



LIFE Project Number
LIFE06 NAT/D//000005

FINAL REPORT
Covering the project activities from 01.01.2007 to 31.12.2010

Reporting Date
28/04/2011

LIFE PROJECT NAME
The re-introduction of Allis shad (*Alosa alosa*) in the Rhine System

Data Project

Project location	Germany
Project start date:	01/01/2007
Project end date:	31/12/2010
Total Project duration (in months)	48 months
Total budget	956.348 €
EC contribution:	478.174€
(%) of total costs	50
(%) of eligible costs	50

Data Beneficiary

Name Beneficiary	Landesamt für Natur, Umwelt und Verbraucherschutz in NRW (LANUV), Fachbereich 26 Fischereiökologie
Contact person	Mr Heiner Klinger
Postal address	Heinsberger Str. 53, D-57399 Kirchhundem-Albaum, Germany
Visit address	Heinsberger Str. 53, D-57399 Kirchhundem-Albaum, Germany
Telephone	00 49 2723779 45
Fax:	00 49 2723779 77
E-mail	heiner.klinger@lanuv.nrw.de
Project Website	www.alosa-alosa.eu

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1 Lists of (i) key-words and (ii) abbreviations

(ii)

CEMAGREF = Centre National du Machinisme Agricole du Génie Rural des Eaux et des Forêts

FD47 = Fédération départementale des associations agréées pour la pêche et la protection des milieux aquatiques du 47 (Lot et Garonne)

LANUV = Landesamt für Natur, Umwelt und Verbraucherschutz in NRW, Fachbereich 26 Fischereiökologie

MIGADO = Association pour la restauration et la gestion des poissons Migrateurs du bassin de la Garonne et de la Dordogne

NRW = North Rhine Westphalia

SW = Stiftung Wasserlauf, Project management

YOY = young of the year (fish at their first year of life)

2 Executive Summary

- Project objectives

The overall objective of the project is the conservation and protection of Allis shad in Europe. The distribution range of the species has decreased dramatically and as a consequence Allis shad is listed as priority species in Annex II and V of the Habitats Directive. In this European project with financial and practical support of three Rhine bordering countries (Netherlands, Germany, France) the project objective is the re-introduction of Allis shad in the Rhine System. One of the main results of the project will be the development of mass production techniques for Allis shad breeding, the transfer in praxis and the breeding of up to 5 Million Allis shad larvae in the years 2008-2010.

The beneficiary of the project is the Landesamt für Natur, Umwelt und Verbraucherschutz in NRW (LANUV), Fachbereich 26 Fischereiökologie. The project partners are CEMAGREF and MIAGDO in France and co-financing is coming from the Hit Umwelt- und Naturschutz Stiftungs- GmbH, Bezirksregierung Düsseldorf, Rheinfischereigenossenschaft NRW, Hessisches Ministerium für Umwelt, ländlichen Raum und Verbraucherschutz and the Sportvisserij Nederland.

- List of key deliverables and outputs

- The detail management plan was finished, which gives a summary of the most current projects achievements with regard to shad rearing, marking, stocking and monitoring and demonstrates how the project measures need to be continued, measured and how the progress must be assessed.
- The knowledge on shad rearing gained by the project partner CEMAGREF during feasibility studies was transferred to the project partner MIGADO and a sub-contracted fish farmer and finally led to the development and installation of the first European fish farm for Allis shad mass production which went into operation in April 2008.
- Laboratory experiments on the influence of artificial waves on shad egg and larval developments revealed that stranding rates of shad larvae suddenly exposed to wave washes (as possibly occurring in conjunction with shipping traffic on the Rhine) were after all low. Larvae developed responses towards the waves and avoided habitats exposed to waves and currents with some delay. Stranding rates decreased during the experiments and the results were implemented for optimization of the stocking operations.
- The mapping of spawning habitats in the Rhine system revealed that a wealth of potential spawning sites is available, which have similar conditions like active shad spawning grounds in French and American shad rivers. These were identified with the help of experts from the respective countries. Potential spawning sites of t Allis shad like inner bend banks, secondary channels and gravel islands are situated mainly in the Rhine itself, but also in the lower stretches of some tributaries.
- The mapping of optimum stocking site selection was done on basis of the wave experiments and results of the stocking observations. In order to provide the larvae with the best possible conditions to grow and to survive, habitats in secondary channels, tributaries and connected floodplain waters without shipping influence, low predator densities and increased planctonic production are preferred upon habitats situated at the Rhine's main channel.
- Less adult shads than planned (118, 281, 255 in 2008, 2009 and 2010, instead of 300-600 per year, respectively) could be taken from the Garonne and the Dordogne and transported to the fish farm in Bruch for shad production due to the unexpected collapse of the adult returner numbers. Consequently larval production was lower than scheduled in 2008 and 2009, however, exceeded the scheduled amount of 2 Mio produced larvae in 2010 due to substantial improvements in the production process. Egg survival rates could be increased

from 28% to 65%, post hatching survival from 50% to 96% and the numbers of viable larvae per female spawner was increased from 9,400 to 24,700 from 2008 to 2010, respectively.

- The marking of shad larvae could be improved with regard to mark quality by finding an optimum concentration of the OTC solution and an optimum duration of exposition time whilst reducing the marking related mortality to less than 2%.
- The transport of larvae was optimized and transportation mortality minimized by transporting the larvae in doubled plastic bags filled to one third with water and two thirds with pure oxygen. 5,000 to 15,000 larvae per bag were transported to Germany using vans and refrigerating the bags with ice-filled bags in between. The bags were received from the stocking teams at meeting points, reloaded and transferred to the stocking sites.
- Stocking operations were substantially optimized in the project duration. In general the bags were placed inside the stocking water for acclimatization before the larvae were released. In order to reduce predation mortality the release of larvae from the bags directly was mainly conducted in open water areas, where less potential predators, however planctonic organisms as a prey resource were abundant. In order to be able to delay stocking operation after the onset of dusk, when mortality pressure is reduced, the shad larvae (in 2010 more than 600,000) were kept in round channel tanks supplied with river water and fed with Artemia. Provided with an increased fitness they could be released without additional handling and without any apparent extra mortality. The amount of larvae was shared between stocking teams operating in Hessen and NRW to equal parts. The Erfeldener Altrhein in Hessen and the river Sieg in NRW were stocked in each year. A subset of the larvae was stocked to gravel pits connected to the Rhine from 2009 onwards.
- Investigations on stocking efficiency indicate that larvae drift downstream during night-time, however apparently disperse and niche in river habitats. No larvae could be detected in the habitats where they have been stocked in the days following the release, however even were not detectable in the drift many kilometres from the release site. Larvae actively move in to open water areas and avoid habitats situated close to the bank and the water surface.
- Records of 30 juvenile Allis shads (a sub-sample of 11 shads could be proven to come from the 2010 stocking by means of the otolith marks) by a fishermen at the lower Rhine in autumn 2010, prove that the stocked larvae grow into juveniles in the Rhine and migrate to the Sea as scheduled. With this an important threshold and indication for the project's success could be reached!
- The After-LIFE conservation plan was prepared at the end of the project. It demonstrates how the project objectives will be pursued after the projects termination. Many of the measures will be carried out under the umbrella of a subsequent LIFE+ Allis shad project
- Public relation work

The project was presented at several national and international meetings. Allis shad stocking events under the attainment of the environment ministers of NRW and Hessen, the project partners and representatives from the Aquitaine region, the con-financers and politicians were conducted in each year additionally to regular stocking. Besides from the ministers shad larvae were released from pupils as part of an Allis shad school class program. Particularly these events attracted an enormous media interest and generated many articles and reports by the mass media. A project flyer (in 4 languages) documentary DVD (in 3 languages) was produced and distributed. Information boards were produced and installed in Germany and France at exposed positions. The project manager Dr. Peter Beeck was invited by the IUCN to an Australian meeting on freshwater fish conservation to present the Life projects as a reference for European fish restoration approaches. An international conference on the restoration of fish populations with more than 100 participants from 22 nations

was arranged and the articles will be published in conference proceeding. Scientific articles on Allis shad mass marking, wave experiments and Allis shad mass production were produced.

The Layman's report was produced in 4 languages and is available to the interested public on the projects website. From the website additional products will be available after the Commission's approval.

Table 1: Comparison of the projects key deliverables and products according the proposal and how and when they were achieved

		Proposal		project achievements	
		result	date/deadline	result	date
A.1	Detailmanagementplan	1 report	01.05.2008	1 report	01.05.2005 continued
A.2	Transfer of know-how	installation of fish farm	01.05.2008	installation of fish farm	01.05.2008
		handbook shad rearing	31.12.2010	handbook shad rearing	10.12.2010
		publication	31.12.2009	publication	31.12.2009
A.3	laboratory experieces on the influene of artificial waves on egg and larval development	1 publication	31.12.2008	2 publications /1 poster presentation	31.12.2008
A.4	Mapping of spawning habitats	mapping	01.01.2008	report	01.01.2008
A.5	Mapping of stocking habitats	mapping	01.01.2008	report and implementation of results for stocking	01.01.2008
D.1	Catch, transport and rearing of adult Allis shads	300-600 year ⁻¹	2008-2010	mean 218 year ⁻¹ ; max 255 year ⁻¹	2008-2010
D.2	Allis shad production	1 Mio	2008	0.5 Mio	2008
		2 Mio	2009	1.7 Mio	2009
		2 Mio	2010	2.6 Mio	2010
		5 Mio	Total	4.8 Mio	Total
		handbook shad rearing	31.12.2010	handbook shad rearing	10.12.2010
D.3	Marking	marking of 5 Mio larvae	31.12.2010	marking of 4.8 Mio larvae (see above)	31.12.2010
		handbook shad marking	31.12.2010	handbook shad marking	16.12.2010
		publication shad marking	31.12.2009	publication shad marking	31.12.2009
D.4	Transport and stocking to the Rhine system	stocking of 5 Mio larvae	31.12.2010	stocking of 4.8 Mio larvae (see above)	31.12.2010
D.6	Examination of stocking material for parasites and infections	examination	ca 100 / year	examination	ca 100 / year
E.1	Public relation works	project webseite	01.08.2007	project webseite	01.08.2007 (regularly updated)
		project flyer (german, english, french, dutch) / 4.000 copies	01.08.2007	project flyer (german, english, french, dutch) / 4000 copies	01.08.2007
		project logo		project logo	
		project documentary (german, french, englisch) / 150 copies	01.01.2008	project documentary (german, french, englisch) / 650 copies	01.01.2008
				Allis shad Bordeaux (250 bottles)	
		installation of information boards (5)	01.05.2008	installation of information boards (6) (3 FR; 3 DE)	31.12.2010
		development of interactive computer program			
		mobile presentation system		mobile presentation system	
				public stocking events with environmental ministers	
				school class program	
E.2	Layman's report	exhibition Aquazoo		exhibition Aquazoo	
		media work		media work (> 120 reports in newspapers, tv- and radiostations; >140 reports in online media)	
		organisation of international workshop	01.12.2009	organisation of international workshop	01.10.2009
		Layman's report (in german, english, french and dutch) 500 copies	31.12.2010	Layman's report (in german, english, french and dutch) 200 copies	31.12.2010

3 Introduction

Allis shad were widely distributed in Western Europe at the end of the 19th century. The distribution ranged from Scotland in the North to Morocco in the South and in Germany they were found in all large rivers draining to the North Sea.

The fishery on Allis shad in spring was very important and freshly caught shads were sold on the market and in restaurants. In the last 100 years the distribution range of the species has decreased dramatically. Reasons for the decline included over fishing, water pollution and the construction of migration barriers. Today only a few shad are observed in the River Rhine and large populations only exist in France. As a consequence Allis shad is listed as priority species in Annex II and V of the Habitats Directive. In Germany Allis shad is listed as extinct or suffering from extinction in the Red List.

The overall objective of the project is the conservation and protection of Allis shad in Europe. In this European project with financial and practical support of three Rhine bordering countries (Netherlands, Germany, France) the project objective is the re-introduction of Allis shad in the Rhine System, which was the most important river system for Allis shad in its northern distribution range. One of the main results of the project will be the development of mass production techniques for Allis shad breeding, the transfer in praxis and the breeding of up to 5 Million Allis shad larvae in the years 2008-2010. The resulting numbers of mature Allis shad returning to the River Rhine can only be estimated because no other re-introduction projects have been conducted in Europe so far. According to experiences from the re-introduction of the closely related American shad (*Alosa sapidissima*) at the American East Coast the stocking of 5 million shad larvae can result in the return of up to 20.000 mature shads.

The first idea to restore Allis shad to the River Rhine was discussed during a meeting of the International Commission for the Protection of the River Rhine (ICPR) in the early nineties of the 20th century. At that time the possibility of a natural recovery of the species was not ruled out and the decision was to monitor the Allis shad abundance in the Rhine for another 10 years. However, at the beginning of the 21st century no significant improvement was observed and the Migratory Fish Program of North Rhine Westphalia started the first scientific exchange with French scientists of CEMAGREF on the re-introduction of the species to the River Rhine in 2002. In the years 2003-2005 a feasibility study according to the IUCN guidelines for re-introductions was conducted which included e.g. habitat, genetic, marking and breeding studies. As a result of this feasibility study the LIFE project was developed.

Allis shad was a commercially important species for the Rhine Fishery until the first half of 20th century. Hundreds of thousands shads were caught annually and sold locally. In Cologne, Germany still exists a traditional shad celebration which celebrates the catch of the first shads in the river, although the last catches of Allis shad in Cologne were more than 60 years ago. The International Commission for the Protection of the River Rhine (ICPR) with members of all Rhine bordering countries, nature conservation and sport fishery organizations support the Re-Introduction of Allis shad to the River Rhine. In addition, the development of mass production and mass marking techniques can help to support the conservation of Allis shad in Europe, if other European populations will suffer from extinction.

4 LIFE-project framework

The beneficiary of the LIFE project is the State Office for Nature, Environment and Consumer Protection in North Rhine Westphalia, Germany (Landesamt für Natur, Umwelt und Verbraucherschutz in NRW, LANUV) since April 2008. The legal status of the beneficiary has

changed twice since the submission of the proposal due to an administrative structural reform in the Ministry of Environment. The original organization of the beneficiary LÖBF (Landesanstalt für Ökologie, Bodenordnung und Forsten in NRW) was closed on 31 Dec 2006 and all NRW activities on fish ecology and the Migratory Fish Program were coordinated from the Bezirksregierung Arnsberg from 1 Jan 2007 until 31 March 2008. Since April 2008 the LANUV is coordinating the activities. The change of the legal status of the beneficiary has been approved from the European Commission on 26 Jan 2007 and 11 Nov 2008.

The LANUV is the competence centre for fish ecology and nature conservation in NRW and is a subordinated authority of the Ministry of Environment NRW. The LANUV coordinates the Migratory Fish Program of NRW with the three key species Allis shad, Salmon and Eel. The project management has been sub-contracted to the Stiftung Wasserlauf (SW) which was established to ensure the continuation of the Migratory Fish Program in the future. The French project partner CEMAGREF developed and optimized the mass production and mass marking techniques and transferred this knowledge to fish farmers. They also help with monitoring activities, public relation work and the development of the management plan. The French project partner MIGADO is, together with the LANUV, responsible for the catch and transport of spawners, supervision of the fish farmer and shad mass production, mapping of spawning and stocking habitats and the development of the management plan.

The LIFE project has established a working group “LIFE Allis shad” where all the co-financers and representatives of the Ministry of Environment NRW are informed during a meeting once a year. In addition, all members of the working group are invited to important meetings and public relation events.

The progress of the LIFE project is presented at the Scientific Board of the Migratory Fish Program in the Ministry of Environment NRW and the Working Group “Diadromous Fish” at the International Commission for the Protection of the River Rhine every year.

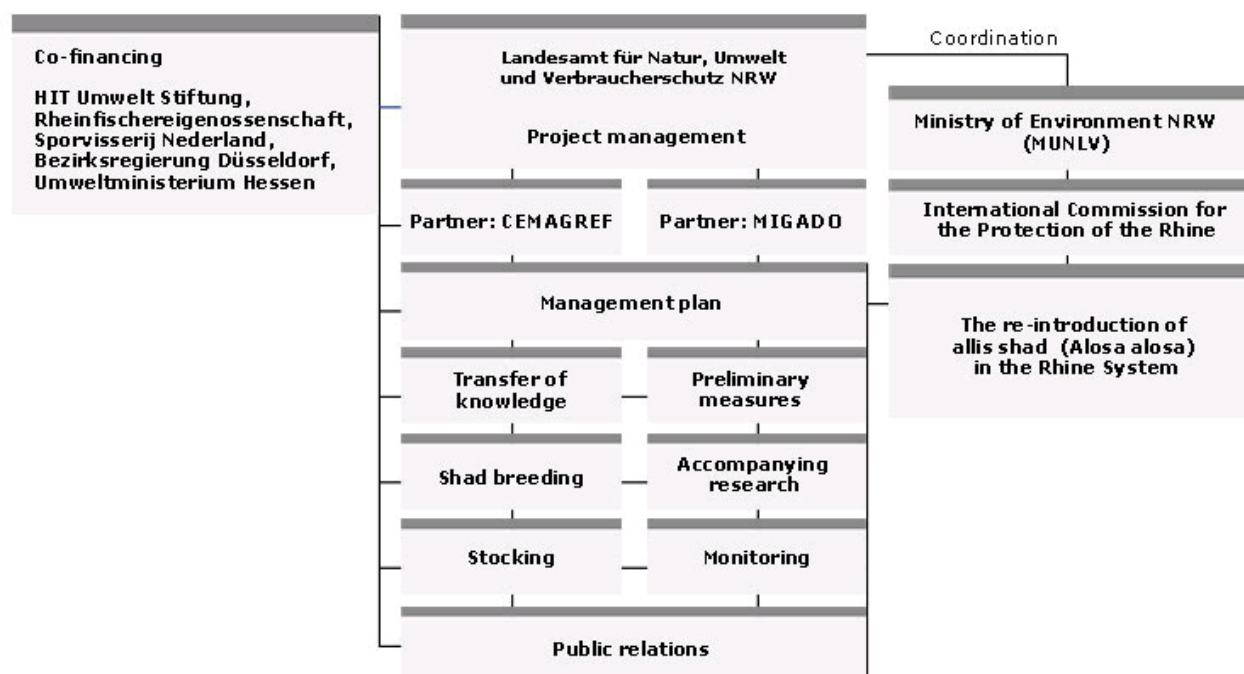


Fig. 1: Diagram of project organization and project activities

5 Technical development

5.1 A Preparatory actions/management plan preparation

5.1.1 A.1 Management plan

The management plan was completed at the end of the LIFE project. Besides the project management, Eric Rochard and Philippe Jatteau from the project partner CEMAGREF, David Clavé and Matthieu Chanseau from the project partner MIGADO, as well as representatives of the Conseil Régional d'Aquitaine, the French ministry of Environment and water agencies, and the shad expert Richard St. Pierre from the USA were involved in the preparation of the management plan. It provides an overview over the historical situation of the Allis shad and the fisheries in the Rhine, the causes for its decline, the present situation in Europe and particularly in the Gironde watersheds (donor population for stocking the Rhine), experiences with American shad reintroduction projects in the USA, the achievements of the LIFE project and the key issues for the After-LIFE-conservation plan, i.e. how the long-term objective of the project, the re-introduction of Allis shad to the Rhine system, will be pursued in the coming years. This comprises besides the maintenance of stocking 1.5 - 2 Mio shad larvae per year over a period of 15 years (from 2011-2015 as a part of a LIFE+ project, after 2015 most probably as an action embedded in the migratory fish program) as well as monitoring schemes to measure the project's success with regard to a milestones schedule until 2024 (stocking over three full life-cycles from 2009 onwards). In the timeframe from 2014 to 2024 two key items should be fulfilled, which are (a) regular proofs of juveniles reaching the Delta area / the Sea, and (b) proofs of adult returners originating from the project's stocking measures. These could be identified as originating from the stocking by means of the OTC marks in their otoliths. Regular proofs of substantial numbers of juveniles (relative to the number of stocked larvae) migrating to the Sea and at least single records of returning adults to the Rhine system, are the criteria for considering to continue the projects schemes, to alter or even to stop them when these could be attributed to particular causes and reaching these milestones is apparently are out of reach even when considerably increasing the stocking effort. The management plan is listed in Annex 9.1.

