THE QUARRY LIFE AWARD

HEIDELBERGCEMENT

**Final report**

**Quarry Life Award 2018**

# Restoration and optimization of the functionality of a secondary channel in Charny-sur-Meuse

## 1. Contestant profile

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|---|---|
| ▪ Contestant name: | **Sébastien CORMONT** |
| ▪ Contestant occupation: | Project leader |
| ▪ University / Organisation | Fédération de la Meuse pour la Pêche et la Protection du Milieu Aquatique (Federation of the Meuse for Fishing and the Protection of the Aquatic Environment) |
| ▪ Number of people in your team: | **1.** |

## 2. Project overview

| | |
|---|---|
| Title: | Restoration and optimization of the functionality of a secondary channel in Charny-sur-Meuse |
| Contest: (Research/Community) | Research |
| Quarry name: | Charny-sur-Meuse (France) |

## Abstract:

Numerous secondary channels (wetlands in permanent or temporary relationship with the current environment through connections that are either surface or underground) of the Meuse River are subject to anthropogenic disturbances. In Charny-sur-Meuse, one of them was classified as “degraded” in 2009 during an inventory. Multiple malfunctions, including hydraulic disturbances from an alluvial quarry operated by the GSM company (French subsidiary of the HEIDELBERGCEMENT Group), were identified. In 2018 the Federation of the Meuse for the Fishing and the Protection of the Aquatic Environment (FDPPMA 55) deepened the diagnosis of the study site by carrying out topographical surveys, a fish inventory and by using radio-tracking data on adult pike. A project was conceived in partnership (25 partners involved) to restore the seconday channel and optimise its functionality for two fish species under threat according to the IUCN France Red List: the pike (VU) and the mud loach (EN). Earthworks were carried out in July 2018, which have improved the connection of the secondary channel with the river Meuse, increased the immersion time of the banks over a surface of 4000 m² and created a pond of 750 m². A fence was also installed to allow extensive and ecological management of the study site. In addition to the works done by the FDPPMA 55, the company GSM will create in the autumn of 2018 a channel between the quarry and the river Meuse which will finalise the hydraulic restoration of the wetland. Finally, post-works ecological monitoring has been defined in collaboration with the Maison Familiale Rurale (MFR) (Agricultural training centre) of Damvillers. Implemented in the form of practical pedagogical work with students, it will measure the evolution of habitats on the study site and the benefits of the operation for the pike and the mud loach.

## Introduction:

The Meuse's alluvial valley is exceptionally rich. The very slow lateral displacements of the river bed and the frequency of the floods favour the presence of diverse and varied wetlands, including the secondary channels (wetlands in permanent or temporary relation with the current milieu by connections that are either surface or underground). A study conducted from 2008 to 2009 by the Meuse Federation for Fishing and the Protection of the Aquatic Environment (FDPPMA 55) has made it possible to map and evaluate the ecological quality of 574 secondary channels throughout the regional administrative area. Of these, 60% are essential sites for the pike reproduction(*Esox lucius*) (species classified as “vulnerable” on the IUCN France Red List) and 24.5% are likely to host mud loach (*Misgurnus fossilis*) (species listed as 'endangered' on the IUCN Red List France), of which the Meuse Valley is one of the last refuges in France. This study revealed that 32% of the secondary channels were disturbed or degraded in the department of Meuse (FDPPMA 55 and ONEMA [L'Office national de l'eau et des milieux aquatiques] (French National Agency for Water and Aquatic Environments) 2009).

The Charny-sur-Meuse secondary channel was classified as “degraded” in this inventory due to the impact of trampling livestock, its low level of connection with the Meuse river and the presence of surface flows from the quarry. A new study, conducted since autumn 2016 by the FDPPMA 55, is starting to deliver its first conclusions. It confirms the dysfunctions of the secondary channel on the life cycle of the pike and highlights the problem of creating quarries in the major bed of watercourses with regard to this specific issue.

All the data available today make it possible to design a project to restore and improve the functionality of the Charny-sur-Meuse secondary channel. The objectives of this project are multiple:

- increase pike reprodcution capacity at the study site (create spawning areas),
- increase hosting capacity for the pond loach at the study site (create habitat areas),
- reduce the impact of the quarry on pike movements in the major bed,
- create new favourable habitats for other sensitive biological compartments (avifauna, odonates, amphibians etc.)

# 1. Methods

## *1.1 Disturbance diagnosis*

To characterise the malfunctions of the secondary channel, the FDPPMA 55 initially relied on the collection of existing data: the inventory of secondary channels of the Meuse river in the department of Meuse (FDPPMA 55 and ONEMA. 2009), an ecological expert opinion of the consulting firm ESOPE and NEOMYS (2010) and a study on fauna and flora by the consulting firm Sciences Environnement (2016). This last document was provided by the company GSM.

To complement the existing studies, the FDPPMA 55 carried out complementary inventories as part of the project and as part of a study carried out on the secondary channels situated between Charny-sur-Meuse and Belleville-sur-Meuse as this sector has been the subject of many restoration operations since the early 2000s.

- Hydraulic expert opinion and topographical surveys

In order to determine the areas of surface connections between the river Meuse and the secondary channel and between the quarry and the secondary channel, a hydraulic survey was carried out in March 2018 by the Public Establishment of the Meuse and its Tributaries (EPAMA) [Etablissement Public d'Aménagement de la Meuse et de ses Affluents] which has a hydraulic model on the study area. This analysis also made it possible to determine the flow rates enabling these different wetlands to be communicated. Some topographic surveys were carried out by the FDPPMA 55 using a theodolite in order to calculate the quantities of soil to be extracted to restore the secondary channel.

- Telemetric monitoring of pike

Since 2016, telemetry monitoring by radio-tracking on 100 adult pike has been carried out between Belleville-sur-Meuse and Charny-sur-Meuse (7.5 km of river) to better understand the movements of the species in the secondary channels (restored and degraded) but also in the minor bed and the major bed of the Meuse. Annex 1 summarises the methodology used for tagging fish and the radio-tracking protocol used. As part of this monitoring, the Charny-sur-Meuse water dependent area was the subject of increased surveillance in 2018 since it is one of the last secondary channel that have not been restored in this sector. Two trainees (Paul MASSARD in the second year of a Master's degree at the University of Lorraine and Guillaume GONZALEZ in the last year of engineering school at ENGEES [École Nationale du Génie de l'Eau et de l'Environnement de Strasbourg] (National School for Water and Environmental Engineering in Strasbourg) carried out 66 radio-tracking surveys between 17 January and 28 June 2018 around the secondary channel and 3 radio-tracking surveys in the GSM quarries on foot or by boat (21/02/2018, 27/04/2018 and 27/06/2018).

- Fish inventory

On 13 June 2018, FDPPMA 55 carried out a fish inventory by electric fishing in the secondary channel. The protocol implemented in the secondary channel is set out in Annex 2. Six people took part in the electric fishing operation, which made it possible to carry out 77 sampling points.

## *1.2 Operating procedure*

The nature of the works was discussed and validated in partnership with a steering committee created specifically for this project, which gathered 20 participants on 6 February 2018. The recommendations formulated by the French Agency for Biodiversity (AFB) [l'Agence Française pour la Biodiversité] and the fauna and flora expertise of the Permanent Centre for Environmental Initiatives (CPIE) [Centre Permanent d'Initiatives pour l'Environnement] were taken into account.

