Research and Development lab (Chatou, France), in the National Hydraulics and Environment Laboratory (LNHE). His study areas have covered ecology of amphibiotic species (Atlantic salmon, European eel, Allis shad and Sea lamprey) and fish passage performances in hydroelectric dams, with a special focus on fish behaviour using telemetry systems (RFID, acoustic 1D/2D).

Contact : stephane.tetard@edf.fr

Isabelle CAUT (Migrateurs Garonne Dordogne, France)

Isabelle CAUT followed the university training Master 2, restoration of aquatic environments Continental (REMAC) at the Faculty of Science and Technology of the University Blaise Pascal in Clermont-Ferrand. She is now hydrobiologist engineer for the Migratory fish of Garonne and Dordogne association (MIGADO). She is responsible for monitoring operations of natural reproduction of shad and lamprey on the Dordogne and she is in charge of educational activities to the environment in Aquitaine and Limousin.

Contact : icaut.migado@orange.fr

Françoise DAVERAT (Institute for Research in Science and Technology for Environment and Agriculture, France)

Françoise Daverat is a researcher at Irstea Bordeaux since 2001. Her main research interests lie in life history plasticity of fish (especially growth and migration patterns) and otolith science. Since several years she has focused on the investigation of diadromous fish species alternative habitat use patterns (eel, flounder, grey mullet, salmon, allis shad) and growth patterns under climate change.

Contact : francoise.daverat@irstea.fr

Stephen SABATINO (University of Porto, Portugal)

Stephen studies the genomics of ecological adaptation and life history evolution in shad. Alosa are usually anadromous, but some individuals spend their entire lives in freshwater lakes. Phenotypic convergence among landlocked populations of Alosa has likely occurred in response to similar, repeated environmental and ecological factors. In addition, life history traits including parity, age at maturity, migration distance and size vary considerably within and among anadromous Alosa species and may have evolved in response to environmental factors including temperature, salinity and levels of upwelling. Such life history variation within Alosa make it an interesting group of species in which to study the molecular basis of ecological and life history adaptation. Stephen and his colleagues are working to understand the genetic architecture of ecological adaptation in Alosa species and determine the phylogenetic scale at which convergence at adaptive loci associated with anadromous life history adaptations can be observed. They are using this information to understand the evolutionary history and population dynamics of Alosa species and help devise strategies to protect A. alosa and A. fallax.

Contact : sjsabatino@gmail.com

Yan LABORIE
(City of Bergerac, France)

Yan LABORIE is heritage conservation assistant, head of Municipal Archives of the City of Bergerac. Also archaeologist, as a researcher, he led various programmed excavations centered on the study of the material culture of Périgorde and Gascon medieval society. Author of numerous publications, he was also required to work in the collection and study of past evidence relating to the boatman past of the Dordogne River.

Contact : ylaborie@ville-bergerac.fr

Chris FRESE
(Kleinschmidt Group, USA)

Christopher R. Frese is a Senior Scientist with Kleinschmidt Associates. He received a Bachelor of Science degree in Biology from Millersville State College in 1974. Chris has been invited to present on anadromous fish restoration and upstream passage at national conferences and AFS continuing education workshops. In 2007, Chris provided the American Society of Civil Engineers (ASCE) a write-up on fish passage that was included in "Civil Works, for Hydroelectric Facilities – Guidelines for Life Extension and Upgrade" which served as EPRI's Volume 6 of their seven volume Hydropower Modernization guideline. He has managed fish passage operations at each of the four lower mainstem Susquehanna River Hydroelectric projects.

Contact : chris.frese@kleinschmidtgroup.com

Charles CRUNDWELL (Environment Agency, United-Kingdom)

Charles CRUNDWELL is employed by the Environment Agency in the UK. The EA is a non-departmental public body, established in 1996 and sponsored by the UK government's Department for Environment, Food and Rural Affairs (Defra), with responsibilities relating to the protection and enhancement of the environment in England. My job is Senior Technical Specialist for Fisheries in the National Fisheries Service. I have been involved with fisheries professionally for over 20 years, working with both salmonids and course fish management; I also sit on the National Eel Group and the National Fish Pass Advisory Panel. I have recently taken on the role as shad lead. This is a challenge new role for me but one I am keen to develop. My current involvement with shad is an EU Life partnership bid to re-establish the shad spawning passage that supports the UK's only shad designation and advice to the environmental permitting of proposed tidal lagoon in the Severn Estuary for electricity generation.

Contact : charles.crundwell@environment-agency.gov.uk

Pedro RAPOSO DE ALMEIDA
(University of Evora, Portugal)

Twenty year experience of research in biology and ecology of fishes, aquatic biotelemetry, conservation and management, fish population dynamics and ecological monitoring. He is an Assistant Professor at the Department of Biology of the University of Évora, Coordinates the MARE– UÉVORA Pole, and is the Head of the Scientific Research Board of the Mora Freshwater Aquarium. Extensive experience in project management regarding anadromous fish biology and conservation. Over 65 peer reviewed publications in scientific journals, 3 books, and 11 chapters of books. Contributed as a co-author and co-editor to the Red List of Portuguese Endangered Vertebrate Species (ICN, 2005).

Contact : pmra@uevora.pt

Colloque international sur l'étude, la restauration et la gestion de l'**alose**

International symposium on restoration and conservation of **shads**

Bergerac 14-15 octobre 2015
Dordogne - France

Life Maifisch Grande Alose Elft

www.lifealose2015.com