5.1.2 A.2 Transfer of Know-How

The perhaps most important achievement of the LIFE Allis shad project is the development and improvement of artificial reproduction and rearing techniques as a prerequisite for stocking young Allis shad in the Rhine watershed. No approach of breeding European Allis shad had been successful so far. The rearing techniques are close to those developed for the American Shad (*Alosa sapidissima*) which was thus subject to many successful reintroduction and protective stocking measures in the eastern United States. However, the techniques advanced by the project partner CEMAGREF differ particularly with regard to artificial spawning itself and the rearing of eggs. Further improvements were made in the other process steps and mass-marking techniques. The transfer of know-how to fish farmers, which were sub-contracted, and besides the project partner MIGADO, responsible for mass-rearing in the first Allis shad fish farm in Bruch, was given by representatives from CEMAGREF, Thierry Rouault, Patrick Chèvre and Philippe Jatteau, as well as David Clavé from MIGADO, who was already involved in the development of the techniques in the St. Seurin facility before he became employed at the MIGADO. The training was subdivided into a theoretical and a practical part which was planned to be held during the main shad migration period in late May of 2007. But because of the extreme weather conditions with very high water levels during the main migration period and a low number of migrating fish, the largest part of shad

migration was already finished in the middle of May 2007. For these reasons the practical part of the fishermen training had already taken place in the new Allis shad fish farm in Bruch between 20 May and 6 June 2008. The delay of the practical part of the training from spring 2007 to spring 2008 was not problematic because it was conducted at the beginning of the migration period in 2008 together with the experiments of CEMAGREF for the optimization of Allis shad marking techniques. The theoretical part of the training was conducted in the experimental facility in St. Seurin/Isle on 17 October 2007. With the installation of the fish farm in Bruch in 2008 the transfer of know-how was nearly completed. CEMAGREF assisted MIGADO during the rearing period 2009 and visited Bruch to improve the marking procedure. The 2010 rearing season was however conducted by MIGADO and the fish farms staff themselves. In comparison to the feasibility studies carried out in the St. Seurin facility significant improvements were made in the different stages of production and larval output was considerably increased since the Bruch facility is in operation. Due to the increased production of larvae less adult fish are henceforth required to produce the same amount of larvae.

According to the Milestones timetable a scientific publication on Allis shad rearing was finalized in 2009 by the project partner CEMAGREF and is now included in the review process of the Special Issue of the LIFE conference in the Journal of Applied Ichthyology. The manuscript is listed in Annex 9.2.



Fig.2: The transfer of know-how finally led to the installation of the LIFE Allis shad fish farm in Bruch. First row from left to right: Philippe Jatteau (Cemagref), Alain Lartigue and David Clavé (MIGADO), Peter Beeck (Project Manager) and Patrice Astre (Fishfarmer).

5.1.3 A.3 Laboratory experiments on the influence of waves on egg and larval development of Allis shad

The perhaps largest difference between the current situation of the River Rhine and that of the situation before Allis shad disappeared from the Rhine and even those of remaining active shad rivers in Western-Europe and the USA is the today heavy shipping traffic on the Rhine, which is accompanied by unnatural rapidly changing currents and an artificial wash of waves at the river banks. These influences are considered to cause harm to early developmental stages of fish due to stress, physical impairment and injury. The assessment of the possible influences of wave wash on the development of early stages and possible detriments or stranding rates was subject to experimental studies conducted in France and Germany.

Due to inconvenient weather and discharge conditions during the planned schedule in late May 2007 the conduction of experiments was postponed to start in 2008. The experiments were conducted in the new experimental system SCOLA (SCOLA: Structure expérimentale d'étude du COmportement LArvaire) in the research facility of CEMAGREF in St. Seurin/Isle, France and the wave mesocosms (Fig. 4) of the University Konstanz, Germany in May-June 2008. The SCOLA system was especially designed to investigate larval stages of fishes and allows using different currents and substrate within this flow through chamber. The central question of the experiments, which were realised in the experimental system SCOLA was, how Allis shad eggs develop under strong current velocities and a modified substrate structure. In the experimental approach, the rolling effect of eggs on fine gravel (4- 8mm), medium sized gravel (8-16mm) and coarse gravel (30-95mm), and the development of eggs on a modified substrate structure were tested. No replicates were conducted in 2008. The number and mean total lengths of hatched larvae were in the same range in all three SCOLA (hatching rate between 67 and 90%), but the highest number of larvae was found with medium sized gravel. Although it remains unknown whether the bottom substrates directly influences spawning habitat selection the results provide hints that survival rates are directly influenced by the substrate composition. Coarse and medium sized gravel are furthermore the most frequent grains found in the Rhine, thus providing additional information that substrate conditions in the Rhine are adequate for natural reproduction of shads. The experiments conducted at the University of Konstanz aimed on gathering information on the effects of wave wash on behavior and mortality of larvae by using mesocosms in which wave actions could be simulated and a bank structure similar to the Rhine was constructed with a fine mesh close to the surface, which allowed controlling whether larvae became stranded. These mesocosms were stocked with 23-28 days old shad larvae and their behavior during wave operations controlled and statistically analyzed. Behavioral adaptations and only very weak influences of the waves on shad larvae were observed, which showed a tendency to move close to the bottom, where currents were weaker. No habituation effect had been noticed and no stranding has been observed. To get a more precise view of the wave influences, the experiments were continued in 2009 however focused on the very young life stages (1-3 weeks old larvae). The work was sub-contracted to Dr. Stefan Stoll who already supervised the 2008 experiments in Konstanz. Allis shad larvae generally avoided the shallow water areas. Younger fish preferred open water areas closer to the surface, while older fish preferred the lower third of the water column. Allis shad larvae reacted to the onset of wave pulses. One and two week old larvae moved downwards concentrating in the lower third of the water column. Two and three week old larvae, which also used the bottom compartment moved away from the stony bottom substratum with the onset of waves, probably to avoid getting trapped in between stones by waves. Fish responded to the onset of waves without time lag. In contrast to the experiments of 2008 stranding of shad larvae was observed. However, stranding rates of Allis shad decreased with fish age. Stranding rates were highest directly after the release of fish and decreased throughout the experiments which lasted eight hours. Stranding rate further depended on the weather, with significantly more fish stranding when it was sunny. Finally, stranding rate increased with

decreasing water temperature. The results of this study demonstrate that survival of released larvae can be optimized by carefully choosing place and timing of release. The results of the experiments were presented with a poster at the LIFE workshop: International Workshop on the Restoration of Fish Populations and a manuscript is in progress which was submitted to a peer-reviewed journal in the first half of 2010 (see annex 9.3). The first results of the 2008 studies had been already presented at the annual conference of the Deutsche Gesellschaft für Limnologie, 22-26.9.08 in Konstanz and were published in the conference proceedings.

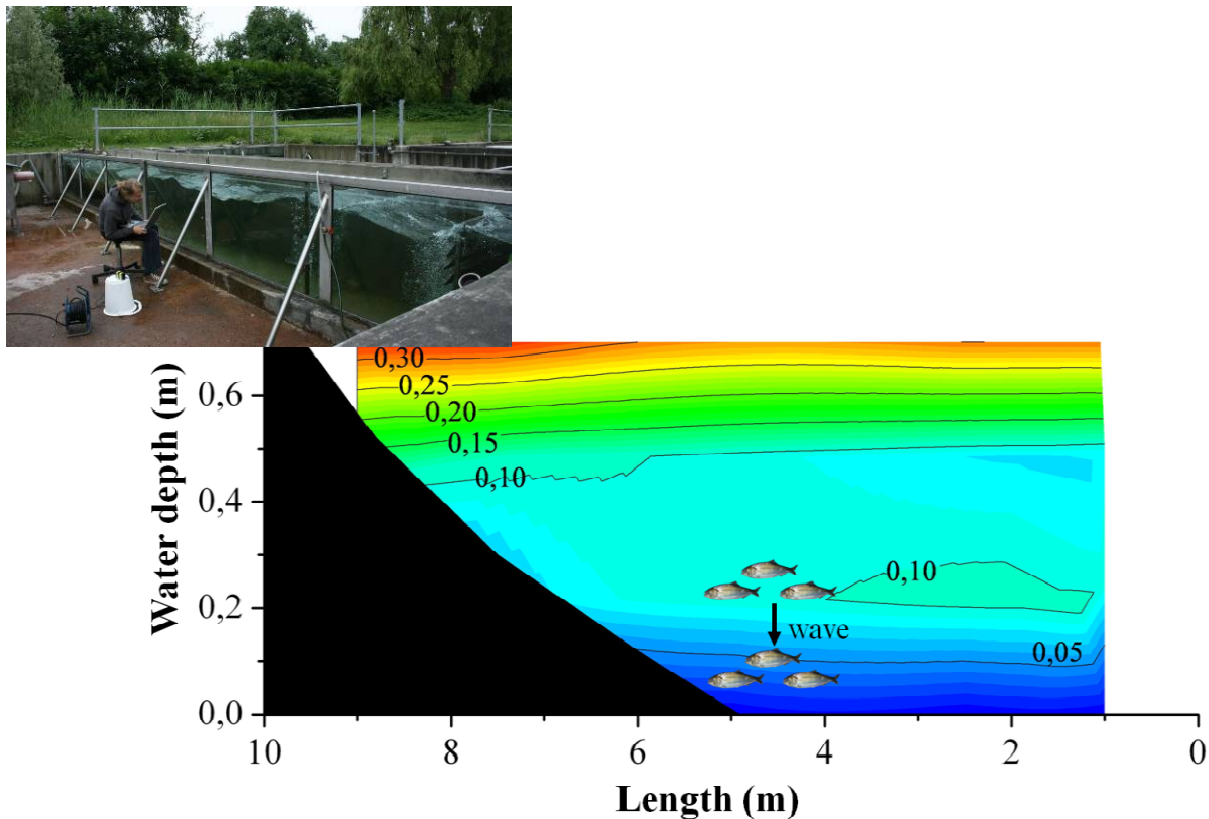


Fig. 3: Observations on Allis shad larvae in mesocosms at the University of Konstanz revealed a behavioral response of shad larvae to artificial waves in terms of actively moving to the lower compartments of the open water area.

5.1.4 A.4 Mapping of potential spawning sites

Mapping of potential spawning habitats for Allis shad in the Rhine system was realized in several steps. The first was defining the criteria from findings on the habitat conditions of active spawning sites at French shad rivers and an excursion of shad experts from France and the USA to respective sites along the Rhine and the experts judgment on their suitability, respectively. These confirmed that habitats along the inner bend banks of meanders as well as gravel banks provide identical conditions with regard to current, depth and substrate composition like active shad spawning sites, which are stretches of intermediate depth ($> 0.5 - 3$ m) and current velocity ($0.4 - 1.5$ m/s) and gravel substrate, preferably situated in the transitional zone of pools to riffle habitats. In a second step these sites were identified by means of aerial pictures and additional assessments were made in the field. A total of at least 66 potential spawning habitats were identified in the free flowing section of the Rhine below the Iffezheim dam. The most downstream potential spawning habitat is situated

at the river Wal in the Netherlands, whereas most of the potential spawning sites after the predefined criteria (embankment-free inner bend banks) are situated at the German lower Rhine section. These habitats extend from many hundred to many thousand meters length along the course. However, due to the large water-level dependent fluctuations of habitat area, which alter the current area of these slightly inclined habitats even at moderate water-level changes considerably, no further efforts were made to quantify the available area of potential spawning sites. It is however stated, that their area in the Rhine alone, is sufficiently high to maintain a self-sustaining population. Even at the lower stretches of tributaries (i.e. the Lippe, Sieg, Moselle, Main, Neckar) below the first migratory obstacles single potential spawning habitats are present, which however are restricted to the first kilometers upstream of the mouth into the Rhine (see Annex 9.4).

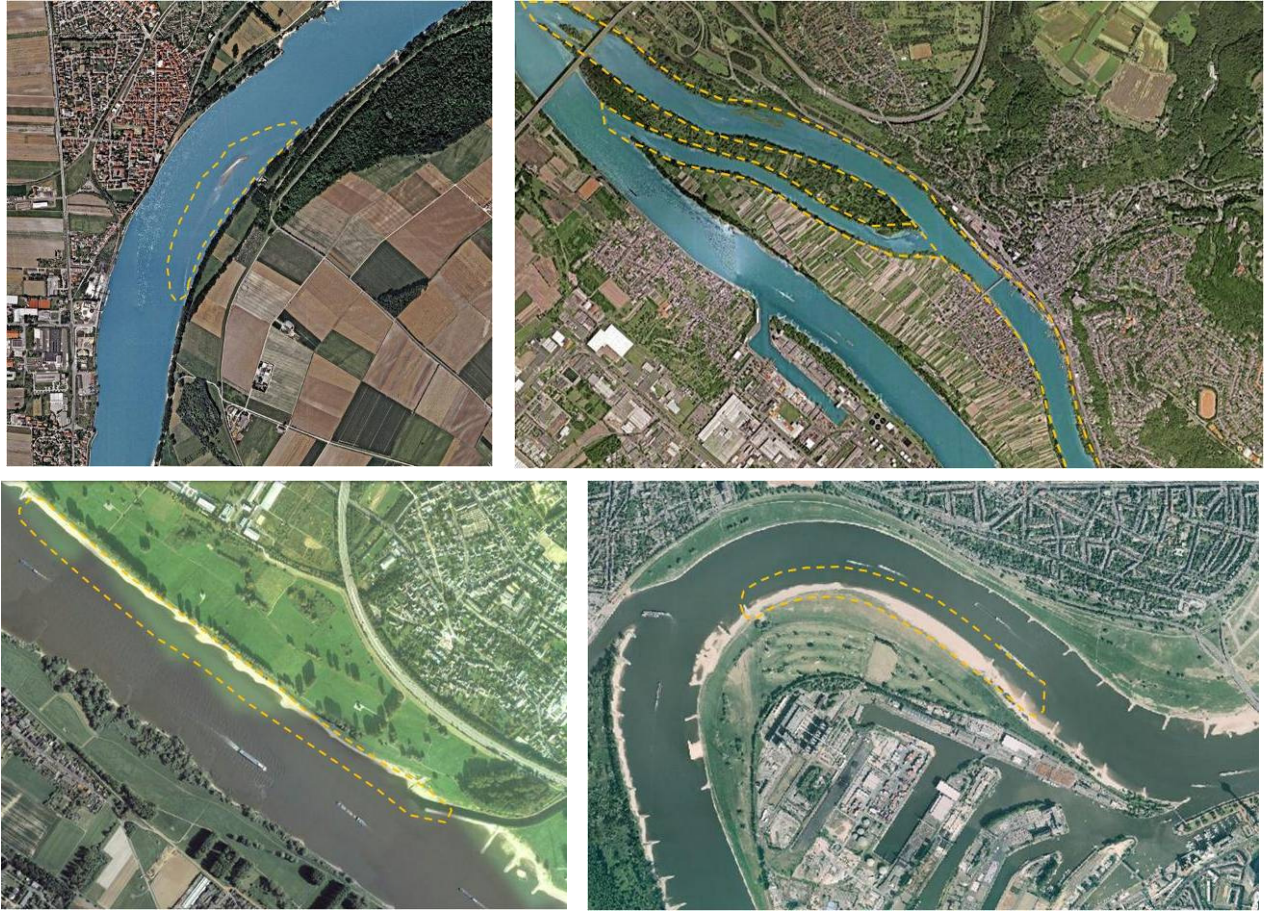


Fig. 4: Habitats that meet the requirements of Allis shad for spawning are highly available in the upper, middle and lower Rhine section. Amongst these are gravel banks or isles (Left above), secondary channels (right above), mouths of some tributaries (left down) and inner bend banks (right down).

5.1.5 A.5 Mapping of stocking sites

Despite the experiments on the effects of waves on the survival of larvae did not proof an increased mortality caused by navigation impacts, it was avoided to stock the shad larvae to the Rhine directly. Particularly at low water levels the intensity of wave washing might be considerably stronger than could be simulated at the mesocosm experiments. Despite larval development is possible in the Rhine's main channel itself, the comparably low number of larvae stocked was decided to be provided with the best conditions to survive and stocked to sites which provide optimum support to this objective. Thus a few selected habitats were chosen for stocking activities, which are locations in some tributaries (Sieg, Lippe) and secondary channels of the Rhine without shipping influence and reduced current and finally lentic waters connected to the stream (gravel-pit lakes) and additionally easy to reach. The benefit of such habitats for the shad larvae is most probably an increased planctonic production compared to the main channel. These supply better conditions for feeding, adapting and growing. The lower current and the wealth of food, implies that the young shad are provided with a higher fitness to maintain their position in the current or to actively move to the preferred habitats. Last not least the conditions for conducting monitoring investigations is considerably facilitated compared to the Rhine's main channel with its enormous width, depth, current and traffic (cf Annex 9.5).

5.2 D Recurring biotope management

5.2.1 D.1 Catch, Transport and rearing of adult Allis shad

Catch, transport and rearing of Allis shad took place in May and June in all years. The project partner MIGADO was responsible for the catch of spawners and instructed and accompanied the fish farmer during the shad production period. Transport of spawners between the river and the fish farm was realized by the Fédération départementale de la Pêche 47 (FD47). The fish farmer “La ferme du Ciron” and the FD 47 were subcontracted by MIGADO. In 2009 the Tuilières fish lift at the Dordogne River, which was out of order after an accident occurring at the Tulières dam in 2006, was re-opened and could be used as an additional source for adults in 2009. After the low catches of adult Allis shad in 2008 (118) a total of 281 mature Allis shad were caught in the spawning period 2009 at the Golfech fish lift in the Garonne River and at the Tuilières fish lift in the Dordogne River. However due to the low numbers of adult Allis shad records at the Tulières fish lift in 2010, all shads for rearing (255) needed to be taken from the Golfech fish lift at the Garonne river (see table 1).