The works were carried out between late July and early September. The schematic representations of the initial state of the site and the project are presented in Annex 3. The description of the works and the operating procedures implemented are detailed in Table 1 and photographs of each operation are presented in Annex 4. FDPPMA 55 worked in total with 25 partners to develop this project. Annex 5 lists all the partners and their respective contributions to the components: Technical/scientific, financial, land/legal, implementation of works and communication.

| Name of the operation | Main objective of the operation | Description |
|---|---|---|
| Creation of a third depression (pond). | Enlarge the habitat area of the mud loach. | A pond with an area of about 750 m² (during low water) was created with a hydraulic excavator. The banks were terraced into gentle slopes on a part of this depression and in steps 40cm high, spaced 2 m wide, on another part. A total of 1400 $m^3$ of soil was extracted using dump trucks. |
| Transfer of mud from the Meuse river towards the created depression. | Create a substrate to stimulate the development of aquatic vegetation and the establishment of the mud loach. | Transfer of 50 $m^3$ of silt taken from the river Meuse at the secondary channel. This operation was carried out with a hydraulic excavator and tractors equipped with watertight skips. |
| Earthworks on the banks of the secondary channel into gentle slopes. | Increase the area of spawning grounds for the pike and other phytophilous species (species depositing their eggs on aquatic vegetation). | The profile of the banks, located on the west face of the water dependent area, were terraced into gentle slopes from the surface of the water to a distance and 5 to 20 m wide. The operation was carried out by a hydraulic excavator and a bulldozer. 1300 $m^3$ of land was evacuated from the site with dump trucks. |
| Creation of a channel between the water dependent area and the river Meuse. | Promote access to the spawning grounds for the adult pike and allow the migration of the juveniles to the Meuse River. | A channel about 5 m wide and 20 cm deep (in summer) was shaped with the hydraulic excavator. Three small channels were created to increase the shoreline linear (helophyte development area). 350 $m^3$ of land was evacuated from the site with dump trucks. |
| Installation of a fence. | Preserve the profile of the banks of the water dependent area and the flora growing there. | A fence was installed over a linear of 170 m. It consists of acacia stakes spaced 8m each (implanted with the hydraulic excavator) and two smooth wire current conductors (manually installed). It thus protects this area from the rest of the site that is grazed. |
| Development of an alluvial forest. | Create a rare habitat type in the Meuse Valley | This operation will be done by spontaneous development of the vegetation. No maintenance and operation will be carried out over this 3000 m² area. |
| Creation of gently sloping banks in the quarry. | Promote the development of moist vegetation (helophytes) favourable for the breeding of fish species, including the pike. | The earth materials from the study site (digging of the pond, earthworks of the banks of the water dependent area into gentle slopes etc.) were deposited on the banks of the quarry by the dump trucks. The earth was next pushed into the quarry with a bulldozer and then terraced into gentle slopes with the hydraulic excavator. |
| Creation of a grassed ditch by GSM. | Stop the surface flows between the quarry and the secondary channel (outside flood periods). | In autumn 2018, the GSM company will create a ditch, or hydraulic threshold, 240 m long and 12 m wide between the quarry and the river Meuse. This development, authorised in the prefectural order of 28/09/2017 authorising the renewal and extension of the quarry, is a common hydraulic measure in the operation of alluvial quarries in the major bed of the watercourse. This action is part of the set of favourable measures for the target species (the pike and the pond loach). |
| Installation of an information board. | Inform and educate walkers about the operation that has been carried out. | Installation of a rot-proof wooden panel (larch). The display board is 140 cm wide and 120cm high and has an information panel (85 cm/120 cm) describing the works carried out. The additional space on the wooden support will allow the posting of temporary news (e.g.: to warn of future activity on the site) since this site is frequented by the walkers. |

***Table 1: List of works implemented on the study site***

## 2. Results

The results presented here are raw. Their interpretation and discussion are detailed in Part 3 of the "Discussion" report.

### *2.1 Telemetric monitoring of the pike*

The lateral movements of the pike are concentrated during the reproduction season and flood periods. During these periods, 34.29% (reproduction periods) and 37.07% (flood period) detections of marked adult pike were conducted in the floodplain and secondary channels compared to only 4.71% during a period known as "Basic" (outside the reproduction season and flood period).

Six detections of marked adult pike were carried out in the Charny-sur-Meuse secondary channel during the reproduction season. Pike No. 104 was detected on 13/03/2017 and on 15/03/2017. Pike No. 124 was detected twice on 20/03/2018, on 23/03/2018 and on 26/03/2018. No marked adult pike were trapped in the secondary channel of Charny-sur-Meuse after flooding and reproduction periods but an individual (No. 123) died in the major bed between the secondary channel and the quarry.

The winter floods of 2018 made it possible to connect the river for several weeks to 10 alluvial quarries that were dug in its major bed, including those of the GSM quarry. Nineteen pike moved into these quarries during this period, 35% of the total number of pike still alive in the study area, and 13 remained trapped in the quarries during the river recession, or 24% of the total number of pike still alive in the study area. Four of them are trapped in the GSM quarry located near the secondary channel of Charny-sur-Meuse. The analysis of the positions of these individuals, as well as the position of the dead pike between the secondary channel and the quarry, suggests that the secondary channel is used as the access channel to the quarry by the pike (Annex 6).

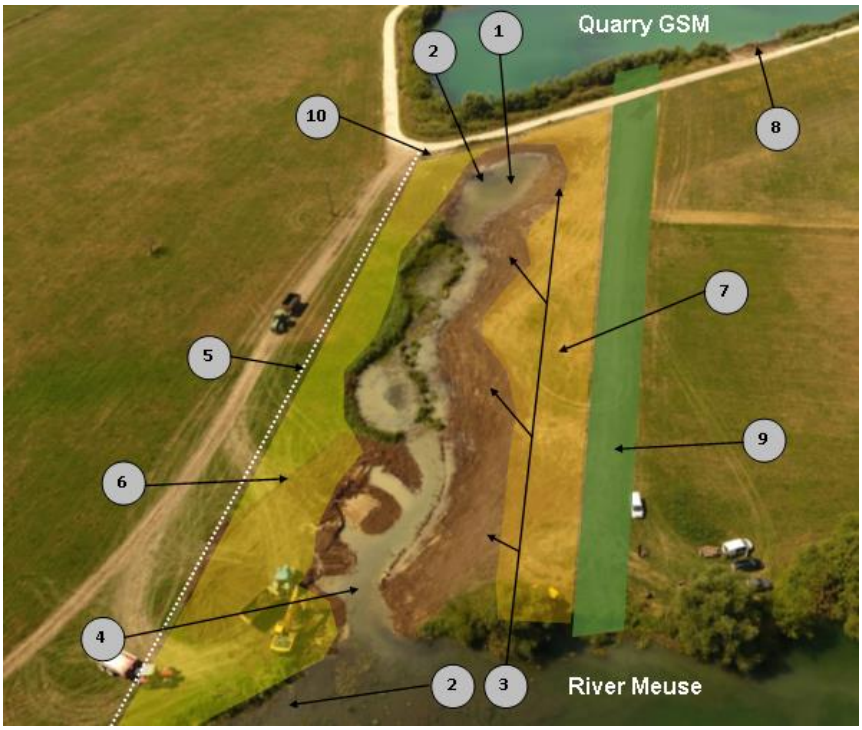
### *2.2 Fish inventory*

The two target species of our project, the pike (*Esox lucius*) and the mud loach (*Misgurnus fossilis*), were inventoried in the secondary channel of Charny-sur-Meuse on 13 June 2018 (Table 2). Forty-one pike juveniles (76 to 232 mm) were caught, or 0.53 pike per sampling point. This result is high compared to inventories carried out at the same time in the secondary channels whose connection is functional with the minor bed (Annex 7).

| Vernacular name | Latin name | Number of individuals | Vernacular name | Latin name | Number of individuals |
|---|---|---|---|---|---|
| Bitterling | *Rhodeus sericeus* | 53 | Mud loach | *Misgurnus fossilis* | 8 |
| Common bream | *Abramis brama* | 2 | Stone loach | *Barbatula barbatula* | 1. |
| Pike (juveniles) | *Esox lucius* (juveniles 0+,) | 41 | Perch | *Perca fluvitilis* | 7 |
| Pike (non juveniles >1+) | *Esox lucius* (non-juveniles >1+) | 0 | Common rudd | *Scardinius erythrophthalmus* | 5. |
| Crucian carp | *Carassius auratus* | 8 | Tench | *Tinca tinca* | 61 |
| Common roach | *Rutilus rutilus* | 25 | Common dace | *Leuciscus leuciscus* | 12 |
| Gudgeon | *Gobio gobio* | 1. | American crayfish | *Orconectes limosus* | 1. |

***Table 2: Result of the fish inventory carried out on the 13/06/2018 in the secondary channel of Charny-sur-Meuse***

### 2.3 Works




| No. | Actions taken | Main results | Principal species benefiting from the action |
|---|---|---|---|
| 1. | Creation of a third depression (pond). | Increase of 215% in the water surface area in the secondary channel during low water period. | Mud loach, pike, amphibians, odonates |
| 2 | Transfer of mud from the Meuse river towards the created depression. | Creation of a muddy substrate allowing the development of aquatic vegetation. | Mud loach |
| 3. | Earthworks on the banks of the secondary channel into gentle slopes. | Increase the duration of submersion of the banks of the secondary channel over a surface of 4000 m². | Pike and other phytophilous fish, avifauna (small and large wader species) |
| 4. | Creation of a channel between the secondary channel and the river Meuse and creation of three small depressions. | Permanent connection between the secondary channel and the river. Possible movement of fish between these two environments all year round. | Pike and other phytophilous fish |
| 5. | Installation of a fence. | Stoppage of cattle trampling on the study site (1.3 ha). | Pike, phytophilous fish, amphibians, odonates, avifauna |
| 6. | Spontaneous development of vegetation to create an alluvial forest. | Creation of new rare terrestrial habitats in the valley of the Meuse over a surface of 3000 m². | Insects, amphibians, mammals, avifauna |
| 7 | Establishment of a late mowing (recommended measure on Natura 2000 site “Vallée de la Meuse”). | Maintain grassland habitats by mowing the grassland after the nesting season. | Avifauna |
| 8 | Creation of banks into gentle slopes in the quarry and spontaneous development of vegetation. | Creation of new semi-aquatic habitats (wetland vegetation). | Pike, phytophile fish, avifauna (small and large wader species |
| 9 | Creation of a grassed ditch by GSM. | Removal of the connection between the quarry and the secondary channel (outside flood periods). Connection of the quarry with the river Meuse from 22 $m^3/s$ (according to the hydraulic model of EPAMA). | Pike, pond loach and all fish fauna |
| 10 | Installation of an information board. | Awareness-raising of the walkers using the municipal road located along the study site. | - |

***Figure 1 and Table 3: Location of actions performed and summary of results***

## 3. Discussions

### *3.1 Restoration of the water dependent area*

For the pike species, the creation of a communication channel between the Charny-sur-Meuse secondary channel and the river will facilitate access for the spawners to the spawning area and especially for the juveniles to migrate to the minor bed to continue their growth. The density of pike juveniles is low in functional secondary channels (permanent or almost permanent connection with the river). On the contrary, the number of juveniles is significantly higher in the secondary channels where the connection with the minor bed is not functional, like that of Charny-sur-Meuse (before the completion of the works). This result supposes that, when the secondary channel is functional, the pike juveniles migrate rapidly into the minor bed, which is confirmed by several scientific publications. The communication channel between the secondary channel and the river could also constitute a spawning area for pike spawners and a nursery area for juveniles. Casselman and Lewis (1996) found this effect on a channel 480 m long and 1.2-1.5 m deep. The three small channel connected to the connecting channel of the Charny-sur-Meuse secondary channel should strengthen the nursery role of the latter.

The lowering of the ground level, achieved by the terracing of the banks of the secondary channel into gentle slopes, will promote the reproduction of pike during dry spring seasons by increasing the surface area of the submerged secondary channel. This action, advocated in the “Technical Guide for the restoration of pike spawning grounds” [Guide technique pour la restauration des frayères à brochet] (UFBAG [Union de Bassin Adour-Garonne] and the Adour-Garonne Water Agency 2014), has become even more important in recent years with the changes in the river's hydrological regime, linked to changes in farming practices and climatic disturbances.

Stagnant, shallow, muddy water with submerged aquatic vegetation is an essential parameter for the mud loach habitat (FDPPMA 55 and ONEMA 2009). These requirements were taken into account in the FDPPMA 55 process to create a third depression connected to the two existing ones on the study site. The organic mud deposition collected in the Meuse river will allow the rapid development of aquatic vegetation and over time increase the degree of siltation of this new environment. The cessation of surface flow between the quarry and the secondary channels will also be a favourable element for retaining the mud loach on the study site and for its progressive colonisation of the new created depression. Finally, the recommendations of the Permanent Centre for Environmental Initiatives (CPIE) of the Meuse were taken into account to create the depression to render this new environment favourable for amphibians and odonates. The depression was dug to a maximum depth of 1.20m and some of its banks were laid out with 40cm high steps (CPIE. 2017).

The trampling of the banks of the secondary channels by cattle causes destruction of the spawning supports, such as the helophytic vegetation, and increases turbidity due to the resuspension of the mud (Vecchio Y. 2010). The installation of a fence makes it possible to stop the impacts of trampling on the secondary channel of Charny-sur-Meuse and makes possible the setting up of an extensive management of the whole plot. The implementation of late mowing on grassland is part of the agri-environmental measures included in the document of objectives of the site Natura 2000 SPA Meuse Valley (Conseil Général de la Meuse (General Council of the Meuse) 2011)) and will be favourable for nesting avifauna. The abandonment of mowing and grazing on part of the study site will result in spontaneous plant recolonisation, a phenomenon shown by Dufour S and Piégay H. (2006). The latter will probably evolve towards an alluvial afforestation which will constitute a wooded strip between the riparian forest of the river Meuse and the developing woods on the banks of the quarry. Dasnias Ph. (2002) explains that hedgerows and woodland strips are prime movers for insects, amphibians and mammals (corridor role) and that they constitute complementary habitats for many wetland species.

### *3.2 Post-works ecological monitoring*

It is impossible to measure all the effects of the works carried out a few weeks after the realisation of the latter. The main objective of the operation is focused on fish species (pike and mud loach); it is necessary to wait a few years to measure the benefits of the operation.

To do this, the FDPPMA 55 has designed a post-works ecological monitoring of the entire study site in partnership with the MFR of Damvillers (Table 4). This action allows an educational component to be integrated into the project because the majority of the monitoring will be in the form of practical work with students training for the Bac Pro Management of Natural Environments and Wildlife [Bac Pro Gestion des Milieux Naturels et de la Faune Sauvage]. The proposed monitoring has been validated by GSM, which owns the lands where all the surveys will take place over the next few years.

| Name of the monitoring | Periodicity | Objectives |
|---|---|---|
| Fish inventory (protocol in Annex 8) | Every three years at the end of May, from 2021 | To evaluate the status of the mud loach population and the extent of its habitat. To assess the quality of pike reproduction in the water dependent area (number of juveniles). |
| Photographic monitoring (protocol in Annex 9 and first monitoring in Annex 10) | Four times a year minimum (once per season) + during the reproduction season of the pike | Visually measure the physical changes in the study site (vegetation, areas submerged during the pike reproduction season). Evaluate the need for maintenance. |
| Monitoring the habitat of the mud loach (protocol in Annex 11) | Once a year (May/June) | Observe the evolution of the three depressions (ponds) with regard to the ecological requirements of the mud loach. |
| Phytosociological monitoring (protocol in Annex 12) | Once a year (May/June) | Observe the evolution of the spontaneous development of vegetation on the study site and assess the need for maintenance. |

### *3.3 Communication*

Many steps have been taken to allow a broad communication around the project on the Charny-sur-Meuse quarry:

- Creation of a steering committee,
- Two articles in the local press (Annexes 13 and 14),
- Thirty publications on the Quarry Life Award blog which has become the preferred means of communication with the project stakeholders over the months,
- Publication of the Quarry Life Award blog postings on the FDPPMA 55 Facebook page,
- Sending of an email to all fishermen in the department of Meuse (7097 people),
- Installation of a sign on the study site, (Annex 15),
- Dissemination of an operation report to the project partners and provision to all the French recreational fishing associations' structures in a digital library,
- Presentation of the telemetry monitoring on pike and the process of restoration of water dependent areas in a documentary made by the association “Reflets d'Eau douce” (Reflections of Freshwater) released in April 2018 (several shots are taken from the study site). Documentary recording more than 9000 views on YouTube at the end of August 2018 and which will soon be broadcast on the TV channel “Chasse & pêche” (Hunting & Fishing),
- Presentation of the project to the employees of Charny-sur-Meuse quarry and drafting of a questionnaire (Annex 16) to assess their understanding of the works carried out,
- Realisation of a site reception with the project stakeholders on 11/09/20188 (13 participants).