Table 2: Comparison of spawner catches from 2008 to 2010.

Year	number of adult shads taken for rearing total (Garonne/Dordogne)		n Mortality
2008	118	(118/-)	2
2009	281	(192/89)	7
2010	255	(255/-)	5
	654	565/89	14

Fish from the Golfech fish lift were kept in two holding tanks which allowed a separation of sexes. Three transports to the shad fish farm in Bruch were required in 2008, nine in 2009 and seven in 2010 (Table 2).

Table 3: Details on the spawners’ transports and the sex ratio of adult shads for larval rearing

Year	number of transports	female	male	sex ratio
2008	3	51	67	1.31
2009	9	128	153	1.20
2010	7	107	148	1.38
	19	286	386	1.30

5.2.2 D.2 Allis shad production

The optimisation of Allis shad mass production techniques started in the experimental facility of CEMAGREF in St.Seurin/Isle in the year 2007 with special emphasis on the food for the Allis shad larvae. The experiences gathered there were implemented into the LIFE Allis shad fish farm, which was constructed in the existing hatchery of the Fédération départementale de la Pêche 47 (FD47) in Bruch near the Garonne River, and went into operation the first time in the shad spawning season 2008. The FD47 invested in the extension of the existing fish farm in order to enable the LIFE project to install the shad production and rearing system without any costs for the LIFE project. The main supervisor of the shad production in Bruch is David Clavé from the project partner MIGADO, who is mainly responsible for the installation of the facility and the improvements in the following years.

The facility was developed with four compartments, three directly dedicated to the production and one for the daily work and the production of food. The spawning area (Fig. 6) is supplied with water pumped from the “Canal du Midi” and filtered with a mechanic filter of 200 µm. The hatching area (Fig. 7) and the breeding (Fig. 5) area are supplied with water from the “Canal du Midi” treated with additional mechanic filters (200 / 40 / 20 µm) and disinfected with UV. The site is equipped with an alarm which calls the fish farmer when there is a default in the system. Moreover there are external ponds in the fish farm of Bruch which allowed testing larvae survival in an inartificial environment.

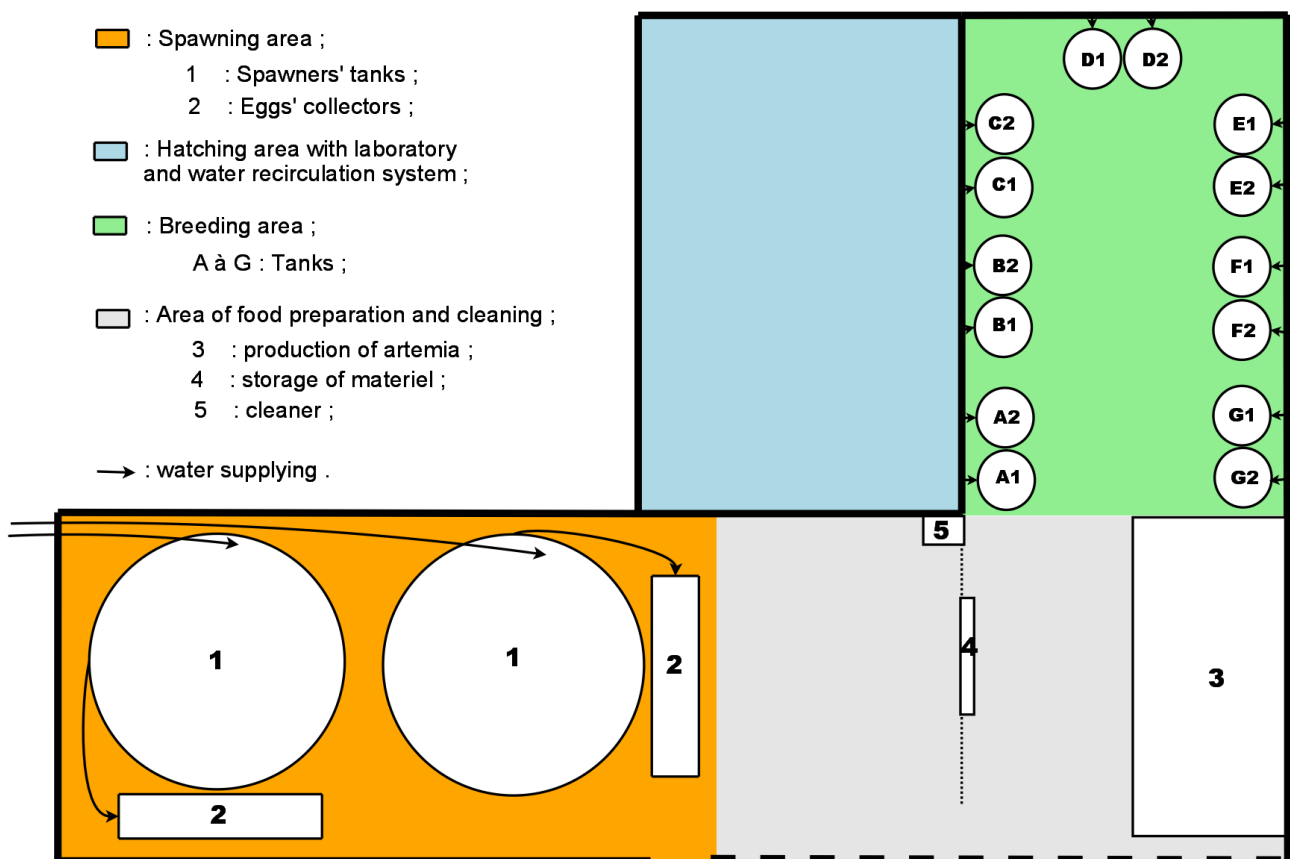


Fig. 5: Floor plan and scheme of the Allis shad fish farm in Bruch

In the course of the LIFE project several additional improvements were realized:

In the first floor of the hatchery, the lost space next to the reservoir of the recircular system was fitted out in storage space. In addition a small tank has been connected to the pipeline which provides water to the incubation place. Its aim is to deliver a small quantity of biocide (H_2O_2) in the water during a long period to prevent bacteria and fungi attack on eggs.

In the breeding area, 10 rearing tanks were replaced by new ones. These are bigger (600 l) with a conic and self-cleaning bottom. Some fluorescent lights have been placed above rearing tanks (1 for 2 tanks), monitored by a computer and recreating natural day light. The storage place has been replaced by a disinfection place (disinfectant bath + drying hammock). A sand filter has been bought to replace the old one. In order to collect waste water from tanks, a gutter has been built all around the breeding area.

A new type of hatching jar has been developed, without a screen in the bottom. These are specially used for the hatching step in the tank.



Fig. 6: Spawner tanks and egg collection tank (in front), right: breeding area with new tanks, lights and feeding devices.



Fig. 7: Incubation jars, right: improved hatching jars (right) .

A water spreader has been arranged on the roof of the hatchery to prevent increasing of temperature inside the hatchery when the weather is warm.

Since the shad spawning run had decreased sharply from 2005 onwards and only slightly recovered in 2009 and 2010, less shads than planned in the LIFE project proposal could be taken from the watershed resulting in lower than scheduled number of produced larvae in 2008 and 2009. However, due to improvements in the rearing process and despite the lower number of adult shads taken for rearing, the net larval production could be increased substantially in 2010 and climbed the scheduled mark of 2 Mio. larvae. This is mainly due to an optimization of the spawner stock sex ratio and particularly because the survival rates could be raised at all stages of the rearing process. Thus the number of viable larvae per female spawner could be increased by the factor 2.6 from 2008 to 2010 (see figure 8 and 9).

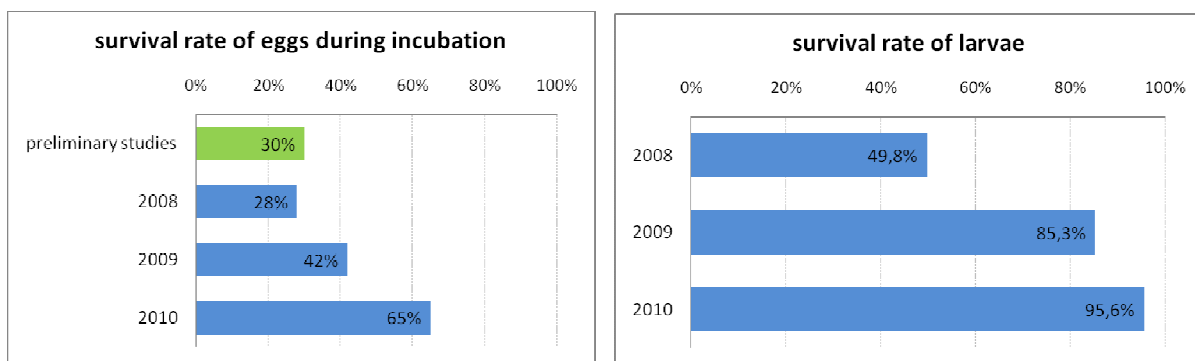


Fig. 8: Survival rates of eggs during the incubation period (n viable eggs before hatching/n eggs after spawning, left) and survival rate of larvae (n larvae before marking/ n eggs before hatching)

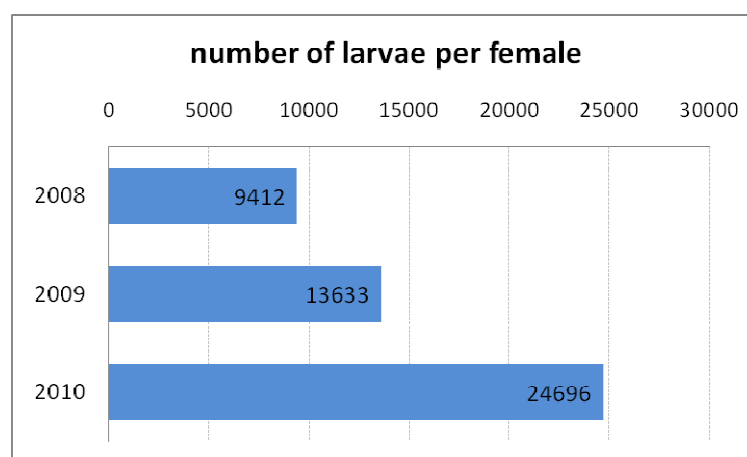


Fig. 9: The number of produced viable larvae per female spawner in the course of the projects duration

Due to sharp decrease of adult returners from 2006 onwards, which reached its all-time low in 2008 and only slightly recovered in 2009 and 2010, the number of larvae produced for stocking the Rhine was considerably lower than scheduled in 2008 and 2009. However, due to the higher production in

2010 the total amount (4.85 Mio larvae) is only slightly lower than scheduled in the project duration.

Table 4: Planned and actually produced number of Allis shad larvae for stocking the Rhine during the project duration

Year	Planned Production	Actual Production
2008	1.000.000	500,000
2009	2.000.000	1.711,000
2010	2.000.000	2.642,000
Total	5.000.000	4.853,000

Two deliverable products were finalized until the end of the project and according to the milestones timetable of the LIFE Proposal. The practical guidelines for shad rearing (see annex 9.6) were prepared by the project partner MIGADO and provide a details on the entire rearing process. Additionally a scientific publication on the rearing techniques (Jatteau et al. 2011, in press see annex 9.2) prepared by the project partner CEMAGREF will be published in the proceedings of the LIFE conference until July 2011. The guidelines are available to the interested public for downloading from the project's website.

5.2.3 D.3 Marking

The Marking of the young shads is a prerequisite to be able to identify them as stocked individuals, and to distinguish them from fish from natural reproduction, respectively, when getting caught later. This applies all the more since a monitoring of stocking measures in order to assess their success are mandatory for reintroduction programs of species according to the IUCN guidelines. The marking method used is a further development (by the project partner Cemagref) of the technique invented with the reintroduction programs of American shads in the USA. For this purpose young shad larvae are exposed to a oxytetracycline (OTC) solution, which is incorporated in bony structures like the otoliths and can, after preparation from the fish's skull, be microscopically recognized as a lighting mark under fluorescent light. In order to make sure that marks could be even detected years after marking, i.e. in adult returning fish, experiments on the optimal concentration of the marking solution and the duration of incubation of larvae to the solution where conducted at the Cemagref St. Seurin facility. Generally mark quality is considered to increase with increasing OTC concentration and duration of incubation, which however might even increase mortality of larvae as a consequence of the marking procedure. From 4 different treatments one turned out to provide best results with low mortality as well. For the mass-marking protocol in the hatchery in Bruch in the following years, an OTC concentration of 250 ppm (pH=7) and 20 cc of milk, during 4 hours, was used. The protocol follows the recommendation of the CEMAGREF marking experiments of 2008. Larvae were 3, 5 and 9 days old according to the batch marked. Some extra mortality was recorded the day after marking in 2009, around two times of the daily mortality the day before. But due to the overall very low mortality during the rearing period (mean survival rate: 98%), this extra mortality had no consequences for the rearing period. A batch of the larvae marked in 2008 were exposed to a natural pond at the hatchery in Bruch and the quality of marks controlled at a subsample of 10 fish after emptying the pond three months later. In all cases the marks were clearly recognizable. The same applied to young shads of a similar age from the 2010 stocking caught in the River Rhine (see 5.4.3)

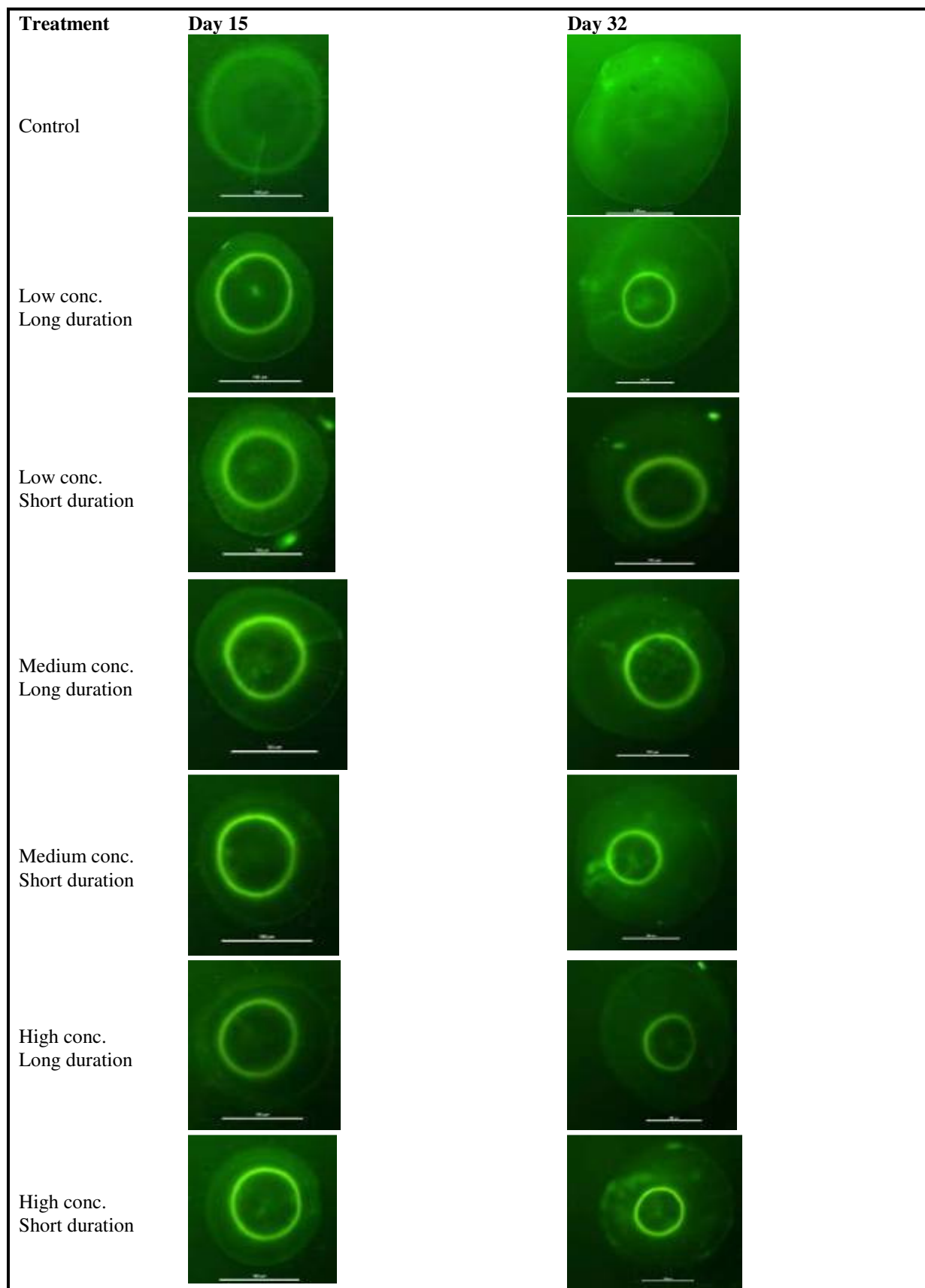


Fig. 10: Images of representative otoliths from treatments to figure out optimum concentration of OTC solution and duration of larvae exposition to the solution for optimization of the marking procedure for 15-days old and 32-days old larvae, respectively. The shiny yellow-green mark is the tetracycline mark (White scale = 100 μ m).

Two deliverable products were finalized until the end of the project and according to the milestones timetable of the LIFE Proposal. The practical guidelines for shad marking (see annex 9.7) and the scientific publication on the otolith marking techniques (Lochet et al. 2009, Fisheries Management & Ecology, see annex 9.8). Both publications were prepared by the project partner CEMAGREF. The guidelines are available to the interested public for downloading from the project's website.

5.2.4 D.4 Transport and stocking of Allis shad larvae to the River Rhine System

The transport of shad larvae from the Allis shad fish farm in Bruch to Germany is part of the contract of the fish farmer Mr. Astre. The Transports were carried out by using a refrigerated van, with which the transportation time is much lower than with large special, however slower, fish transportation trucks and is around 13 hours. In order to avoid delays due to increased traffic and possible harms due to higher temperatures at day time, the transports were mostly conducted during night-time, so that larvae arrived in Germany in the early morning hours. Generally, the larvae are transported in large plastic bags; each bag is filled with one-third water and two-thirds pure oxygen. In this way, up to 12,000 larvae can be kept for many hours and survive the long journey to North Rhine-Westphalia and Hessen in Germany without damage even in high summer temperatures, in which conditions they are stored on ice packs. From 2008 onwards the larvae were transported in a kind of double-walled sack (an additional sack pulled around the actual transportation sack) which turned out to keep the pressure within the sacks stable and prevents larvae from being kept in narrow edges and to further reduce mortality. After arrival at the stocking site the bags were placed into the stocking water for temperature adjustment (for at least one hour) before they were released. The first transports to Germany in 2008 were realized in mid June to North Rhine-Westphalia and late June to Hesse, respectively. The pre-selected stocking sites were a stretch at the lower river Sieg approximately 3 kilometres from its mouth into the Rhine in North Rhine-Westphalia and the Erfeldener Altrhein, an oxbow flowed through by the river Rhine in Hessen. Larvae were released from the bags during day-time after acclimatization and mixing the water inside the bags carefully with river water. In both locations the stocking teams independently from each other observed a slight to moderate mortality of freshly released larvae due to predation by other YOY fish, which had due to the late stocking date a notable size advantage towards the small shad larvae. As a consequence of the stocking team's assessments and recommendations the stocking operation was modified in the following years.