Communication about the project will continue in the future thanks to the post-works monitoring that will be carried out on the study site. Some inventories can be carried out in the form of participatory projects with the general public. The secondary channel of Charny-sur-Meuse will be a showcase for illustrating the feasible works on wetlands and quarries. The results of the telemetry monitoring on the pike will be published in a scientific report in 2019 and these will probably be published in a scientific publication in partnership with the design office Profish technology.

### *3.4 Problems of quarries in major bed on fish fauna*

The fish stocksi in alluvial quarries occurs spontaneously when they are connected to the watercourse, either permanently or during floods (Dasnias Ph. 2002). Generally, pike are part of the composition of this fish stocks because the species often migrates laterally from the fluvial axes to the floodplain hydrosytems (Keith P et al. 2011). The FDPPMA 55 telemetry monitoring results confirmed a significant increase in lateral displacements to the secondary channels and the floodplain during the flood periods and the breeding season. It also showed that a significant number of pike remained trapped in the quarries when the floodwaters receded (approximately ¼ of the total number). This situation can be perceived both as a boon, because it allows the species to colonise new environments that are generally favourable for its development (clear water, aquatic vegetation, lystic hydrosytem etc.), and as a disturbance because it leads to a probable decrease in the stock of fish in the watercourse.

In order to avoid and limit the impacts of the quarries that have been dug in the major river bed on fish fauna, the FDPPMA 55 recommends the following courses of actions:

- Limit the movement of fish between the minor bed and the quarries outside periods of heavy floods. This action may consist of installing grids on artificial channels that were created for the operation of the quarry (feasible in the quarries of Charny-sur-Meuse) or ground enhancements at the natural connections if the regulations allow it.
- Restore or create secondary channels that connect to the minor bed of the watercourse before the quarries, as the flow increases. This action, carried out in Charny-sur-Meuse, aims to allow fish in search of areas of refuge or spawning grounds to find favourable sites before the quarries are accessible.
- Carry out development and revegetation work in the quarries to allow the survival and development of fish in these environments. This action makes it possible to maintain a fish population in the quarry whose genetic origin originates from the nearby river. In the case of pollution inducing fish mortality in the watercourse, this stock of fish can be used to repopulate it, either naturally by flooding or artificially by capture and transfer. The treatment of earth materials in the quarry in Charny-sur-Meuse and their terracing into gentle slopes forms part of this measure.
- It is possible to create a permanent communication between a quarry and the minor bed of a watercourse. This action, completed by development and revegetation work, can make it possible to convert quarries into veritable secondary channels. Chancerel F (2003) proposes this type of action on watercourses with little diversity. However, it is important to study this possibility of action on a case-by-case basis as it can lead to hydrological consequences. This type of development is subject to strong regulatory constraints and can in no way be part of an extraction strictly speaking because the regulations prohibit the extraction of materials within 50 metres of the minor bed and within the mobility space of the river.
- Transfer the fish management from the quarries at the end of their operation to the manager of the associated watercourse (generally the Associative Recreational Fishing Structures [Structures Associatives de Pêche de Loisir]). This action makes it possible to set up a coherent management on the fish population of the two environments, which are intimately linked. This fish management must also take into consideration the faunal issues that are often important in quarries in water, particularly ornithological (e.g. preservation of quiet areas).

### *3.5 Added value of the project for the Charny-sur-Meuse quarry*

The project to restore and optimise the functionality of a secondary channel in Charny-sur-Meuse has been beneficial for the GSM company. It has allowed it:

- To have a better knowledge of the wetlands surrounding the quarry,
- To demonstrate its commitment to the restoration of wetlands (conversion of a plot of 1.3 ha, improvement of a condition that was defined as disturbed, financial contribution to the project),
- To be clearly identified as a facilitator in the realisation of environmental projects (prefectural order allowing the recovery of the earth materials of this project and also of future projects),
- To better understand the impacts of quarries located in the major bed of watercourses on fish species (especially on pike) and to have new management approaches to limit these impacts,
- To benefit from a positive image on this project in terms of carbon footprint (transport of earth materials very limited thanks to the treatment of these latter in the quarries),
- Pursue its development of local partnerships on environmental projects,
- Involve employees in the project by their attendance at an information meeting and a site visit after work. Employees also responded to the questionnaire put in place by the FDPPMA 55 as part of the evaluation of the understanding of the works carried out. They obtained a rate of 95% of correct answers.

## Conclusion

A broad partnership approach has made it possible to carry out restoration work and optimise the functionality of a secondary channel at Charny-sur-Meuse. The conducted operation has stopped the malfunctions that had been highlighted on this wetland since 2009, some of which came from the exploitation of the Charny-sur-Meuse quarry. The cessation of surface flows between the quarry and the secondary channel, combined with an improvement in the connectivity of the secondary channel to the Meuse River, will reduce the impact of the quarry on pike movements in the floodplain. The new configuration of the study site suggests the benefits that the operation will have on recruitment capacity for the pike and hosting for the mud loach. These will only be measurable in a few years by the realisation of new fish inventories (programmed in 2021 for the first ones). In the meantime, the rest of the post-works ecological monitoring began on 10 September 2018 in the form of pedagogical practical work with the students of the MFR of Damvillers. This will make it possible to monitor the evolution of the habitats over the entire study site as well as over a part of the quarry.

Finally, the regression of wetland areas is a reality on a global scale. Development work on old quarries and their surrounding environment, such as those carried out in Charny-sur-Meuse, are solutions to be developed for restoring and/or recreating fragile environments rich in biodiversity.

## Bibliography (Annex 17)

## To be kept and filled in at the end of your report

**Project tags (select all appropriate):**

This will be use to classify your project in the project archive (that is also available online)

Project focus:

- ☒Beyond quarry borders
- ☐Biodiversity management
- ☐Cooperation programmes
- ☒Connecting with local communities
- ☐Education and Raising awareness
- ☐Invasive species
- ☒Landscape management
- ☐Pollination
- ☒Rehabilitation & habitat research
- ☒Scientific research
- ☐Soil management
- ☒Species research
- ☐Student class project
- ☐Urban ecology
- ☐Water management

Flora:

- ☐Trees & shrubs
- ☐Ferns
- ☐Flowering plants
- ☐Fungi
- ☐Mosses and liverworts

Fauna:

- ☐Amphibians
- ☐Birds
- ☐Insects
- ☒Fish
- ☐Mammals
- ☐Reptiles
- ☐Other invertebrates
- ☐Other insects
- ☐Other species

Habitat:

- ☐Artificial / cultivated land
- ☐Cave
- ☐Coastal
- ☐Grassland
- ☐Human settlement
- ☐Open areas of rocky grounds
- ☐Recreational areas
- ☐Sandy and rocky habitat
- ☐Screes
- ☐Shrub & groves
- ☐Soil
- ☐Wander biotopes
- ☐Water bodies (flowing, standing)
- ☒Wetland
- ☐Woodland

Stakeholders:

- ☒Authorities
- ☒Local community
- ☒NGOs
- ☒Schools
- ☒Universities

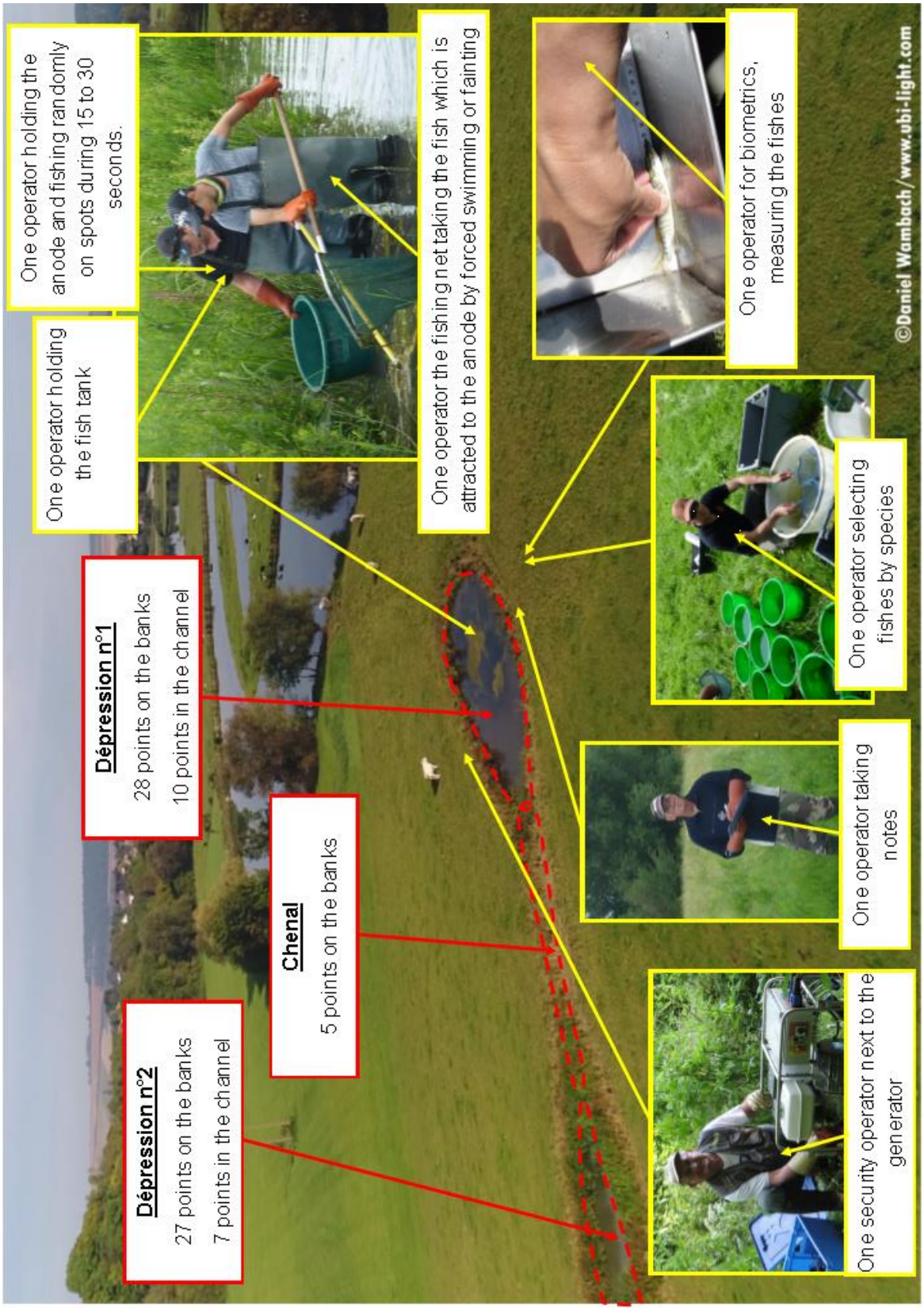
## Annexes to the final report

## Quarry Life Award 2018

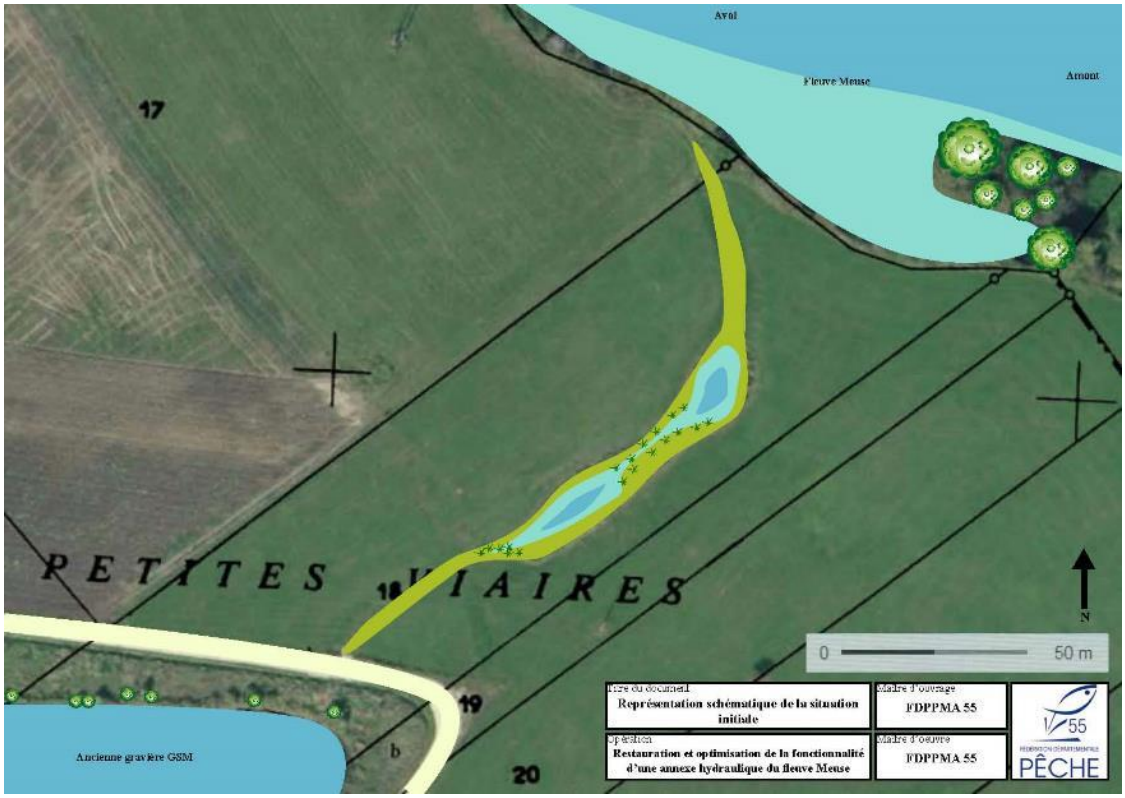
# Restoration and optimization of the functionality of a secondary channel in Charny-sur-Meuse

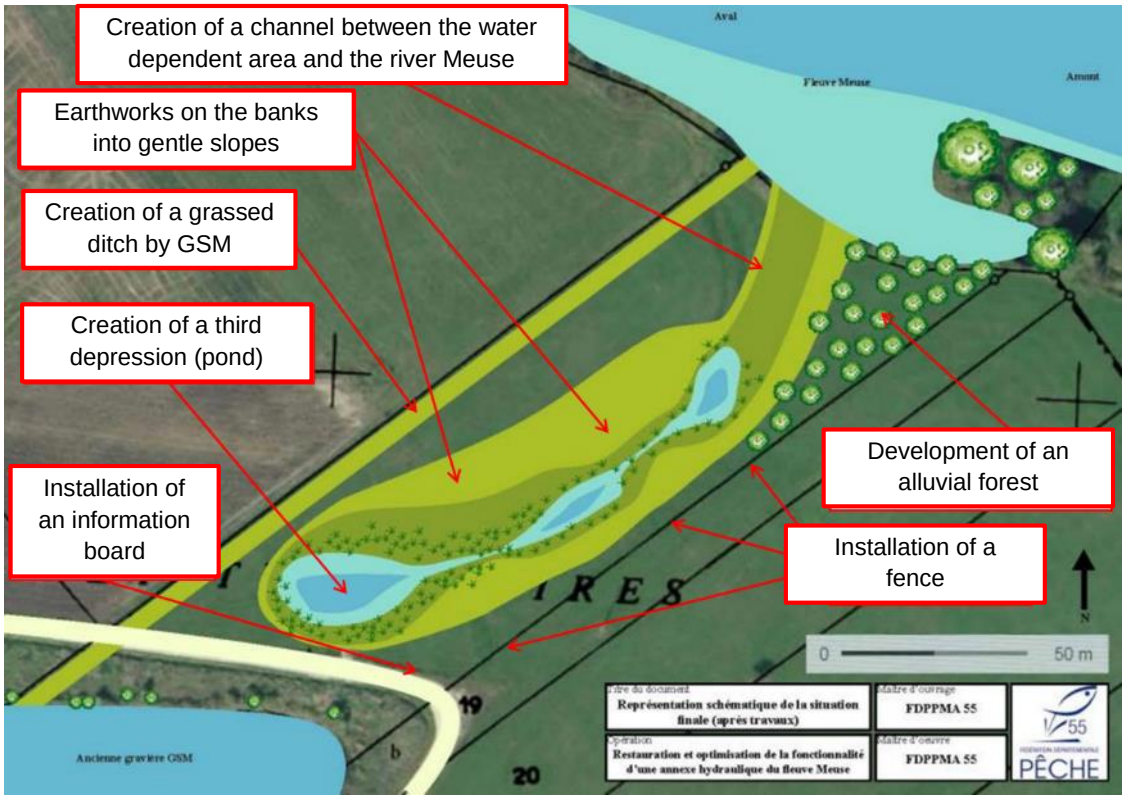
***ANNEX 1: Pike tagging and the radio-tracking protocol im plemented***