In 2009 larvae were transported at younger age with 5.000 to 15.000 per bag. Two transports to Germany were carried out at the 29th of May and the 17th of June and the number of larvae was divided into two half's for stocking in North Rhine-Westphalia and Hesse at either dates, respectively. In North Rhine-Westphalia all larvae were stocked to the river Sieg. In Hesse the second stocking was as in the previous year, conducted at the Erfeldener Althrein, whereas at the first date the larvae were stocked to a stagnant waterbody (a gravel-pit) connected to the river Rhine. In both cases the release of larvae from the transportation bags (after acclimatization) was carried out during night time.

At the first stocking date at the river Sieg some seine-net samples on a random base revealed that the abundance of other YOY fish with a considerable size advantage towards the shad larvae and thus the number of potential predators was quite low. For this reason the major part of first stocking was carried out during day time, however larvae were released (after acclimatization) in habitats with larger distance to the bank where other YOY are categorically less abundant. A sub-sample of the shads were experimentally transferred to a round channel tank supplied with river water in order to test whether keeping in such conditions is feasible and released at late afternoon with no observed additional mortality.

Due to the apparently higher abundance of other YOY fish at the stocking date in mid June, the release of larvae was carried out during night time and early morning, respectively. No predation mortality could be observed. In addition we tested additional feeding of larvae after the transport at the stocking site in NRW. Between 30.000 and 60.000 larvae were kept in a round channel tanks supplied with water from the river Sieg and fed for several hours with *Artemia* and dry food. No extra mortality occurred and an immediate feeding of larvae was observed. Stocking was conducted by discharging the tank with a 2 inch tube without additional handling the larvae. Since no problems with the adaptation of larvae within the round channel tanks were encountered and due to the persuading benefits this strategy implies (increasing fitness after long transport, delaying stocking into the dark even over longer periods) it was decided to extend the number of so kept larvae before release at optimum conditions in 2010.



Fig. 11: Stocking modifications like transferring the delivered larvae to round channel tanks supplied with river water (left) and feeding them with *Artemia* before stocking after dusk, or releasing the larvae from the bags in open water areas (preferably in the dark) are considered to enhance post-stocking survival.

In 2010 the first transport was conducted at May the 19th. The transport arrived in the morning hours and the almost entire amount (total 650,000) of larvae was kept and fed in large round channel tanks according to the 2009 experiences before being released to river Sieg at the evening. Due to a modification of the accompanying investigations question, and in contrast to the 2008 and 2009 stocking, larvae were released immediately downstream of lowest weir in St. Augustin-Buisdorf (approximately 15 km upstream from the mouth into the Rhine). Approximately 50,000 larvae couldn't be transferred to the round channel tanks and were thus released at the same location where the monitoring investigations had been carried out in the previous years. After the long winter and the cold spring in 2010 other YOY, which could have been acted as predators to the shad larvae, were almost absent and no predation or other source of mortality was observed.

With the second stocking transport at June 11th 820,000 shad larvae were directly delivered to Hessen and, as in the previous years, released to the Erfeldener Altrhein after dusk. Drifting larvae were observed from a boat moving with the current and additional light sources. No mortality of larvae was determined.

A third transport on the 25th of June comprised 1.150,000 larvae, which were divided between North Rhine-Westphalia and Hessen to nearly equal parts. In both cases the larvae were released at pelagic habitats of stagnant water bodies (gravel-pits connected to the Rhine) during day time, since at this time large assemblages of potentially predatory YOY occurred in the habitats close to the

bank. Stocking in pelagic habitats in the highly productive connected gravel-pits is furthermore regarded to provide the shad larvae with the opportunity to feed on, compared to lotic habitats, highly abundant planktonic organisms. Post-stocking mortality was estimated to be < 5%.

5.2.5 D.6. Examination of stocking material for parasites and infections

Control samples of the stocking material were analysed in the laboratory of the LANUV NRW (Fischgesundheitsdienst) for virus diseases and parasites (Salmoniden IPN (e.g. infektiöse Pankreasnekrose, VHS virale hämorrhagische Septikämie, IHN, infektiöse hämatopoetische Nekrose). In none of the years any kind of infection could be determined.

5.3 E Public awareness and dissemination of information

5.3.1 E.1 Public relations

Public relations work focussed on the presentation of the project at national and international meetings, yearly stocking events and press conferences with the environment ministers of Hessen and NRW in Hessen, the organisation of the international LIFE conference, and a press event on the occasion of the first records of juvenile shads migrating downstream the Rhine.

5.3.2 Project logo

A project logo was developed by the project management with the help of the printing press Schotte in Krefeld, Germany without any additional costs. The logo shows an Allis shad together with the Allis shad name of the three participating countries Germany, France and the Netherlands (Fig. 12). The Logo became widely established in the course of the project and was even used for the projects publications, presentations, reports from subcontractors and as a label for the durable goods purchased for the project.



Fig. 12: The LIFE Allis shad project logo

5.3.3 Project DVD

The 18-minute video film by nature and animal documentary film maker Jens Oliver Hoffmann about the LIFE Project was finalized in September 2007. The film reports on the content of the project in enthralling and impressive images. It gives an impression on the traditions and techniques of Allis shad fishing in Germany and France and covers the long and hard journey the Allis shads have to embark on as they travel from the ocean to their river spawning grounds. In never before seen pictures the viewer is provided with insights into the farm raising facilities for Allis shads in France.. English and French versions of the documentary are available since March 2008. The documentary has been shown on numerous occasions during the presentation of the project (Fig. 26; see Annex 8.10.4). The Stiftung Wasserlauf was able to get additional funding from the HIT Umwelt- und Naturschutzstiftungs GmbH for 500 copies of the documentary. 350 copies have been sent to grammar and comprehensive schools in North Rhine Westphalia. Additional copies were sent to the project partners and co-financer for the distribution to stakeholders and the copies were also distributed during public relation events. The duplication of the documentary was published in the journal “Natur in NRW” 4/2008 and on the website and the documentary can be ordered without any costs from the project management. Due to the large demand by the interested public which lasted unbroken until the official termination of the LIFE project almost all DVDs (650) were distributed until December 2010. A copy of the project documentary is listed in Annex 9.9.



Fig. 13: Cover of the project documentary DVD

5.3.4 Flyer

A flyer was developed by experts from the LANUV NRW (formerly belonging to the Bezirksregierung Arnsberg) and the project manager. The flyer is available in German, French, English and Dutch. A share of the flyers was transmitted to the project partners and co-financers in France, Netherlands and Germany, and distributed to the interested public, particularly at public relation events. Although a second edition with a number of further 1.500 was produced, except for less than 200 copies all Flyers were distributed in the project's duration. Copies of the LIFE flyer in the four languages are listed in Annex 9.10.

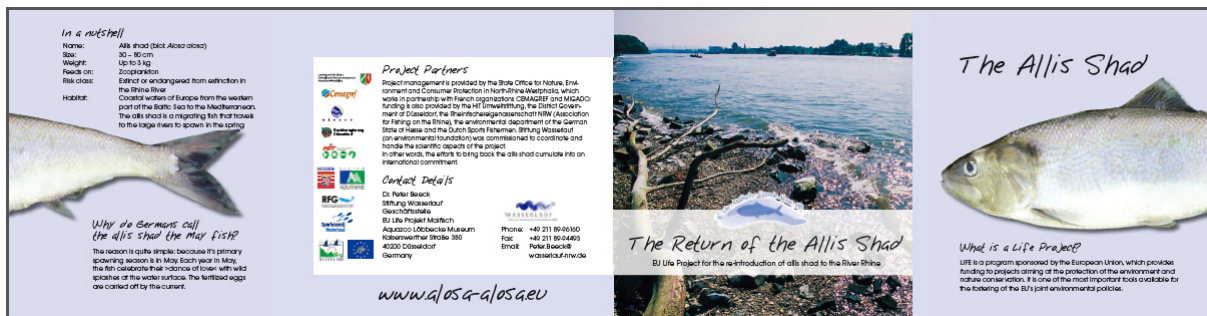


Fig. 14: Project Flyer

5.3.5 Public stocking events in Hessen and in North Rhine-Westphalia/ Allis shad sponsorship,

Stocking events and press conferences with the environment ministers of Hessen and NRW were alternately conducted at exposed locations at the Rhine River in North Rhine-Westphalia and Hessen from year to year (2008 Düsseldorf, 2009 Wiesbaden, 2010 Cologne). At these stocking events a few hundred Allis shad larvae were released to the Rhine by the environment ministers of both federal states and attracted a great media interest. At the stocking events conducted in NRW, the STIFTUNG WASSERLAUF organized Allis shad sponsorships with regional sponsors for school classes which were hereby sensitized for the still problematical situation of Allis shad and migratory fish in general. The sponsors received a document (an Allis shad share) and pupils from the school classes released young Allis shad into the Rhine their selves. Staff members of the Rheinischer Fischereiverband from 1880 provided the pupils with an insight into the fish communities of the Rhine in combination with a demonstration of fishing techniques in advance to the release of shad larvae. Many public representatives were present at each of the events. In 2010 the stocking event was embedded in the "Maispill" celebration in Cologne and co-organized together with the Poller Maigeloog. Representatives of the French project partners CEMAGREF and MIGADO, as well as of the co-financers attended these special events in each year. The public awareness and media interest was impressively raised by these events and numerous newspapers, television and radio stations, as well as internet sources reported about the project in the following days and weeks (see annex 9.15).



Fig. 15: Award ceremony of Allis shad sponsorships under the attendance of the Ministers of Environment from NRW and Hessen and representatives of the North Rhine-Westphalian fisheries association, right: the subsequent releasing of shad larvae to the Rhine by pupils in Cologne-Poll at June the 16th 2010.

5.3.6 LIFE Allis shad Bordeaux

For public relation actions in Germany and France a special LIFE Allis shad edition of a French Bordeaux bottle was developed (Fig. 16). The Bordeaux grapes are growing close to the Gironde watersheds, which represent the habitat of the Allis shad donor population for stocking the Rhine as well. 250 bottles were manufactured for the LIFE project. The Bordeaux red wine filling was paid by the Stiftung Wasserlauf outside the project budget. The red wine was not sold but only served for free at public relation events, e.g. the shad release of the Environment Ministers of NRW and Hessen. The bottles were also distributed to the project partners for further public relation work.



Fig. 16: LIFE Allis shad Bordeaux

5.3.7 International LIFE conference

The LIFE conference: “International workshop on the restoration of fish populations” took place between 1-4 September 2009 in Düsseldorf, Germany. The conference was co-organized by the IUCN Specialist Groups Re-Introduction, Salmon, Sturgeon and Freshwater Fish. More than 100 participants from 22 different countries have submitted 56 scientific presentations on fish restoration dealing with over 30 freshwater and marine fish species. All abstracts were published in the abstract book of the conference which is attached in annex 7.9. Both French project partners presented talks and posters at the conference (MIGADO: David Clave, CEMAGREF: Aude Lochet, Eric Rochard, Philippe Jatteau). Furthermore representatives of some co-financers, e.g. from the Sportvisserij Nederland and the Rhine fisheries cooperative NRW, as well as Frank Vassen from the EU LIFE team and Jörg Böhringer from the Monitoring Team also attended the conference.

Conference excursions to the Rhine River and Rhine delta were organised at the end of the conference. The proceedings of the conference will be published in the peer reviewed Journal of Applied Ichthyology. At the moment the manuscripts for the proceedings are under review and the publication is planned for the second half of 2010. In addition the development of specialised IUCN guidelines for fish re-introduction projects was initiated during the conference and a publication of these guidelines as “IUCN publication” is also planned for 2010.



Fig. 17: Participants of the international LIFE conference held in Düsseldorf in September 2009

The LIFE conference abstract book is listed in annex 9.11. Due to the higher total number of pages and figures within the particular articles, the conference proceedings could not be published as scheduled during the project’s duration (as regular issue of the Journal of Applied Ichthyology), but as a issue supplement, which will thus be published delayed, most probably until July 2011.

5.3.8 Exhibit in the Aquazoo Düsseldorf

A special exhibit was developed by the project manager together with experts from the Aquazoo/Löbbecke Museum to explain the goals of the LIFE project. For this purpose new information panels with illumination were bought. A particular focus was placed on the historical importance of Allis shad fishing in Düsseldorf and in the Lower Rhine region.

In total more than 350.000 visitors were attracted to the Aquazoo in 2007, 2008 and 2009 to see the special EU Project exhibit. Richly illustrated educational boards were produced at the projects early phase. These explained the contents of the project and described the unusual life of the long distance migratory fish (see Annex 9.12). Interesting displays such as Allis shad eggs, larvae and juvenile fish, as well as a preparatory of an adult Allis shad, which was created by the Aquazoo's taxidermist, Renée Lavalette, and special shad lures for anglers completed the exhibition. Moreover, living juvenile Allis shad were on display at the exhibition for the first time in Europe.

At the end of each year's exhibition the juvenile shads were released to the Rhine. In 2010 young shad from the 2010 stocking batch were kept in an Aquarium within the Aquazoo in order to let them grow to premature and to expose them to the public in large aquariums together with other fish as soon as they have grown as far to be not threatened of becoming eaten by other fish. Hitherto the juvenile shads can be visited on request behind the scenes of the Aquazoo. Together with a stock kept in the La Rochelle Aquarium in France since 2008, these are the first Allis shad grown in captivity and to visit.



Fig. 18: Allis shad exposition in Aquazoo Löbbecke Museum Düsseldorf in 2008 (left). Living Allis shad (together with other clupeid fish) exposed in the La Rochelle Aquarium in France (Photo Dominique Jullien). The shads were bred in the LIFE Allis shad fish farm in Bruch and transferred as larvae to the La Rochelle Aquarium.

5.3.9 Website

The website was regularly updated in during the project duration. It was also used for the online announcement and registration of the international conference and extra sub-websites were created within the existing website. At the end of the LIFE project some deliverable products, like the Layman's report (in the four languages the homepages is retrievable in), the handbooks on Allis shad mass rearing and marking techniques), as well as additional information on further LIFE projects and conservation measures of other diadromous fish in North Rhine-Westphalia are available at the download area of the homepage. The domain will also be used for the presentation of the following LIFE+ Allis shad project. Hosting and updating of the website is done by the LANUV.

5.3.10 European Regional Champions award 2008

The LIFE project has won the European Regional Champions Award 2008 in the category “Maritime Champion”. The awards, held in association with the Committee of the Regions (CoR), were announced on 19 November 2008 in Brussels. They aim to identify and showcase the very best in regional innovation and best practices throughout EU regions – highlighting projects that can serve as examples to other regions. In 2008, a total of 250 proposals were submitted, covering 26 Member States of the EU. A big delegation of project partners and co-financers travelled to Brussels to celebrate the award. The prize is a big motivation for all participants in the project and underlines our very good transnational partnership. The award itself was alternating passed on between the ministers of environment of the federal states NRW and Hessen as part on the official stocking events to remain in the respective hands until the following year.

5.3.11 Presentation of the project during seminars, conferences and special events

The project was presented on numerous meetings, seminars, special events and conferences in the in Germany, Netherlands, France during the entire project duration. At the end of November 2009 the former project manager Dr. Peter Beeck was invited by the IUCN to give a presentation at the meeting: ‘Droughts, deserts and water resources: challenges and opportunities in conserving the indigenous freshwater fishes of Australia’, held at Adelaide Zoo, Australia. The LIFE project served as a demonstration and best practice project for the future activities in Australia.

The travel was permitted by the EU. Flight costs were paid by the IUCN and the accommodation and subsistence costs were paid by the LIFE project.

From 2007 onwards the LIFE Allis shad project was presented during the “Poller Maispill”. The “Maispill” is an old shad festival in the Cologne district Poll, which is was a traditional fishing village in former times. The “Maispill” still celebrates the catch of the first Allis shad although last catches were about 60 years ago. In 2010 the public stocking event of Allis shad larvae through the Ministers of environment and school classes was embedded into the ceremony of the Maispill.

On the occasion of the first records of juvenile shads in the river Rhine for many decades, which were proved by a fisherman at the lower Rhine near Kalkar, a press event was conducted at the vessel (an anchored stownet) of the fisherman with which the shads were detected during their downstream migration. Representatives of Dutch and German co-financers attended the press conference.

A complete list of presentations is given in Annex 9.13.

5.3.12 Installation of Allis shad project information boards

Each three boards providing a brief description of the LIFE Allis shad projects contents and aims were created for permanent exhibitions in Germany and France. Since the contents for the French boards needed to get modified, and the installation itself was thought to be carried out parallel in Germany in France, it was delayed until autumn 2010 (instead of 2008 as according to the milestone time table). The boards were installed at exposed and highly frequented locations along the Rhine in Germany and along the donor population’s home rivers Garonne and Dordogne in France. In Germany these are the nature reserve information point at the Kühlkopfaue (not far from where the shad larvae are released) in Hessen, at the bank of the Rhine in Cologne Poll where the public stocking event in 2010 was conducted, and at the waterside promenade in the old town of Düsseldorf, which is straight at the opposite bank side from where the public release event was carried out in 2008. The old town in Düsseldorf attracts many thousand visitors each weekend. Since the location is affected by floods of the Rhine, it turned out to be beneficial to remove the

board during the winter months. In France the boards are shown at the visitors exhibitions at the hydro-power plants of the Tulières and Golfech dams at the rivers Garonne and Dordogne in order to raise awareness for the impacts of hydro electricity and dam construction on the populations of Allis shad and other migratory fish. The installation itself could be carried out without additional costs to the project in each case.



Fig. 18: Visitors in front of one of the French Allis shad information boards at the Tulières fish lift on the Dordogne, right: Installation of the LIFE board with representatives from the Stiftung Wasserlauf, Rhineland fisheries association, the Poller Maigeloog and local politics in Cologne-Poll.

A copy of the French and German language versions of the LIFE Allis shad project information boards as they were installed are listed in Annex 9.14.

5.3.13 Media

The LIFE project received a very good feedback in the media which included newspapers, journals, online media and radio and television stations. Inter alia the German language Wikipedia encyclopedia reports about and links to the LIFE project when searching for the item “Maifisch”. This feedback was also generated by several press releases and press conferences during the entire project duration. A complete list of all publications is given in annex 9.15.



Fig: 19: Some German and Dutch newspaper articles and online media on the LIFE Allis shad project from 2010.

5.3.14 E.2 Layman's report

The layman's report was finalized in December 2010. It provides the interested public with a quite detailed and richly illustrated description of the background, the aims and the achievements of the international LIFE project, however, even gives a brief summary for each topic. Translations into Dutch, English and French were realized by professional translators and the project partners themselves. Layout was done by the specialized department No. 36 of the LANUV without additional costs to the project. The Layman's report is published as part of a LANUV publication series and available for downloading in French, German, Dutch and English language from the projects homepage. The Layman's report is listed in Annex 9.16.



Fig. 20: Cover of the LIFE project's Layman's report. The Layman's report is available in the languages German, English, French and Dutch.

5.4 F Overall project management

5.4.1 F.1 Project management

The project management is sub-contracted to the Stiftung Wasserlauf. The Stiftung Wasserlauf is a regional environmental foundation in North Rhine Westphalia, Germany with special focus on diadromous fish and Freshwater Ecology. Since 15 January 2007 Dr. Peter Beeck was employed for the management of the project. Project management included organization of meetings, the Allis shad symposium in Düsseldorf, mapping of spawning and stocking habitats, public relation campaigns, development of flyer, website, exhibit, project documentary, Rhine visits, awarding of contracts, accounting of the project and the preparation of progress and interim reports. With the beginning of September 2010 Peter Beeck decided to give up the project management unexpectedly in order to seek new professional challenges. For the remaining four months the fisheries biologist Dr. Andreas Scharbert was won on short term notice and was entrusted with the maintenance of business operations and preparing outstanding technical publications and reports including the management plan, the After-LIFE-Conservation Plan, the Layman's report and the final report. The conditions of employment were the same as with regard to Peter Beeck. A complete list of the project presentations of the project manager during the entire project duration is listed in annex 9.13.

5.4.2 F.3 Efficiency control of stocking

From 2008, the year of the first release of Allis shad in Germany, onwards accompanying investigations on the post-stocking behavior of the larvae were conducted in order to be able to draw conclusions on the further optimization of the stocking operations and the stocking habitats. These investigations provide the first data on freshwater habitat utilization of YOY Allis shad so far, which has never been subject of any studies before. Based on the information gained at each previous stocking operation the sampling design was modified in order to get a comprehensive view on the spatial and temporal distribution of the larvae and to be able to identify possible bottlenecks. The efficiency control of stocking activities was sub-contracted to the fish biologists who also did the stocking operations: Dr. Egbert Korte & Dr. Jörg Schneider (BFS) in Hessen and to Dr. Stefan Staas (Limnoplan) in NRW. The 2008 monitoring focused on sampling the immediate stocking site and adjacent habitats with small meshed dip- and seine nets in Hessen as in North Rhine-Westphalia the days after stocking. The original intention was to carry out a kind of screening and to continue with methods, which allow quantifying the abundance after records were made. However, no shad larvae were detected in the next few days after stocking, neither in NRW nor in Hessen. These results and direct observations parallel to the release of larvae from the transportation bags suggested that larvae went into drift and moved downstream immediately. Even repeated samplings in the respective habitats up to two weeks after stocking, did not provide information that the young shads remain in habitats close to the stocking site (see interim report Annex 8.6 and 8.7 for the sub-contractors reports on stocking efficiency).

In 2009 a set of drift nets were used to monitor the behavior of Allis shad larvae after stocking. In NRW the nets were exposed a few hundred meters downstream of the stocking site and in Hessen about 3 km downstream of the stocking site and monitored between 16 and 20 hours after stocking (to monitor day and night differences in migration).



Fig. 21: Observations on post-stocking behavior of shad larvae by a diver in a gravel-pit connected to the Rhine in NRW and from a boat drifting with the current on the oxbow Erfelden in Hessen

In NRW Allis shad larvae were detected in the drift nets directly after stocking indicating a fast downstream dispersal. No larvae were detected in the drift nets in Hessen. However, it was possible to follow the larvae with a drifting boat for about 300 meters downstream. No predation was observed. The larvae swam normally and drifted with the current (see interim report Annex 7.6 and 7.7 of the 2nd progress report for the sub-contractors reports on stocking efficiency). In order to test the hypothesis that larvae drift downstream and to question whether this applies over the entire watercourse the drift experiments were extended and further modified in 2010. At the river Sieg drift-nets were exposed at the same and obviously well suited location as in 2009, however larvae were released approximately 15 km upstream after being kept and fed in round channel tanks until dusk. The drift-nets were set for 48 hours after stocking and controlled every two to three hours during which the larvae should theoretically and entirely pass by the monitoring site when drifting with the current.

No Allis shad, except some few released at the monitoring site some hours before the drift nets were set, were detected and even none during a further 24 hours experiment one week after the stocking. The investigations in Hessen even focused on the drift behavior of shad larvae. After being released in the dark, the larvae shoals were observed in the light of artificial torches from a boat drifting with the current over a distance of several kilometers. Shad larvae initially drifted immediately beneath the water surface, however tended to move deeper with increasing distance from the stocking site. Furthermore the size of the shoals was decreasing parallel. After about three kilometers no Allis shad larvae were detected anymore (see Annex 9.17 and 9.18 for the sub-contractors reports on stocking efficiency 2010). In combination with the results obtained in NRW and those of the previous years the conclusions are that larvae actually drift downstream with the current during night time, however apparently disperse along the river course and perhaps niche there. However, further work is required to draw this picture clearly.

The fate and the behavior of Larvae stocked in stagnant (floodplain) water bodies connected to the Rhine were observed by divers. Since larvae are nearly translucent it turned out to be almost impossible to trace them for a longer time. However, the observations in parallel carried out in gravel-pit lakes in North Rhine-Westphalia and Hessen accordingly yielded similar results: Larvae concentrate in the middle of the water column and avoid the layers close to the surface and even prefer open water areas compared to those close to the bank, from which they moreover actively move away. This behavior apparently aims on predator avoidance. Actually potential predators for

such small larvae are known to be more abundant in bank habitats and no predation was observed during the experiments.

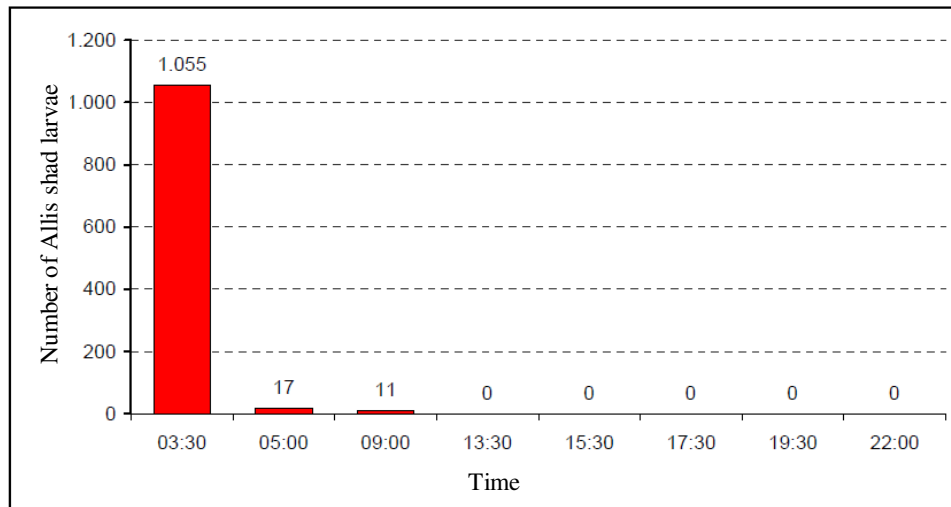


Fig. 22: Number of Allis shad larvae detected in the drift in the period following stocking (Time: 02:30) during the 2009 drifting experiments at the river Sieg.

5.4.3 F.4 Monitoring

Except for the accompanying investigations to the stocking measures no regular monitoring with regard to Allis shad was carried out in German Rhine section so far. However, stakeholders involved into other monitoring measures were informed about the project objects and actions in advance and information on Allis shad records will be immediately forwarded to the responsible authorities in North Rhine-Westphalia and thus to the project management. A reward payment of 50 Euros was announced to ensure, that the information of caught Allis shads will be forwarded to the project management. Allis shad require 3 to 5 years to reaching maturity and returning to the freshwater for spawning, thus no returning adult Allis shad were to expect in the project duration. Monitoring measures thus on juveniles before entering the sea. In the freshwater Allis shad records could be provided at surveillance facilities at fish ways of the Rhine (e.g. at the Iffezheim and Gamsheim dams) and its tributaries (e.g. at the Buisdorf/river Sieg, Koblenz/river Moselle dams), by means of electric fishing measures regularly carried out in the Rhine and the tributaries (e.g. monitoring in connection with the water framework directive) and particularly by means the fyke-, stow-, and gillnet fishing activities of professional fishermen. Actually it was a professional fisherman who detected the first juvenile shads on their seaward migration for decades by means of a stow-net in the German section of the lower Rhine close to the Dutch border. This particular fisherman caught a total of 30 juvenile shads between September the 7th and October 28th of 2010, which indicates, that there must have been many: The stow-net is covering with 10 meters opening width only a marginal fraction of the rivers width, which is approximately 600 meters at the location and the opening width of the mesh sizes selective to shads in the respective size range (81-139 cm) is even smaller. In order to be able to confirm whether the juveniles originate from the stocking measures of the LIFE projects a subsample of 11 shads was transferred to the nearby Ecological Field Station of the University of Cologne, which disposes on the technical capabilities and personal skills of otolith preparation and analysis. All identified fish could be proven to come from the 2010 stocking.

The fact that no further fisherman detected juvenile shads in the Rhine so far might indicate that anchored stow-nets are probably well suited for detecting downstream migrating shad juveniles. To our knowledge only one further fisherman in the middle Rhine section practises stow-net fisheries, except for the respective timeframe in 2010. In addition we have started to establish a monitoring in the Dutch part of the River Rhine. This monitoring comprises an information campaign for the professional and recreational fishermen and the standard fisheries monitoring in the estuary (Rare Fish Species Program, Trawling Program in the North Sea). An information campaign was organized with the help of IMARES (Erwin Winter, Olvin van Keeken). They distributed a discrimination sheet developed for the LIFE project (see Annex 9.20) to the fishermen. IMARES is also responsible for the coordination of the monitoring programs and informed the responsible persons and distributed the discrimination sheet.. The fishermen sub-contracted to the Rare Fish Species Program are mainly fishing with fyke nets. Amongst several other species fishermen often catch the closely related twaite shad (*Alosa fallax*) in the fyke nets. This indicates that this kind of monitoring is able to detect *Alosa* species.

With regard to extraordinary high number of Allis shad larvae stocked to the Rhine system in 2010 (see 3.2.4) and furthermore due the records of juvenile Allis shad in Germany, special monitoring investigations were planned to get conducted in the Delta in the same autumn. This monitoring were sub-contracted to the Dutch company ATKB and aimed on identifying the shads' migratory routes through the Delta by means of seine-net surveys in open water habitats and electric fishing of habitats more close to the bank. However, due to legal restrictions and unsuitable discharge conditions the monitoring started in early December. Due to extremely cold temperatures at this time the monitoring investigations couldn't be conducted as intensive as planned and no shads could be recorded (see Annex 9.21). Most probably the shads had already migrated to the North Sea.



Fig. 23: The first juvenile Allis shads were detected on their seaward migration by means of an anchored stow-net at the lower Rhine in September 2010.

5.4.4 F.5 Networking

The LIFE project Allis shad is integrated in the European Diadfish network. (www.diadfish.org), in which European Research Institutes working on diadromous fish are bundled. At the moment 34 European laboratories and research institutions are incorporated in the network. The Diadfish network organized a workshop during the international LIFE conference in Düsseldorf:

“Opportunities of cooperation between European labs working on diadromous fish recovery”. The international LIFE conference has greatly increased the networking activities with a lot of new contacts in 22 countries. The project manager has been invited to be an associated member of the IUCN Freshwater Fish Specialist Group.

Particular attraction to other stakeholders working on the conservation of shad species was drawn by the shad rearing techniques developed within the LIFE project. Fish ecologists from Portugal, Italy and the USA already visited the LIFE fish farm in Bruch in order to learn more about the mass production techniques. Cooperation with the University of Parma, Italy, was initiated in 2010. Armando Piccinini visited the fish farm in Bruch in May 2010 and the first project manager Dr. Peter Beeck visited the University of Parma in June 2010. The Italian fish ecologists work on the conservation of the closely related Twaite shad (*Alosa fallax*) in a tributary of the Po river. Interestingly the Italian Twaite shad shows the migration behaviour of Allis shad with long distance migration into freshwater areas. Plans were developed how to install a small scale shad farm in Italy and the project manager and David Clavé from the project partner MIGADO gave advice on the technical part of the installation. Shad rearing techniques are going to be established in fish farms in Germany in the course of 2011 and there has been first request from a planned shad project in the United Kingdom to inform about shad rearing techniques. Additional attention was evoked through the projects website which led to first contacts to shad reintroduction programs in the USA, e.g. the Potamac shad project.

5.4.5 F.6 After-LIFE Conservation Plan

The After-LIFE Conservation Plan was completed at the end of the LIFE project in 2010. In the After-LIFE Conservation Plan it is explained how the objectives of the LIFE project will be guaranteed after the projects termination, from whom the respective measures will be provided, how they are financed and scheduled. Thanks to the approval of a LIFE+ project (LIFE09/NAT/DE/000008), which aims besides the restoration of the Allis shad in the Rhine-system on the conservation of the Gironde population, some of the measures carried out to achieve the LIFE Allis shad project's objectives, can be realized under the umbrella and with financial resources from the LIFE+ project. The project duration will be from January 2011 until December of 2015. The continuation of the key measures, particularly the production and the stocking of larvae to the Rhine system in the following years after 2015, are not fixed contractually yet, it is however planned to integrate them into the migratory fish program. Durable goods purchased for the LIFE project, will since the project partners of the LIFE project will be even involved into the implementation of LIFE+ project's actions, used for the continuation, e.g. the larval rearing in Bruch or tasks of the project's management. Furthermore the After-LIFE Conservation Plan explains how the monitoring measures to detect the projects progress will be organized. Some of the monitoring actions will be implemented in the LIFE+ project's duration and with funding from the EU, however additional measures will be implemented using infrastructures without additional costs to the project. Threats like the suffering of the population in the Gironde watersheds and its influence on the Allis shad project in the Rhine area are as much addressed as the chances arising from the extension of the institutions, partners and supports contributing to the LIFE+ phase.

The After-LIFE-conservation plan is listed in Annex 9.22.

6 Problems encountered

6.1 The Allis shad population in the rivers Garonne and Dordogne

Until recently, the Allis shad population of the Garonne – Dordogne watershed was considered as having the best status in Europe. A drastic decrease of the number of adults in the migration runs appeared in 2005 and continued in the years 2006 -2008. In 2008 the lowest number was recorded in the Garonne – Dordogne watershed since the beginning of the monitoring. A complex combination of factors seems to be responsible for this decline. A detailed comment on the actual status of the Allis shad population of the Garonne – Dordogne watershed has been prepared by the two French project partners CEMAGREF and MIGADO in the first progress report. Since 2008 a moratorium on the Allis shad fishery is in place. In 2009 this moratorium was tightened and the Twaite shad fishery was already closed for amateur fishermen in the middle of April. It has been shown that Allis shad by-catch occurs with the Twaite shad fishery. For the first time since 2005 the numbers of Allis shad at the Golfech fish lift in the Garonne River increased again in 2009 with a total of 1856 fish. In addition to that the Tuilières fish lift at the Dordogne River was re-opened and 5635 Allis shad were recorded there (see table 5). Although the number of Allis shad detected at the Golfech fish lift on the Garonne increased considerably in 2010 at the same time the number of shads detected at the Tuilières fish lift on the Dordogne was the lowest in the time the facility was operating. The reasons for the decline are not understood yet and will be approached within the already approved LIFE+ Allis shad project.

Table 5: Allis shad numbers at the fish lifts in Golfech (Garonne) and Tuilières (Dordogne) since 2003

Year	Golfech	Tuilières
2003	22269	23835
2004	19993	30106
2005	18306	15975
2006	9671	0
2007	2979	0
2008	1464	0
2009	1856	5635
2010	9403	789

7 Evaluation and Conclusions

Project implementation

a. The process

Project implementation started quickly after the beginning of the LIFE project in January 2007. This was possible because the beneficiary and the project partners already worked together closely in the feasibility study of the project since 2003. In 2007 a focus was laid on the development of the shad fish farm in Bruch, training of fish farmers, mapping of potential spawning and stocking sites and the public relation work including the LIFE website, flyer, project exhibition and documentary. A delay occurred in the practical part of the training of the fish farmers and marking and rearing experiments at the CEMAGREF research facility because of extreme weather conditions and a low number of returning adults. This was not problematic because the actions could be postponed in the following year without a delay in other actions. The development of the shad mass production facility was planned during several meetings in 2007 in France and Germany and the construction was finalised in April 2008. Larvae production started in May 2008. However, flooding in winter 2006 meant that the fish lift in Tuilières on the Dordogne could not be used to catch parent fish as planned. Moreover, the number of migrating fish had been declining sharply throughout the Gironde system since 2005. The insufficient number of parent fish meant that only 500,000 marked Allis shad larvae could be transported to Germany during the first production year rather than the 1,000,000 planned. However, in subsequent years, the more professional facilities and the expertise gained brought about steady improvements at all production levels, as a result of which net larva production rose considerably. Moreover, as the fish lift in Tuilières again became available for catching spawning fish in 2009 and the number of fish observed in the fish lift at the Golfech dam on the Garonne in 2010 showed a slight improvement for the first time since 2005, it was possible to deliver 1.7 million marked Allis shad larvae to Germany in 2009 and no less than 2.6 million in 2010. Despite the unexpectedly low numbers of spawning fish caught, it was therefore possible to produce 4.8 million Allis shad larvae and send them to Germany. Experiments on the influence of wash waves and substrate on the egg and larval development of Allis shad larvae were conducted in the experimental facility of the project partner CEMAGREF in St.Seurin/Isle, France and the wave mesocosms of the University Konstanz, Germany in May/June 2008 and 2009. The results indicate that the influence of artificial wash on the mortality rate of Allis shad larvae may be relatively low. Even when they were just a few days old, Allis shad larvae which had been exposed to a breaking wash for the first time adapted their behaviour within just a few hours, causing them to move into the middle and lowest depths of the water and thus reducing the risk of them being stranded or injured in the bottom substrate. Public awareness campaigns and the dissemination of the project activities were an important part of the LIFE project. This included the production of the website, the 18-minutes project video, a leaf-letter, the EU LIFE Allis shad red wine, installation of information panels in Germany and France, integration in the European Diadfish network, several articles in national and international journals, a project symposium, stocking events in Düsseldorf, Wiesbaden and Cologne, and temporary exhibitions at the Aquazoo Löbbecke Museum in Germany with the first display of living Allis shad in an European aquarium, press conferences and the presentation of the project at national and international meetings and conferences.

b. The project management, the problems encountered, the partnerships and their added value

Management of the LIFE actions was conducted without major difficulties. It was sub-contracted to the Stiftung Wasserlauf under supervision of the beneficiary LANUV. This was possible due to an alteration of the LIFE project proposal at the beginning of the LIFE project. The project was coordinated by Dr. Peter Beeck from January 2007 but he resigned his contract in August 2010 around 5 months before the end of the LIFE project. However, the new project manager Dr. Andreas Scharbert took over his position without delay and all actions could be conducted as planned with the previous project manager. Dr. Andreas Scharbert is an experienced fish ecologist and will also coordinate the follow up LIFE+ project. The already established partnerships helped a lot to coordinate the different actions which were conducted in Germany and France. Added value for the goals of the LIFE project could be generated for different actions:

1. Construction of the LIFE Allis shad fish farm in Bruch

The new LIFE Shad fish farm is constructed in the existing hatchery of the Fédération départementale de la Pêche 47 (FD47) in Bruch near the Garonne River. The FD47 invested in the extension of the existing fish farm in order to enable the LIFE project to install the shad production and rearing system. This extension was done by FD47 without any costs for the LIFE project.