***ANNEX 2: Protocol of the fish inventory carried out in the Charny-sur-Meuse secondary channel on June 13, 2018***



***ANNEX 3: Schematic representation of the initial and final state of the project of restoration and optimization of the functionality of a secondary channel in Charny-sur-Meuse***



## *ANNEX 4: Photographs of the different works realized (page 1)*

Creation of a third depression (pond) (24/07/2018)


Transfer of mud from the Meuse river towards the created depression (26/07/2018)

Earthworks on the banks of the secondary channel into gentle slopes (25/07/2018)


## *ANNEX 4: Photographs of the different works realized (page 2)*

Creation of a channel between the water dependent area and the river Meuse (26/07/2018)


Installation of a fence (26/07/2018 and 06/09/2018)

Spontaneous development of vegetation to create an alluvial forest (photographs 21/08/2018)

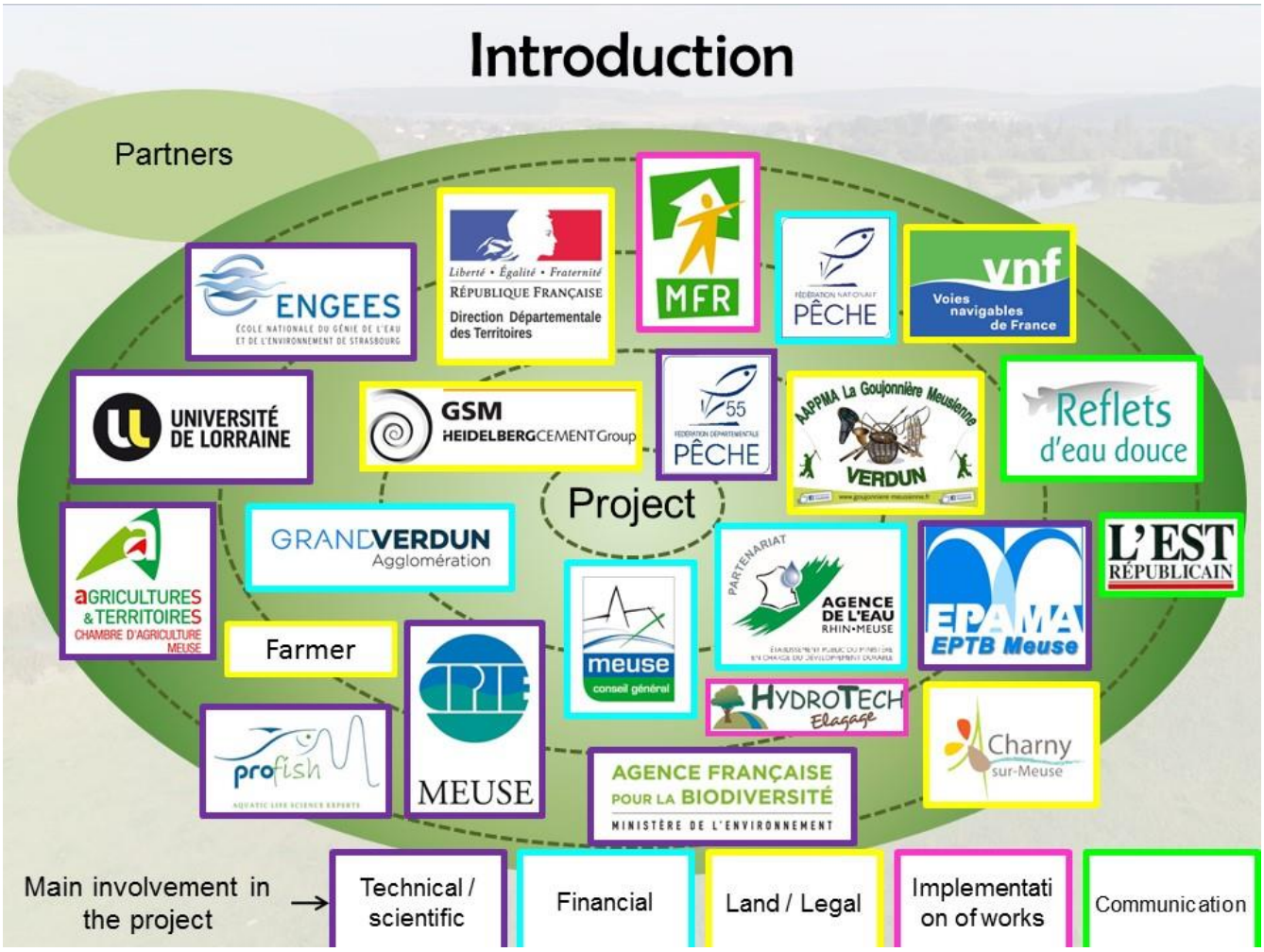
## *ANNEX 4: Photographs of the different works realized (page 3)*

Creation of gently sloping banks in the quarry (24/07/2018 and 26/07/2018)

Creation of a grassed ditch by GSM


Installation of an information board (10/09/2018)

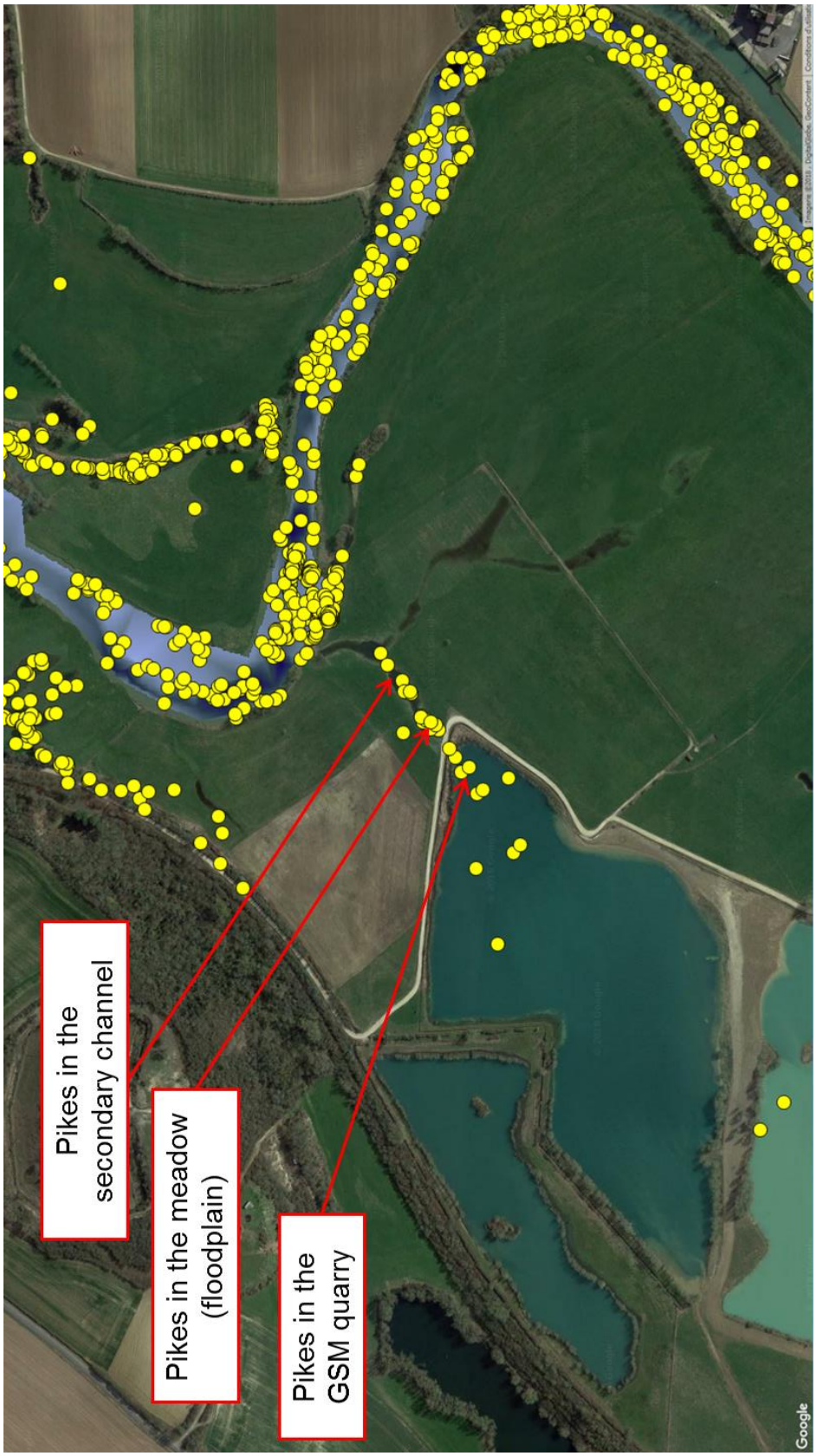
***ANNEX 5: List of project partners and their respective contributions (page 1)***



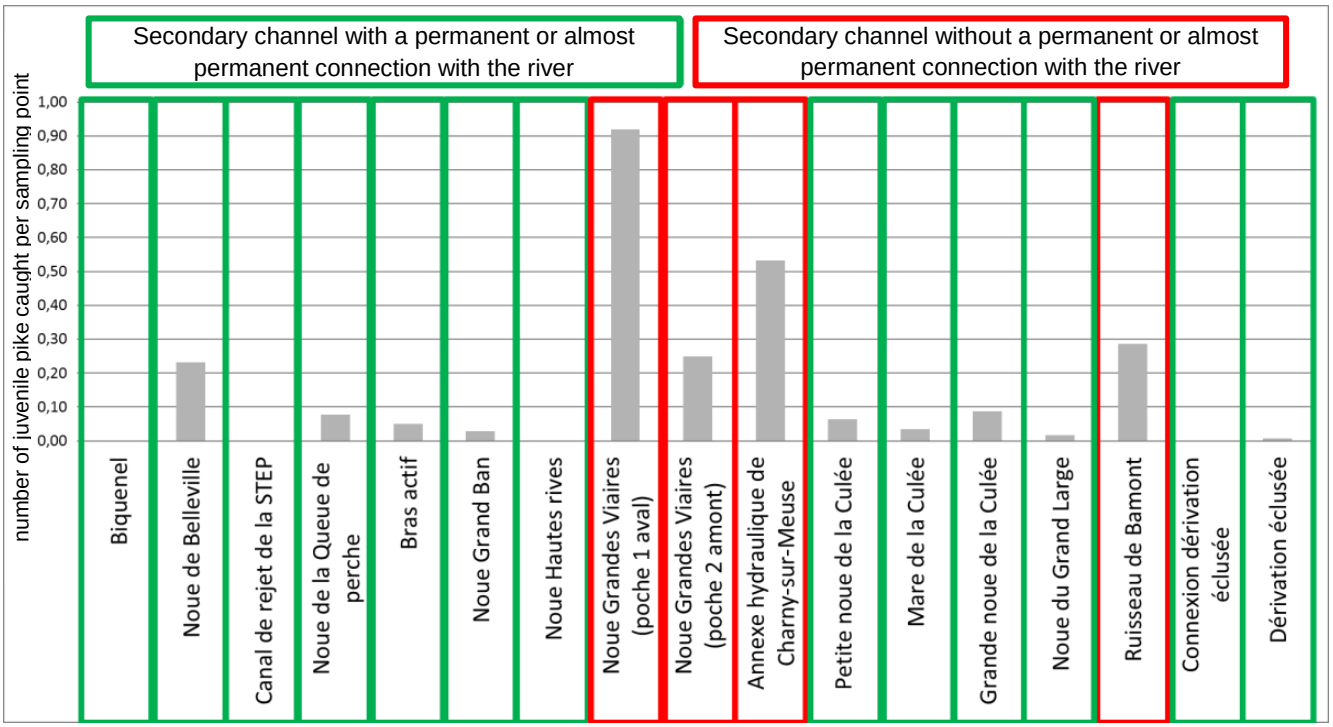
## *ANNEX 5: List of project partners and their respective contributions (page 2)*

| Nom du partenaire | Participation au projet |
|---|---|
| GSM | - Owns the land,<br>- Accepts the recovery of earthy materials in the quarry,<br>- Carries out works in association with the FDPPMA 55 project,<br>- Contributes financially to the works (5%). |
| Agence de l'Eau Rhin Meuse | - Contributes financially to the works (60%) as part of its intervention policy on the restoration of wetlands,<br>- Participates financially in the project management (50%),<br>- Is financially involved in telemetry monitoring on pike (50%),<br>- Gives technical advice. |
| Conseil Départemental de la Meuse | - Participates financially in the works (30%) as part of its intervention policy on Sensitive Natural Areas,<br>- Validates the fauna / flora data prior to the project,<br>- Validates the period of execution of works with regard to the impacts on the Natura 2000 area "Vallée de la Meuse" (under the European Bird Directiv). |
| Communauté d'Agglomération du Grand Verdun | - Contributes financially to the works (5%) within the framework of the GEMAPI competence. |
| Fédération Nationale Pour la Pêche en France | - Participates financially in the project management (50%),<br>- Publishes the operation report on a database accessible to all other associations of recreational fishing in France. |
| Voies Navigables de France | - Owner and manager of the fluvial public domain (river Meuse). |
| Direction Départementale des Territoire | - Validates the project under the Water Act and gives the authorization to start the works |
| Agriculteur | - Operator of the parcel before the work,<br>- Will continue to operate part of the plot after works according to the requirements defined by the FDPPMA 55,<br>- Validates the type of fence that has been set up. |
| CPIE de la Meuse | - Analyzes the existing fauna/ flora inventories,<br>- Taking fauna/ flora and drone photography,<br>- Provides technical advice for the project to benefit other biological compartments. |
| Agence Française pour la Biodiversité | - Gives advice and technical requirements in the design of the project. |
| EPAMA | - Carries out hydraulic expertise. |
| Chambre d'agriculture de la Meuse | - Provides advice to enable the project to be viable in the local agricultural environment. |
| ENGEES et l'Université de Lorraine | - Participation of two trainees from these universities in telemetry monitoring of pike, fish inventories and diagnosis of disturbances of the study site. |
| Profish technology | - Provides radio-tracking equipment and assists in statistical analysis. |
| Bénévoles de la FDPPMA 55 | - Participation in fish inventories. |
| MFR de Damvillers | - Participate in the creation of the fence in the form of pedagogical practical work,<br>- Designs and participates in post-work monitoring. |
| Hydrotech élagage, Maire SARL, Patrice HENRY | - Grouping of three companies to carry out earthworks. |
| Commune de Charny-sur-Meuse | - Location of works,<br>- Participates in the works by installing the board. |
| CEGE | - Prints the board that are installed on the study site (information board and photo monitoring support). |
| Pic Bois | - Manufactures the support of larch board. |
| AAPPMA « La Goujonnière Meusienne » | - Possession of the fishing rights of the Meuse river. |
| Association « Reflets d'eau douce » | - Produces a documentary on the theme of the restoration of the secondary channels of the Meuse and on pike radio-tracking (shooting of the study site). |
| Est Républicain | - Disseminates the news of the project at the local level by the realization of two press releases. |