2. Duplication of the LIFE documentary

The Stiftung Wasserlauf, where the project management is situated, was able to apply for an additional funding at the HIT Umwelt- und Naturschutzstiftungs GmbH for a duplication of the documentary (500 copies, funding; 2700 Euros)

3. Genetic analyses of the stocking material

This action was in the original proposal of the LIFE project but was eliminated in the review stage. Because the project management believes it is important to characterize the founder population and compare returning Allis shad to the Rhine system with other populations the Stiftung Wasserlauf was able to apply for an additional funding at the HIT Umwelt- und Naturschutzstiftungs GmbH to make genetic analyses of the stocking material and new catches of Allis shad in the Dutch part of the River Rhine (Costs: 7.500 Euros)

4. The LIFE Allis shad red wine

The Bordeaux filling of the LIFE Allis shad wine bottles was paid by the Stiftung Wasserlauf (costs: 750 Euros).

5. Aquazoo Löbbecke Museum

The office of the project management is in the Aquazoo Löbbecke Museum, a large aquarium in Düsseldorf. This had several positive impacts on the project implementation: The project exhibit with more than 250.000 visitors could be displayed without any costs, the seminar rooms can be used without any additional costs (e.g. for talks, symposia, international workshop, press conferences), the project can be presented at regular visitor days in the museum (e.g. museum's night, World Ocean Day, dinner debate of NRW politicians). Living Allis shad will be exposed from 2011 onwards.

6. Migratory Fish Programme NRW

The Allis shad project is one of the main components of the Migratory Fish Programme NRW and public relation work can be combined in many occasions.

7. Additional scientific publications

Additional publication were prepared surpassing the LIFE proposal (see Annex 9.23)

c. Success and failures

Development of Allis shad mass production could be successfully transferred into practice and the first European Allis shad fish farm is in operation since May 2008. During the LIFE project three production periods were conducted in the years 2008-2010. In these three production periods the established mass production techniques could be reproduced every year very successfully. In addition, the survival rate of incubated eggs, for example, rose from 25% in 2008, the year in which larvae were first produced to restock the Rhine system, to 65% in 2010. Over the same period, the larva survival rate rose from 49% to a good 95%. With reference to the number of larvae produced per Allis shad female, this means that numbers were multiplied by a factor of 2.6 between 2008 and 2010 alone. Economic feasibility was also proven because the mass production costs were well within the estimated calculations of the LIFE proposal. The main limiting factor for Allis shad mass production was the availability of mature fish for artificial reproduction. This situation occurred in the years 2000-2009 where the shad spawning runs were very low and the Tuilleries fish lift was not in operation. However, the improvement of mass production techniques during the LIFE project could compensate these limitations almost completely and a total of 4.8 million larvae were produced and stocked to the Rhine River. This equals 96% of the planned larvae output of 5 million shad larvae. Mass production techniques will be published in the Special Issue of the LIFE project conference proceedings. Mass marking of Allis shad larvae had a 100% success rate and the techniques were published in an international journal (see Annex 9.8). Some minor problems could be observed during stocking activities in the Rhine system in 2008, which was due to transportation techniques not fully developed and the release of larvae during daylight and increased predation induced mortality through highly abundant river born YOY fish. However transport conditions and stocking operations could substantially improved and no mortality was observed henceforth

d. Comparison against the project-objectives

The key action of the LIFE project was the development of Allis shad mass production, the installation of the first European Allis shad fish farm and the production and stocking of 5 million shad larvae to the river Rhine. Despite the above mentioned limiting factors of the Allis shad mass production, it was possible to produce 96% of the planned larvae output. This is a very good result because there was no information about Allis shad mass production available in Europe and all improvements and developments were made by the project partners. First returning adults are expected from 2013 onwards but in autumn 2010 a fisherman at the River Rhine close to the Dutch border caught 30 juvenile Allis Shad on their downstream migration to the North Sea. All fish were in good health without injuries and a total length which is comparable to the lengths of shad juveniles in French rivers. This underlines that the project objective to restore the Allis shad population to the Rhine River is possible and a first, very important, step was taken within the LIFE project period.

e. Environmental benefits

The restoration of the Allis shad population to the River Rhine system has a clear conservation benefit for this species because it would restore one of the most important populations in the former Northern distribution range of the species. Because it is well known that individuals of an existing

population are straying into other river systems, the restoration of Allis shad to the Rhine may also improve the restoration to neighbouring river systems. The development of mass production and mass marking techniques are now available and can be used if other European populations are suffering from extinction.

It also very important to note, that the number of mature adults which have to be removed from the donor rivers in France could be significantly reduced during the LIFE project which clearly reduces the impact on the population.

After the submission of the LIFE proposal a strong decrease of the return rates was observed in the donor population in the rivers Garonne and Dordogne. This led to a moratorium of the Allis shad fishery in these rivers in 2008-2010. The main components of the moratorium are:

- Close of the Allis shad fishery in the estuary and in the rivers Garonne and Dordogne
- Close of the Twaite shad fishery in the estuary and in the rivers Garonne and Dordogne from 15 May onwards.

In 2008 the Twaite shad fishery was closed on 15 May for professional and amateur fishermen. In 2009 and 2010 the moratorium was tightened and the Twaite shad fishery was closed for amateur fishermen already in the middle of April. Due to the good beginning of the Allis shad spawning run in early May 2010, the moratorium was stopped for a period of two weeks at the beginning of June 2010.

In addition to that, the beneficiary LANUV was involved in ecological audits where actions could influence Natura 2000 sites of the River Rhine in NRW (e.g.: extension of the “Godorfer Hafen” near Cologne, modification of the Rhine riverbanks below the confluence of the River Sieg to the Rhine) and thus, also the success of the LIFE project. In all cases, no major effects were expected. However, this demonstrates the political impact of the project and it ensures that negative impacts can be minimised or eliminated during these audit processes.

It is also very important to note that stake holders and policy makers along the River Rhine are aware of the goals of the LIFE project. Fish pass construction plans in two tributaries of the River Rhine (Koblenz dam on the River Moselle and the River Nahe) were modified to enable the upstream migration of Allis shad into these rivers in 2010 (Jörg Schneider, BFS, personal communication). In both cases the fish passes were planned at the first dam upstream the confluence to the Rhine River and thus, will ensure a possibility for the re-colonisation of these rivers in the future. The obsolete fish way at the lowest dam on the river Main near Kostheim is currently under assessment and probably modernized even with regard to the requirements of shads (Christian Köhler, RP Darmstadt, personal communication).

f. Innovation, demonstration value

Before the start of the LIFE project in 2007 no European fish farm was able to conduct Allis shad mass production and mass marking. The techniques used in the LIFE project were developed in the U.S. for the closely related American shad (*Alosa sapidissima*). During the feasibility study in the years 2003-2005 it was tested together with the 2 French project partners CEMAGREF and MIGADO and American experts if these techniques were transferable to the European Allis shad and the results were very promising. However, these studies were done on a rather small scale (up to 100.000 larvae). Within the LIFE project we could demonstrate that Allis shad mass production and mass marking is possible and we established the first European Allis shad farm in Bruch, France with a peak output of 2.6 million larvae per year. The optimised production rates are now several times higher than the production rates achieved in the USA, despite the huge investments made in the American shad repopulation programme. The improved stocking operations led to the proof that stocked larvae grew in juveniles and started their seaward migration as scheduled. They were the first juvenile Allis shad detected in the Rhine system for almost a hundred years. The transfer of

existing know-how to develop restoration plans for related species is innovative. This is underlined by the fact that the project manager was invited to present the project results at the First International Re-Introduction Conference in Chicago, U.S.A in 2008, at a fish conservation conference in Adelaide, Australia organised by the IUCN Freshwater Fish Specialist group in 2009, at the annual meeting of the Italian Ichthyological Society in 2010.

Allis shad mass production, transport to Germany and stocking into the river Rhine could be replicated successfully during the LIFE project in three subsequent years (2008-2010) and with increasing success. Production and stocking protocols were optimised during this project. This led to the development of the shad production manual which is also one of the important outputs of the project (see Annex 9.6). The first project manager Dr. Peter Beeck was a member of the IUCN Freshwater Fish Specialist Group and the IUCN Re-Introduction specialist Group. In addition, the LIFE project is a member of the Diadfish network. This network brings together experts and users of this resource in a joint approach throughout the range of species in question to improve knowledge and to ensure the sustained management of diadromous fish in Europe. At the moment 34 European laboratories and research institutions are incorporated in the network. The International Workshop of the LIFE project was co-organised by these groups and the Diadfish network. Fish ecologists from Portugal, Italy and the USA visited the LIFE fish farm in Bruch in order to learn more about the mass production techniques. Cooperation with the University of Parma, Italy was initiated in 2010. Armando Piccinini visited the fish farm in Bruch in May 2010 and the first project manager Dr. Peter Beeck visited the University of Parma in June 2010. The Italian fish ecologists work on the conservation of the closely related Twaite shad (*Alosa fallax*) in a tributary of the Po river. Interestingly the Italian Twaite shad shows the migration behaviour of Allis shad with long distance migration into freshwater areas. Plans were developed how to install a small scale shad farm in Italy and the project manager and David Clavé from the project partner MIGADO gave advice on the technical part of the installation. Shad rearing techniques are going to be established in fish farms in Germany in the course of 2011 and there has been first request from a planned shad project in the United Kingdom (see part e)

g. Socio-economic effects

Mass production techniques are now established in Europe and can be used for other Allis shad conservation programmes. In the rivers Garonne and Dordogne the Allis shad fishery is still very important and there are still hundreds of fishermen in the rivers and estuaries. Because of the low return rates the fishery was closed in 2008-2010. We now have developed the techniques for Allis shad mass production and transferred them into practice. If the negative trend in the rivers Garonne and Dordogne continues and the population will be threatened with extinction in the future the techniques for a re-stocking and the support of the population are available. These techniques could then be a useful tool for the management of the population and the development of a sustainable fishery in the future. This is also true for other European shad populations with shad fishery (e.g. Loire River) and underlines the positive socio-economic effects of the project results.

h. The future: sustainability, continuation of the project and remaining threats

Restorations of long-distance migratory fish populations are long-term projects and stocking operations have to be conducted for several generation cycles of the species to be successful. Thus, the LIFE project is a first step on the restoration of the species and stocking has to be conducted also after the end of the project. The restoration of Allis shad to the Rhine System is an integral part of the Migratory Fish programme NRW and the LANUV has successfully applied for a LIFE+ project

which combines the restoration of the Allis shad population in the Rhine and the conservation of the Allis shad in the Garonne Dordogne System.

One of the most important points to ensure the sustainability of the LIFE project is the establishment of the Allis shad fish farm in Bruch in France, the development of mass production and mass marking techniques, and the establishment of strong French-German partnerships. This enables the LANUV to continue stocking operations in the LIFE+ project in the period 2011-2015.

One of the main, but also new, threats for the restoration of Allis shad to the Rhine, and also the conservation of Allis shad in Europe, is the decline in the return rates in the Garonne and Dordogne in the years 2005-2009. This population was the biggest population in Europe and a breakdown might have significant impacts on neighbouring populations. In addition this will have consequences on the production of stocking material for the River Rhine system. Thus, all stakeholders in the present LIFE project in France and Germany believed, that it was necessary to develop actions in France and Germany to conserve the population in France and restore the population in the Rhine which eventually went into the new LIFE+ project. The strong decline in the return rates was unforeseeable at the submission of the LIFE project in 2005.

Other potential remaining threats for the restoration of Allis shad to the River Rhine system are problems in the upstream migration of Allis shad (storm surge barriers in the Netherlands, dams in the tributaries e.g. Main, Mosel, Neckar) and the shipping in the Rhine River. The impact of these threats for the restoration of the species is difficult to assess. The re-opening of the storm surge barrier “Haringvliet” was stopped by the new Dutch government in autumn 2010. The further development is unclear. The authorities in North Rhine-Westphalia, accompanied by these of other rhinebordering states and the ICPR, are currently negotiating with the Dutch government to find a solution. The LANUV has demonstrated his point of view in interviews given to Dutch broadcasting companies and newspaper journalists in order to forward this to the Dutch public. The modification of fish pass design in tributaries of the Rhine River within the duration of the LIFE project will help to overcome the problems in upstream migration of Allis shad and promote the re-colonisation of these rivers in the future. The results of the experiments of navigation induced waves on shad larvae at the University of Konstanz demonstrated only minor impacts on shad survival and the larvae showed a fast adaptation of their behaviour to wave events.

i. Long term indicators of the project success

At the moment the Allis shad population in the River Rhine is extinct. There are no active spawning grounds, no proofs of juvenile Allis shads in the river, no detection of maturing shads in the estuary and the North Sea. There are only single observations of mature Allis shad in the new fish passes in Iffezheim and Gambsheim and single accidental catches of Allis shad by amateur fishermen. Genetic analyses of the feasibility study were not able to detect a genetic integrity of these Rhine shads in comparison with other European populations. The mean duration of the Allis shad life cycle is 5 years and first stocking in the Rhine was conducted in 2008. Thus, first returners to the river Rhine coming from the stocking operations are to be expected from 2013 onwards. Quantifiable indicators for the success of the project could then be:

1. Detection of juvenile Allis shad in the river and estuary
2. Increase of mature shads at the fish passes in Iffezheim and Gambsheim
3. Detection of maturing shads in the estuary and the North Sea

4. Detection of active spawning grounds in the Rhine River

The big advantage for the quantification of the success of the project is that all released individuals are marked. If there is an increase of Allis shad in the Rhine River in the following years it is possible to determine if they belong to the stocked individuals or if they belong to natural recruitment. In addition, the mass marking of all released animals will help to monitor the long term success of the project, i.e. the establishment of a natural population. For example, at the beginning of the restoration project of the American shad in the Susquehanna River, USA, most of the returning shads were marked. However, in the following years the percentage of unmarked individuals gradually increased a clear sign for the establishment of a natural population. A detailed plan how to monitor the long term indicators of the project success and the corresponding actions is given in the management plan of the project (see page 32, Annex 9.1).

j. Effectiveness of the dissemination activities

The dissemination of the project results was very effective. This can be determined by a number of factors. First of all, stocking events and press conferences in Wiesbaden, Cologne and Düsseldorf generated not less than 120 press, radio and television articles and more than 144 reports in online-media (see Annex 9.15). In addition the LIFE project website received in some months more than 2000 clicks/month and if you type “LIFE Projekt Maifisch” in Google you will get 1470 hits. Additional awareness was raised in conjunction with press releases and conferences on the catch of juvenile shads on the lower Rhine in October 2010. When searching the German Wikipedia encyclopaedia for the item “Maifisch” the hit result gives reference to the LIFE project and links to the project’s website. The temporary project exhibition in the Aquazoo Düsseldorf visited up to 120.000 visitors per year. School class programmes in Cologne and Düsseldorf sensibilised pupils for the nature conservation activities and the project documentation was sent to all secondary schools in NRW which are situated close to the Rhine River. But dissemination activities were not only effective on a national scale. At the end of the project some request for experiences with re-establishing Allis shad and shad rearing techniques came from the United Kingdom where a shad project is looking forward to start. The respective project manager is going to visit the fish farm in Bruch in the rearing period 2011. The request for technical publications on shad rearing and marking techniques has even increased. The projects website draw the attention of the American shad Potamac river projects manager and there has been some exchange on the both shad projects so far. The LIFE project conference (First International Workshop on the Restoration of Fish populations) was attended by over 100 participants from 22 different countries (Europe and worldwide). The project manager was invited to give presentations about the project in the UK, the USA, Italy and Australia. In 2008 the project was voted as best European maritime project and received the European Regional Champions Award by EU Committee of the Regions and the Parliament magazine. The Allis shad red wine was also an effective tool the dissemination of the project results. During seminars, open days or meetings with politicians the red wine could be used as a starting point for a discussion about the project goals (e.g. dinner debate for the NRW politicians organized by the Nature and Biodiversity Conservation Union (NABU) in the Aquazoo).

8 Comments on Financial Report

8.1 General comments

From the beginning of the LIFE project in January 2007 to 31st December 2010 the total expenditures were **949.794,78** Euro including non recoverable VAT, which corresponds to nearly 100 (99,32) % of the total project budget. The beneficiary LANUV (and the former beneficiary Bezirksregierung Arnsberg) as well as the project partner MIGADO were not able to recover VAT. The project partner CEMAGREF was able to recover 9% of the French VAT in 2007 and in 2008-2010 CEMAGREF was able to fully recover VAT. Calculations of VAT for CEMAGREF expenditures in the financial excel sheet were made accordingly. The corresponding VAT certificates can be found in Annex 9.26 in the financial report. No major discrepancies between the projected project costs and the real project costs occurred after all and all modifications were within the 10% rule for project cost alterations.

Table 6: Incurred cost summary

Cost category	Total cost according to the Commission's decision*	Total costs incurred from the start date to 31.12.2010	%**
1 Personnel	272.315,00	275.996,40	101
2 Travel	58.334,00	54.012,09	93
3 External assistance	478.017,00	474.515,25	99
4 Durables: total cost	49.500,00	47.456,64	96
5 Land purchase			
6 Consumables	18.013,00	17.268,08	96
7 Other costs	38.776,00	35.263,26	91
8 Overheads	41.394,00	45.283,06	109
SUM TOTAL	956.349,00	949.794,78	99

*) or, if there has been an additional clause with budget modification, to the revised budget included in that additional clause

**) Calculate the percentages by budget lines: How many % of the budgeted costs are incurred by 31.12.2010

8.2 Personnel costs

8.3 Travel costs

8.4 External Assistance costs

8.5 Equipment costs

8.6 Consumable material costs

8.7 Other costs

8.8 Overheads

9 Annexes

9.1 A.1 Managementplan

- 9.2 A.2 Scientific Publication: Jatteau, P., Rouault T., Beeck P., Clave D. & Williot P. (2011 in press): Induced spawning and larval rearing in Allis shad. Prospects for restocking projects, Journal of Applied Ichthyology supplement**

9.3 Scientific Publication: Stoll & Beeck (in preparation for publication_A): Habitat use patterns of young Allis shad (*Alosa alosa*) exposed to surface waves

9.3 Scientific Publication: Stoll & Beeck (in preparation for publication_B): Post-release stranding rates of stocked allis shad (*Alosa alosa*) larvae exposed to surface waves

9.4 A.4 Mapping of potential spawning habitats of the Allis shad in the Rhine system

9.5 A.5 Mapping of stocking habitats

9.6 A.2 Handbook on Allis shad rearing

9.7 D.3 Handbook on Allis shad marking

9.8 D.3 Scientific Publication: Lochet, A., Jatteau P. & Rochard E. (2009) A reliable method to assess mark quality on fish otoliths, Fisheries Management & Ecology, 16, 508-513

9.9 E.1 Documentary to the LIFE Allis shad project (DVD)

9.10 E.1 Flyer to the LIFE Allis shad project

9.11 E.1 LIFE conference abstract book

9.12 E.1 Poster presentation of the LIFE Allis shad project

9.13 Project presentations and events

Date	Place	Event
24.01.2007	Düsseldorf	Meeting Migratory Fish Programme NRW
30.01.-03.02.07	Dortmund	Trade Fair Fishing&Hunting
01.03.2007	Düsseldorf	City of Düsseldorf, Environment Committee
08.03.2007	Düsseldorf	City of Düsseldorf, Culture Committee
18.03.-20.03.07	Bordeaux	Meeting CEMAGREF
24.03.2007	Geseke	Fisheries Association NRW
27.03.2007	Köln	School project Abwasserforum
05.04.2007	Düsseldorf	LIFE Working Group
19.04.2007	Frankfurt - Flughafen	River Main Symposium
01.05.2007	Köln Poll	Poller Maispill, Historic shad festival
01.05.2007	Düsseldorf	World Ocean Day
20.05.2007	Sieg, Bergheim	International Museum's Day
8.-15.9.07	Cavtat, Croatia	EUROPEAN CONGRESS OF ICHTHYOLOGY
21.10-26.10.07	France	Meeting CEMAGREF
12.08.2007	Düsseldorf	Aquazoo Seminar
30.10.2007	Hennef	Water Engineers Meeting
13.12.2007	Hamm	Meeting of all NRW Life projects
12.03.2008	Aquazoo, Düsseldorf	Parlamentarischer Abend NRW Landtag, Screening of the documentary, talk, wine tasting
16-19.3.08	Chester, UK	FFSG Annual Meeting, talk
15-17.4.08	Chicago, USA	Reintroduction Conference, talk
01.05.2008	Köln	Poller Maispill, screening of documentary
06.05.2008	CEMAGREF, Frankreich	Talk
20.05.2008	Düsseldorf	Talk Düsseldorfer Jonges
03.06.2008	Wiesbaden	Gewässernachbarschaften Rheinland-Pfalz, Hessen, Talk, screening of documentary
08.06.2008	CEMAGREF, Frankreich	Talk
09.06.2008	Aquazoo Düsseldorf	World Ocean Day 2008
17.06.2008	Düsseldorf	Agnes Miegel Realschule, Talk, screening of documentary
24.06.2008	Düsseldorf	Stocking, press conference, wine tasting
4-5.9.08	Hamm	Life Lippe Tagung, wine tasting
22-26.9.08	Konstanz	DGL conference, Talk
21-23.10.08	Frankreich	Talk
25.10.2008	Olpe	NRW Fischereitag, talk, screening of documentary
29.10.2008	Düsseldorf	Ausbildung Wasserbau, Vortrag, presentation documentary
17-19.11.08	Brüssel	LIFE Natur Konferenz, Poster, Flyer
22.11.2008	Düsseldorf	Angeljugend Düsseldorf, Film u. Vortrag, presentation documentary

Date	Place	Presentations and events
14.01.2009	D-dorf-Benrath	Talk Angling Supervisors
29.01.2009	Koblenz	Talk ICPR Fish Experts meeting
26.03.2009	Düsseldorf	Project presentation with project video demonstration for local people at the Aquazoo
04.05.2009	Bordeaux, France	Presentation of the project at the Conseil Régional d'Aquitaine, Meeting for after Life actions
28.05.2009	Düsseldorf	Talk Marie Curie Gymnasium, Aquazoo
2.6.-5.6.09	France	Monitoring visit Mr. Böhringer, Visit Shad hatchery with American and spanish experts
05.06.2009	Bordeaux, France	Presentation of the project at the Conseil Régional d'Aquitaine, Meeting for after Life actions
12.06.2009	Wünseradiel, NL	Meeting Fishermen NL, Project presentation
19.06.2009	Wiesbaden	Shad stocking and press conference with Environment Ministers of Hessen and NRW
26-28.6.09	Biblis	Maifischbesatz, Ex Situ Haltung
1-2-7.09	Konstanz	Project presentation at the University of Konstanz, Biology students
31.8.09-5.9.09	Düsseldorf	International LIFE Conference with talk and poster presentation
22.09.2009	Monheim	Talk at the strategy meeting of the Diadromous Fish programme NRW
08.10.2009	Utrecht	Talk, Rijkswaterstaat Haringvliet workshop
20.11.09-2.12.09	Australia	Talk IUCN conference, Adelaide, Australia
26.1.-28.1.2010	Molfsee	Talk, LIFE Admin Workshop
19.02.2010	Albaum	Visit Environment Minister NRW, Project Presentation, Allis shad wine tasting
27.02.2009	Wildeshausen	Talk, AFGN Conference
27.03.2010	Düsseldorf	Talk, ZGAP ZOOLOGICAL SOCIETY FOR THE CONSERVATION OF SPECIES AND POPULATIONS Conference
26.-29.4.2010	Freiburg	Talk, International Commission for the Protection of the River Rhine conference
16.06.2010	Cologne	Shad stocking and press conference with Environment Ministers of Hessen and NRW
13.11.2010	Sansepolcro, Italy	Invited Talk, Annual Conference of the Italian Ichthyological Society
16.11.2010	Düsseldorf	Talk at the strategy meeting of the Diadromous Fish programme NRW
20.11.2010	Neu-Isenburg	Invited Talk, nature conservation seminar of the german sportangles association

9.14 Information boards to the LIFE Allis shad project

9.15 Media output

9.15.1 Print media

Date	Newspaper/Journal	Article title
01.08.2007	Fischerei und Gewässer in Rheinland-Pfalz	
08.08.2007	Umwelt kommunale ökologische Briefe 16/07	
19.07.2007	Rheinische Post	Maifisch kehren in den Rhein zurück
19.07.2007	Bild Zeitung	Ich schenke dem Rhein 5 Millionen neue Fische
19.07.2007	Express	Nach 100 Jahren: Der Maifisch kehrt zurück
19.07.2007	Neue Rhein Zeitung NRZ	Ein Fisch wird kommen ...
13.07.2007	Bild Zeitung	Seltene Fische wieder im Rhein
12.07.2007	dpa Pressemeldung	EU-Projekt: Im Rhein sollen wieder Maifische schwimmen
07.03.2007	Rheinische Post	Maifisch soll im Rhein ausgesetzt werden
08.05.2007	Kölner Stadtanzeiger	Echte Maifische in Poll
01.03.2007	Fischwaid 3/07	Maifisch-Projekt am Rhein gestartet
01.05.2007	Rheinischer Fischereiverband	Maifisch-Projekt am Rhein gestartet
25.05.2007	Angelwoche 12/2007	Maifisch-Projekt am Rhein gestartet
25.05.2007	ddp Pressemeldung	Projekt Maifisch
25.05.2007	ad hoc news	Projekt Maifisch
20.07.2007	Die Welt	Der Rhein erhält seinen Maifisch zurück
01.07.2007	Der Hessenfischer Juli 2007	Maifisch-Projekt läuft an / Heringe im Rhein
21.04.2007	Rheinische Post	Wanderfische kehren in den Rhein zurück
30.05.2007	Westdeutsche Zeitung	Mehr Heringe im Rhein
01.01.2007	Europa News Düsseldorf Nr. 11	EU Projekt: Die Wiederansiedlung des Maifischs im Rhein
01.07.2007	Abwasserforum Köln e.V. Infobrief 2/2007	Fische im Rhein - Maifisch
39416	Flussblicke Magazin 2/2007	EU Förderung zur Wiederansiedlung des Maifischs
Dez 07	Visionair - Verstand van Vissen	5 miljoen elften in 2010
01.02.2008	Naturkunde	Ein Wanderfisch kehrt zurück in den Rhein
24.06.2008	Aachener Nachrichten	Maifische in den Rhein ausgesetzt
25.06.2008	Rheinische Post	Schüler und Minister setzen Maifische aus
25.06.2008	Westdeutsche Zeitung	Der Maifisch kehrt zurück
25.06.2008	Bildzeitung	Sauber! Rhein Hering endlich wieder da
24.06.2008	Recklinghäuser Zeitung	Der Maifisch soll wieder im Rhein schwimmen
24.06.2008	Rheinische Post Online	Aktion mit Umweltminister Eckhard Uhlenberg: Maifische im Rhein ausgesetzt
25.06.2008	Westdeutsche Zeitung	Der Maifisch kehrt zurück
25.06.2008	Frankfurter Neue Presse	Der Maifisch soll wieder im Rhein schwimmen
25.06.2008	Wetzlarer neue Zeitung	Der Maifisch soll wieder im Rhein schwimmen
30.06.2008	La Dépêche du Midi	Les Aloses allemandes on un goût de Garonne
17.07.2008	Le Resistant	Le sauvegarde des espèces migratrices
28.07.2008	Frankfurter Rundschau	Neue Heimat für den Maifisch - Jungtiere aus Aquitaine sollen den Rhein bevölkern
04.09.2008	Sud Ouest	5 millions d'alosons partiront pour le Rhin
20.11.2008	Aachener Nachrichten	Projekt zur Wiederansiedlung des Maifischs ausgezeichnet
20.11.2008	Rheinische Post Online	Europäische Auszeichnung für NRW-Maifischprojekt
20.11.2008	Ruhr Nachrichten	Binnenland NRW hat bestes maritimes Projekt Europas
20.11.2008	WAZ	Projekt zur Wiederansiedlung des Maifischs ausgezeichnet
20.11.2008	Westfälische Nachrichten	Binnenland NRW hat bestes maritimes Projekt Europas
21.11.2008	Ahlener Zeitung	Binnenland NRW hat bestes maritimes Projekt Europas

Date	Newspaper/Journal	Article title
20.11.2008	Aachener Nachrichten	Projekt zur Wiederansiedlung des Maifischs ausgezeichnet
Nov 08	Kölner Stadtanzeiger	EU Umweltpreis für den Maifisch
Okt 08	Book chapter: Global Reintroduction Perspectives	Re-Introduction of allis shad to the River Rhine system: Netherlands, Germany & France
Jun 08	Das Tor	Der Maifisch soll im Rhein wieder heimisch werden
Jul 08	Das Tor	Dä Maifisch im Rhing
Aug 08	Het Visblad	Terugkeer van de elft
2008	DGL- Zusammenfassung der Jahrestagung 2008	Der Einfluss von Oberflächenwellen und Bodensubstrat auf die Ei- Und Larvenentwicklung von Maifischen
Ausgab 3/2008	RhFV-Informationsschrift für den Angler	Minister Uhlenberg und Dietzel setzen Maifische im Rhein aus
Ausgab 3/2008	Natur in NRW	Der Maifisch soll zurückkehren
Ausgab 3/2008	Flussblicke Magazin	Comeback des Maifischs
Ausgab 4/2008	Natur in NRW	Die Rückkehr eines vergessenen Fisches
Dez 08	Aquarius	Die Rückkehr der Maifische
Dez 08	Regional Review	Celebrating Excellence - Luc Van den Brande presents this year's Regional Champions awards
Dez 08	LANUV Jahresbericht	Der maifisch kehrt zurück in den Rhein
18.06.2009	Düsseldorfer Express	Der Rhein lebt!
19.06.2009	Bild.de	Millionen Maifisch-Babys in den Rhein
19.06.2009	Südkurier	Millionen Maifisch-Babys in den Rhein
20.06.2009	Lampertheimer Zeitung	In den Fluten des Rheins
20.06.2009	Bürstädter Zeitung	Rückkehr der Maifische
20.06.2009	Badische Zeitung	Maifische kehren zurück
20.06.2009	Frankfurter Rundschau	Die Rückkehr der Maifische
20.06.2009	Frankfurter Neue Presse	Maifische kehren zurück
24.06.2009	Offenbach Post	Rückkehr des Maifischs
01.09.2009	Aachener Zeitung	Maifische sollen wieder in den Rhein
01.09.2009	Aachener Zeitung	Maifische sollen wieder in den Rhein
01.09.2009	Solinger Tagblatt	Neues Leben im Rhein
02.09.2009	Westdeutsche Zeitung	Delikatesse aus dem Rhein
04.09.2009	Bildzeitung	Das saubere Wasser im Rhein macht's möglich Maifisch kommt zurück
3/2009	RHFV Mitteilungen	Maifischbesatz in Wiesbaden
Dec 2009	Lettre d'information sur le programme de conservation de l'Apron du Rhône et de ses habitats	Le Life Grande Alose
Dec 2009	Nieuwsbrief over zoet-zoutvraagstukken	'De Kier: hoeksteen van internationale inspanningen voor de Rijnelt'
Dec 2009	afz-Fischwaid, 4/2009, S. 10-11	Maifische im Rhein
Okt 2009	LANUV intern	Fischexperten aus 22 Ländern bei der ersten Tagung zur Wiederherstellung von Fischbeständen
17.06.2009	Rheinische Post	Maifische kehren in den Rhein zurück
17.06.2009	Aachener Zeitung	Weitere junge Maifische im Rhein ausgesetzt
20.05.2010	Rhein-Sieg Anzeiger	Zweiter Frühling für den Maifisch

Date	Newspaper/Journal	Article title
26.05.2010	Kölner Wochenspiegel	Tradition seit 15 Jahren: Maibaum, Maiumzug und Maifisch
17.06.2010	Kölner Stadtanzeiger	Chance für die Maifische
17.06.2010	Kölnische Rundschau	Zweite Chance für den Maifisch
17.06.2010	Frankfurter Neue Presse	Maifische im Rhein ausgesetzt
17.06.2010	Kölner Stadtanzeiger	Neue Chance für die Maifische
17.06.2010	Grenzecho Eupen	Maifisch bald wieder im Rhein
23.06.2010	Porz Aktuell	Flippies und Glitzer
07.10.2010	WAZ	Erkennungsmerkmal: Grüne Ohren
08.10.2010	Rheinische Post	Etappensieg für Artenschützer
11.10.2010	Express	Kölner Maifische sind die Größten
14.10.2010	Frankfurter Rundschau	Ausgestorbene Art: Wieder Maifische im Rhein
14.10.2010	Kölner Stadtanzeiger	Aus Larven sind junge Fische geworden
17.10.2010	Frankfurter Allgemeine Zeitung	Jungtiere von 34 der einst 44 Fischarten im Rhein
10.11.2010	Kölner Wochenspiegel	Junge Maifische im Rhein gesichtet
17.11.2010	Kölner Wochenspiegel	Ein Infosystem über Maifische ist entlang des Rheins geplant
17.06.2011	Südhessen Morgen	Maifische ausgesetzt
11/2010	Fisch & Fang	Der Maifisch ist zurück
Oct 2010	Aquarius	Die Zucht des Europäischen Maifisches (Alosa alosa)
Dec 2010	LANUV intern	Mai im September
Dec 2010	RhFV Info	Erster Erfolg bei der Wiederansiedlung des Maifisches
Dec 2010	RhFV Info	"EU-Maifischtafel" in Köln-Poll enthüllt

9.15.2 TV

Date	TV-Station	Title	website	type of report
02.05.2007	Center TV Köln		koeln.center.tv	Report
18.07.2007	WDR Lokalzeit Duisburg		www.wdr.de	Interview
18.07.2007	WDR Lokalzeit Düsseldorf		www.wdr.de	News
18.07.2007	SAT1 News NRW		www.sat1nrw.de	News
18.07.2007	Center TV Düsseldorf		duesseldorf.center.tv	News
06.12.2007	Rhein-Main-TV		www.rheinmaintv.de/	Interview
24.06.2008	Sat 1		www.sat1.de	Interview
24.06.2008	WDR Lokalzeit		www.wdr.de	News
24.06.2008	WDR Nachrichten		www.wdr.de	Report
19.06.2009	Rhein Neckar Fernsehen	Millionen Maifisch-Babys in den Rhein	www.rnf.de/	News
19.06.2009	Hessischer Rundfunk	Millionen Maifisch-Babys ausgesetzt	http://www.hr-online.de	News
19.06.2009	Rhein Main TV	Millionen Maifisch-Babys in den Rhein	www.rheinmaintv.de/	News
07.10.2010	WDR-Lokalzeit	Maifische im Rhein entdeckt	www.wdr.de	News

9.15.3 Radio

Date	Radio station	Title	website	type of report
18.07.2007	WDR 2		www.wdr2.de	News
21.02.2007	WDR 2		www.wdr2.de	News
17.04.2007	WDR 2		www.wdr2.de	News
19.07.2007	Antenne Düsseldorf		www.antenne-duesseldorf.de	Report
24.06.2008	WDR		www.wdr.de	News
20.11.2008	WDR		www.wdr.de	News
19.06.2009	SWR 3		www.swr.de	Interview
19.06.2009	WDR 2		www.wdr.de	News
30.10.2009	WDR5 Leonardo Wissenschaftsmagazin		http://www.wdr5.de	Report
09.12.2009	Radio Campus		http://www.infosciences-aquitaine.net	Report/Interview
08.10.2010	Radio Köln	Maifische entwickeln sich gut	www.radiokoeln.de	News
26.10.2010	WDR 5	NRW kulinarisch - Maifisch	www.wdr5.de	dossier/interview
08.11.2010	Radio Köln	Erfolge bei Ansiedlung im Rhein	www.radiokoeln.de	News

9.15.4 Online media

Date	Title	website	host
18.07.2007	Die Rückkehr der Maifische	www.duesseldorf.de	Landeshauptstadt Düsseldorf
21.02.2007	Maifische sollen wieder in den Rhein	www.hr-online.de	HR online
02.03.2007	Maifisch bald wieder auf der Speisekarte	www.wiesbadener-kurier.de	Wiesbadener Kurier
19.04.2007	Gibt es bald wieder Heringe im Rhein?	www.bezreg-arnsberg.nrw.de	Bezirksregierung Arnsberg
21.02.2007	Tagesthemen: Im Rhein sollen bald wieder Maifische schwimmen - EU bewilligt Geld	www.greenpeace-magazin.de	Greenpeace Magazin
21.02.2007	Im Rhein sollen bald wieder Maifische schwimmen	www.baz.ch	Basler Zeitung
23.04.2007	Maifische sollen Rhein besiedeln	www.koelnische-rundschau.de	Kölnische Rundschau
22.02.2007	Wieder Maifische im Rhein	www.abendblatt.de	Hamburger Abendblatt
16.04.2007	Internationale werkgroep Elft	www.sportvisserijnederland.nl	Sportvisserij Nederland
23.05.2007	Maifisch-Projekt am Rhein gestartet	www.fischundfang.de	Fisch&Fang online
12.07.2007	Der maifisch kehrt in den Rhein zurück	www.aachener-zeitung.de	Aachener Zeitung
03.06.2006	Düsseldorf im Rückspiegel: Als Heringe noch en vogue waren	www.duesseldorf-blog.de	Düsseldorf Blog
18.07.2007	Maifisch soll im Rhein wieder angesiedelt werden	www.heute-online.ch	Heute Online
08.06.2007	Umweltminister Wilhelm Dietzel begrüßt die Zusammenarbeit mit der Partnerregion Aquitanien bei der Wiederansiedlung des Maifisches im Rheinsystem	www.hmulv.de	Hessisches Umweltministerium
18.07.2007	Maifisch soll wieder im Rhein schwimmen	www.ngz-online.de	NGZ online
18.07.2007	Maifisch soll im Rhein wieder angesiedelt werden	www.pr-inside.com	PR-inside
06.06.2007	Symposium Life Projekt Maifisch im Aquazoo Loebbecke, Düsseldorf	www.rheinischer-fischereiverband.de	Rheinischer Fischereiverband von 1880 e.v.
29.05.2007	Projekt zur Wiederansiedlung des Maifisches	www.rp-online.de	Rheinische Post online
03.08.2007	LIFE-Projekt Maifisch startet Internetpräsenz	www.rheinischer-fischereiverband.de	Rheinischer Fischereiverband von 1880 e.v.
18.07.2007	Maifisch soll wieder im Rhein schwimmen	www.rp-online.de	Rheinische Post online
11.06.2006	Heimkehrer in den Rhein	www.welt.de	Welt online
03.06.2007	Nordrhein-Westfalen der Woche ist dieses Mal ein Heimkehrer	www.welt.de	Welt online
09.06.2007	Maifisch soll wieder im Rhein schwimmen	www.wiesbadener-kurier.de	Wiesbadener Kurier
18.07.2007	Maifisch soll im Rhein wieder angesiedelt werden	www.epochtimes.de	Epoch Times
30.06.1905	Maifisch	http://de.wikipedia.org/wiki/Maifisch	Wikipedia
05.05.2008	Comeback für den Maifisch - Tier des Monats Mai	www.lanuv.nrw.de	LANUV NRW
20.06.2008	Hessens Ministerpräsident reist im Rahmen einer zweitägigen Reise am 24. und 25. Juni nach Bordeaux	www.stk.hessen.de	Hessische Staatskanzlei
20.06.2008	Hessen und Aquitaine vereinbaren Kooperation mit Schwerpunkt Klimaschutz	www.herbstzeit.de	Hessische Staatskanzlei
24.06.2008	Maifisch-Comeback	www.wdr.de	WDR online
24.06.2008	Maifische in den Rhein ausgesetzt	www.an-online.de	Aachener Nachrichten-online
24.06.2008	Maifische kehren in den Rhein zurück	www.antenne-duesseldorf.de	Antenne Düsseldorf
24.06.2008	Maifische in den Rhein ausgesetzt	http://www.ad-hoc-news.de	ad hoc news
24.06.2008	Maifisch wieder ausgewildert!	http://www.digu-duesseldorf.de	DIGU
24.06.2008	Minister Uhlenberg und Minister Dietzel setzen Maifische im Rhein aus	www.munlv.nrw.de	Umweltministerium NRW
24.06.2008	Der Maifisch soll wieder im Rhein schwimmen	www.rhein-erft-online.de	Rhein-erft-online.de
24.06.2008	Der Maifisch soll wieder im Rhein schwimmen	http://www.recklinghaeuser-zeitung.de	Recklinghäuser Zeitung
24.06.2008	Der Maifisch soll wieder im Rhein heimisch werden	www.rhein-main.net	Rhein-main.net
24.06.2008	Minister Uhlenberg und Minister Dietzel setzen Maifische	www.rhfv.de	Rheinischer Fischereiverband
24.06.2008	Der Maifisch soll wieder im Rhein schwimmen	http://www.westfaelische-nachrichten.de/	Westfälische Nachrichten
24.06.2008	Der Maifisch soll wieder im Rhein schwimmen	www.ruhrnachrichten.de	Ruhr Nachrichten

Date	Title	website	host
24.06.2008	Maifische in den Rhein ausgesetzt	http://de.news.yahoo.com/	Yahoo Nachrichten
24.06.2008	Der Maifisch soll wieder im Rhein schwimmen	http://www.derwesten.de/	WAZ Mediengruppe
24.06.2008	Aktion mit Umweltminister Eckhard Uhlenberg: Maifische im Rhein ausgesetzt	www.rp-online.de	Rheinische Post Online
25.06.2008	Der Maifisch kehrt zurück	http://www.wz-newsline.de/	Westdeutsche Zeitung
25.06.2008	Uitzetting elftenlarven in het kader EU Life project	www.sportvisserijnederland.nl	Sportvisserij Nederland
25.06.2008	Der Maifisch soll wieder im Rhein schwimmen	www.fnp.de	Frankfurter Neue Presse
25.06.2008	Der Maifisch soll wieder im Rhein schwimmen	www.mittelhessen.de	Wetzlarer neue zeitung
26.06.2008	Auffrischung des Fischbestandes: Maifische im Rheinsystem angesiedelt	www.oberkassel.de	Oberkassel.de
28.07.2008	Neue Heimat für den Maifisch - Jungtiere aus Aquitaine sollen den Rhein bevölkern	www.fr-online.de	Frankfurter Rundschau
04.09.2008	5 millions d'alosons partiront pour le Rhin	http://www.sudouest.com/	Sud Ouest
20.11.2008	Projekt zur Wiederansiedlung des Maifischs ausgezeichnet	www.an-online.de	Aachener Nachrichten-online
20.11.2008	Regional Champions Awards 2008: Maßstabsetzende Beispiele für Europa	http://www.cor.europa.eu	Committee of the Regions
20.11.2008	Binnenland NRW hat bestes maritimes Projekt Europas	www.rewirpower.de	Rewirpower
20.11.2008	Europäische Auszeichnung für NRW-Maifischprojekt	www.rp-online.de	Rheinische Post Online
20.11.2008	Binnenland NRW hat bestes maritimes Projekt Europas	www.ruhrnachrichten.de	Ruhr Nachrichten
20.11.2008	Projekt zur Wiederansiedlung des Maifischs ausgezeichnet	http://www.derwesten.de/	WAZ Mediengruppe
20.11.2008	Auszeichnung für Maifischprojekt	www.wdr.de	WDR
20.11.2008	Binnenland NRW hat bestes maritimes Projekt Europas	www.westfaelische-nachrichten.de	Westfälische Nachrichten
21.11.2008	Binnenland NRW hat bestes maritimes Projekt Europas	http://www.ahleiner-zeitung.de/	Ahleiner Zeitung
21.11.2008	Wiederansiedlung des Maifischs ausgezeichnet	http://www.ad-hoc-news.de	ad hoc news
21.11.2008	LIFE project on the re-introduction of allis shad to the Rhine voted 'best European Maritime Project 2008'	http://ec.europa.eu/environment/life/news	EU Life Homepage
01.12.2008	Elftproject wint prijs - beste maritieme project	www.sportvisserijnederland.nl	Sportvisserij Nederland
19.06.2009	Millionen Maifisch-Babys in den Rhein	www.bild.de	Bildzeitung
19.06.2009	Maifische im Juni	www.wdr.de	Westdeutscher Rundfunk
19.06.2009	Bild des Tages	www.n-tv.de	N-TV
19.06.2009	Millionen Maifisch-Babys in den Rhein	www.rmf.de/	Rhein Neckar Fernsehen
19.06.2009	Millionen Maifisch-Babys in den Rhein	www.suedkurier.de	Südkurier
19.06.2009	Millionen Maifisch-Babys in den Rhein	www.ka-news.de	KA News
19.06.2009	Maifische im Rhein ausgesetzt	www.swr.de	Südwestdeutscher Rundfunk
19.06.2009	Millionen Maifisch-Babys in den Rhein	www.kanal8.de	Kanal 8
19.06.2009	Millionen Maifisch-Babys ausgesetzt	www.hr-online.de	Hessischer Rundfunk
19.06.2009	Umweltministerium: Maifisch soll in den Rhein zurückkehren	www.echo-online.de	Echo-Online
19.06.2009	Maifisch soll wieder heimisch werden – 5 Millionen Jungfische bis zum Jahr 2010	www.hmueltv.hessen.de	Hessisches Umweltministerium
19.06.2009	Maifisch soll wieder heimisch werden – 5 Millionen Jungfische bis zum Jahr 2010	www.proplanta.de/Agrar/	Proplanta
19.06.2009	Millionen - Junge Maifische im Rhein ausgewildert	www.newsxl.com	XXL News
19.06.2009	Millionen - Junge Maifische im Rhein ausgewildert	www.ad-hoc-news.de	Ad-Hoc News
19.06.2009	Lautenschläger und Uhlenberg setzen Maifische im Rhein aus	www.hessenfischer.net	Hessenfischer
20.06.2009	In den Fluten des Rheins	www.lampertheimer-zeitung.de	Lampertheimer Zeitung
20.06.2009	Rückkehr der Maifische	www.bürstädter-zeitung.de	Bürstädter Zeitung
20.06.2009	Maifische kehren zurück	www.fnp.de/	Frankfurter Neue Presse

Date	Title	website	host
20.06.2009	Hering schwimmt im Rhein	www.rhein-main-presse.de	Rhein Main Presse
20.06.2009	Maifische kehren zurück	www.badische-zeitung.de	badische Zeitung
21.06.2009	Maifisch soll wieder heimisch werden – 5 Millionen Jungfische bis zum Jahr 2010	www.europaticker.de/	Europaticker.de
24.06.2009	Rückkehr des Maifischs	www.op-online.de	Offenbach Post
26.06.2009	Lautenschläger: Jungfische im Rhein ausgesetzt	www.cdu-wehrheim.de/	CDU Wehrheim - Newsletter
29.06.2009	Das EU Life Projekt geht erfolgreich in das 3. Jahr	www.rhfv.de	Rheinischer Fischereiverband
19.07.2009	Wiederansiedlung des Maifischs im Rhein	www.zoodirektoren.de	Verband deutscher Zoodirektoren
31.08.2009	Lachs und Maifisch kommen zurück in den Rhein	www.agrar-presseportal.de	Agrar Presseportal
01.09.2009	Wonnemonat mit Flossentier - Kehrt der Maifisch zurück?	www.regionale2010.de	Regionale 2010
01.09.2009	Maifische sollen wieder in den Rhein	www.az-web.de/	Aachener Zeitung
01.09.2009	Neues Leben im Rhein	www.solinger-tageblatt.de	Solinger Tagblatt
04.09.2009	Das saubere Wasser im Rhein macht's möglich Maifisch kommt zurück	www.bild.de	Bildzeitung
16.06.2010	Wiederansiedlung: Lautenschläger und Uhlenberg setzen Maifische in den Rhein ein	www.dermerkur.de	Der Merkur
16.06.2010	Umweltminister setzen weitere junge Maifische im Rhein aus	www.wdr.de	Westdeutscher Rundfunk
16.06.2010	Weitere junge Maifische im Rhein ausgesetzt	www.an-online.de	Aachener Nachrichten
16.06.2010	Maifische bald wieder im Rhein	www.dpa.com	Deutsche Presseagentur online
16.06.2010	Wiederansiedlung: Romantischer Maifisch bald wieder im Rhein	www.emsdettenervolkszeitung.de	Emsdettener Volkszeitung
17.06.2010	Frische Maifische - jetzt wieder im Rhein bei Poll	www.report-K.de	Report-k
17.06.2010	Millionen Maifisch-Babys in den Rhein	www.ka-news.de	KA News
17.06.2010	Maifische sollen wieder im Rhein schwimmen	www.welt.de	Welt Online
17.06.2010	Maifische kehren in den Rhein zurück	www.rp-online.de	RP-online
17.06.2010	Neue Chance für die Maifische	www.ksta.de	Kölner Stadtanzeiger online
17.06.2010	Wiederansiedlung: Ministerin Lautenschläger und Minister Uhlenberg setzen Maifische in den Rhein ein	www.munlv.nrw.de	Umweltministerium NRW
17.06.2010	Die Rückkehr des Maifischs im Rhein	www.porzerleben.de	Porzerleben
17.06.2010	Romantischer Maifisch bald wieder im Rhein	www.hellwegeranzeiger.de	Hellweger Anzeiger
17.06.2010	Wiederansiedlung: Lautenschläger und Uhlenberg setzen Maifische in den Rhein ein	www.proplanta.de	Proplanta
17.06.2010	Der Maifisch kommt zurück	www.brd.nrw.de	Bezirksregierung Düsseldorf
17.06.2010	Maifische im Rhein ausgesetzt	www.rodenkirchen.de	Rodenkirchen.De
17.06.2010	Maifische kehren zurück	www.rhein-main.net	Rhein Main Net
21.06.2010	Verdwene Vissoort terug in de Rijn	www.sportvisserijnederland.nl	Sportvisserij Nederland
23.06.2010	Flippies und Glitzer	www.koelner-wochenspiegel.de	Kölner Wochenspiegel
29.09.2010	Allis shad migrate downstream on the Rhine	http://ec.europa.eu/environment/life/news/	Environment- LIFE: News
04.10.2010	Erfolgreich Larven eingesetzt	www.derwesten.de	Der Westen
04.10.2010	Erster Erfolg bei der Wiederansiedlung des Maifisches	www.nrw.de	Landesportal NRW
04.10.2010	Erster Erfolg bei der Wiederansiedlung des Maifischs	www.proplanta.de	Proplanta
04.10.2010	Erste junge Maifische im Rhein entdeckt	www.report-K.de	Report-k - Kölns Internetzeitung
04.10.2010	Wieder Maifische im Rhein bei Kalkar	www.rp-online.de	RP-online
05.10.2010	Die Maifische schwimmen wieder im Rhein	www.welt.de	Welt Online
05.10.2010	Nach Wiederansiedlung erste Maifische im Rhein gefangen	www.abendblatt.de	Hamburger Abendblatt
05.10.2010	Nach Jahrzehnten wieder Maifische im Rhein gefangen	www.rp-online.de	RP-online

Date	Title	website	host
07.10.2010	Erkennungsmerkmal: Grüne Ohren	www.derwesten.de	Der Westen
07.10.2010	Fischer fangen erste Maifische nach Wiederansiedlung	www.wissen.dradio.de	Deutschland Radio Wissen
07.10.2010	Gute Wasserqualität: Wieder Maifische im Rhein	www.ruhmnachrichten.de	Ruhm Nachrichten
07.10.2010	Junge Maifische im Niederrhein seit über 50 Jahren	www.wasserlauf-nrw.de	Stiftung Wasserlauf
08.10.2010	Erfolgreiches Projekt: Wieder Maifische im Rhein	www.morgenpost.de	Berliner Morgenpost
08.10.2010	Erster Erfolg bei der Wiederansiedlung des Maifisches: Im Rhein wurden abwandernde Jungfische gefunden	www.brd.nrw.de	Bezirksregierung Düsseldorf
08.10.2010	Wieder Maifische im Rhein	http://mobil.fr-online.de	Frankfurter Rundschau
08.10.2010	Erfolgreiches Projekt: Wieder Maifische im Rhein	www.grenzecho.net	Grenzecho Eupen
08.10.2010	Hervorragende Bedingungen für Maifische im Rhein	www.pollermaigeloog.de	Poller Maigeloog
08.10.2010	Presserummel im kleinen niederrheinischen Ort Grieth	www.lanuv.nrw.de	LANUV NRW
08.10.2010	EU LIFE-Projekt erfolgreich: Wieder Maifische im Rhein	www.rhfv.de	Rheinischer Fischereiverband von 1880 e.V.
08.10.2010	Etappensieg für Artenschützer	www.rp-online.de	RP-online
08.10.2010	Das Warten hat ein Ende	www.wassernetz-nrw.de	Wassernetz NRW
11.10.2010	Erste junge Maifische seit 70 Jahren im Rhein	www.24pr.de	24 PR - Das Presseportal
11.10.2010	Maifischbesatz zeigt erste Erfolge	www.report-K.de	Report-k - Kölns Internetzeitung
12.10.2010	Eerste junge Elft waargenomen in duitse Rijn	www.sportvisserijnederland.nl	Sportvisserij Nederland
12.10.2010	Erste junge Maifische nach 70 Jahren im Rhein	www.fair-news.de	fair-NEWS.de
13.10.2010	Aus Larven sind junge Fische geworden	www.ksta.de	Kölner Stadtanzeiger online
15.10.2010	Bedeutender Erfolg für EU-Projekt "Maifisch im Rhein"	www.wikinews.de	Wikinews
16.10.2010	Poller Maifische am Niederrhein wiederaufgetaucht	www.myheimat.de	My Heimat.de
17.10.2010	Bedeutender Erfolg für EU-Projekt "Maifisch im Rhein"	http://archiv.c6-magazin.de/06	C6 Magazin
17.10.2010	Erste junge Maifische seit 70 Jahren im Rhein	www.wikinews.de	Wikinews
09.11.2010	Aufstellung Europäische Maifischtafel in Poll	www.k-poll.de	Köln-Poll.de
10.11.2010	Informationstafel zum EU-Maifischprojekt in Köln-Poll enthüllt	www.wasserlauf-nrw.de	Stiftung Wasserlauf

9.16 E.2 Layman's report

9.16.1 Layman's report German language Version

9.16.2 Layman's report English language Version

9.16.3 Layman's report French language Version

9.16.4 Layman's report Dutch language Version

9.17 Final report on shad stocking and monitoring 2010 in Hessen

9.18 Final report on shad stocking and monitoring 2010 in NRW

9.19 Technical publication on Allis shad stocking and monitoring

9.20 Determination sheet for juvenile Allis shad

9.21 Report on monitoring investigations in the Dutch Delta Rhine

9.22 After-LIFE-Conservation plan

9.23 Additional publications from the LIFE project

9.23.1 Aquarius 10.2010

9.23.2 Ingendahl & Beeck 2010: Critical review on the re-introduction of flagship species

9.23.3 OSPAR Commission 2009: Background Document for Allis shad *Alosa alosa*