***ANNEX 6: Detection of pike marked on the study area (as part of telemetry monitoring)***

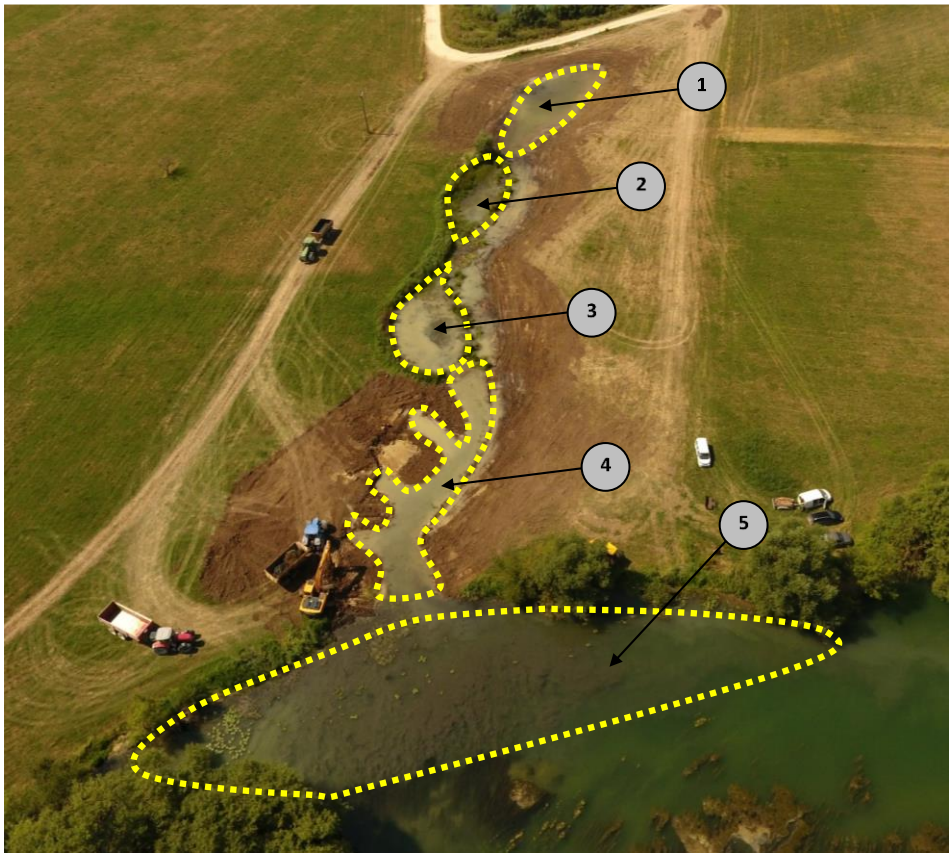


***ANNEXE 7: Average number of juvenile pike caught per sampling point in the secondary channels between Belleville-sur-Meuse and Charny-sur-Meuse***



## *ANNEX 8: Post-work monitoring: fish inventory protocol*

| | | | |
|---|---|---|---|
| **Fréquency** | Every three years, from 2021 | **Période** | End of May |
| **Agencies responsible for monitoring** | | FDPPMA 55 | |



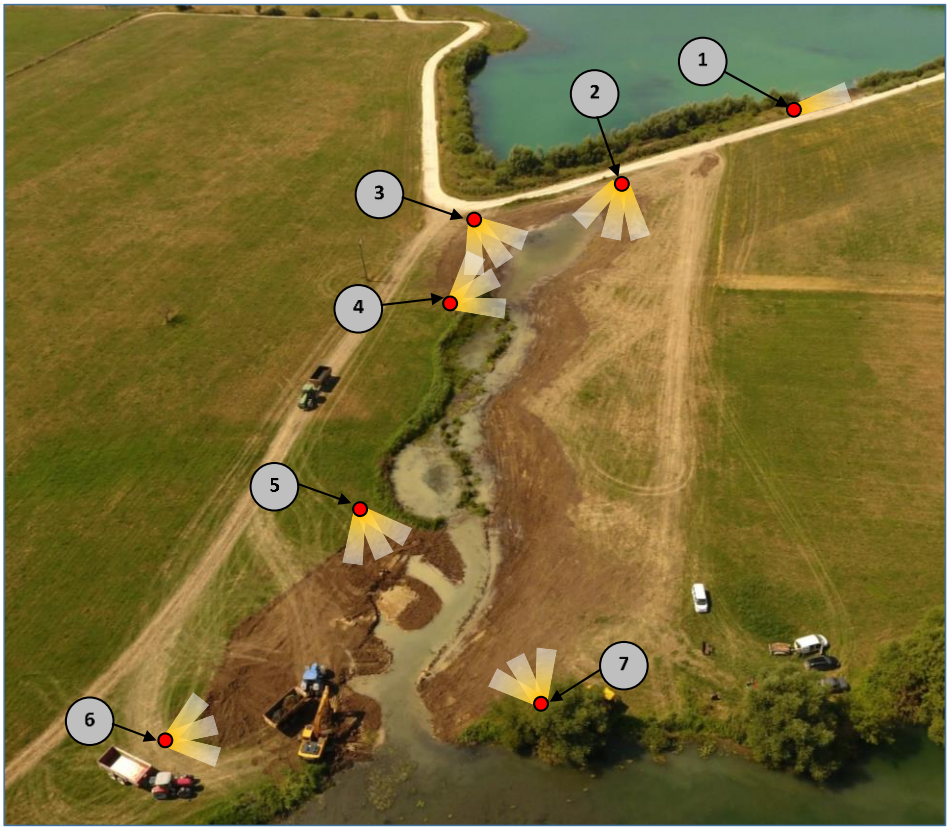

**<u>Operation to realize</u>**

Capture of fish by electric fishing and realization of a differentiated biometry for each of the zones listed below.

| Zone number | Estimated water surface (end of May) | Number of sampling points | Inventory type |
|---|---|---|---|
| 1 | 800m² | 32 | Electric fishing by points (random banks and channel) on foot |
| 2 | 400m² | 16 | Electric fishing by points (random banks and channel) on foot |
| 3 | 500m² | 20 | Electric fishing by points (random banks and channel) on foot |
| 4 | 600m² | 24 | Electric fishing by points (random banks and channel) on foot |
| 5 | 1600m² | 64 | Electric fishing by points (random banks and channel) by boat |

## *ANNEX 9: post-work monitoring: photographic monitoring protocol*

| | | | | |
|---|---|---|---|---|
| **Fréquency** | Four times a year minimum + during the reproduction season of the pike | | **Période** | Once per season |
| **Agencies responsible for monitoring** | | FDPPMA 55 – MFR of Damvillers - GSM | | |




**<u>Operation to realize</u>**

Taking photographs by placing the camera on the supports specially dedicated to this operation.

| Photographic support number | Lat/Long - WGS84 | Number of shots |
|---|---|---|
| 1 | N 49°11'49.1" E 005°21'27.1" | 1 |
| 2 | N 49°11'49.1" E 005°21'31.6" | 3 |
| 3 | N 49°11'48.9" E 005°21'33.8" | 3 |
| 4 | N 49°11'49.8" E 005°21'35.5" | 3 |
| 5 | N 49°11'51.2" E 005°21'38.4" | 3 |
| 6 | N 49°11'52.0" E 005°21'40.5" | 3 |
| 7 | N 49°11'52.9" E 005°21'38.4" | 3 |

*ANNEX 10: Photographic monitoring of the Charny-sur-Meuse secondary channel 10/09/2018 (page 1)*

## Secondary channel of Charny-sur-Meuse – post-work monitoring

## Photographic monitoring

| | | | |
|---|---|---|---|
| **Fréquency** | Four times a year minimum + during the reproduction season of the pike | **Périod** | Once per season |
| **Agencies responsible for monitoring** | | FDPPMA 55 – MFR of Damvillers - GSM | |


**Operation to realize**

Taking photographs by placing the camera on the supports specially dedicated to this operation.

| Photographic support number | Lat/Long - WGS84 | Number of shots |
|---|---|---|
| 1 | N 49°11'49.1" E 005°21'27.1" | 1 |
| 2 | N 49°11'49.1" E 005°21'31.6" | 3 |
| 3 | N 49°11'48.9" E 005°21'33.8" | 3 |
| 4 | N 49°11'49.8" E 005°21'35.5" | 3 |
| 5 | N 49°11'51.2" E 005°21'38.4" | 3 |
| 6 | N 49°11'52.0" E 005°21'40.5" | 3 |
| 7 | N 49°11'52.9" E 005°21'38.4" | 3 |

## *ANNEX 10: Photographic monitoring of the Charny-sur-Meuse secondary channel 10/09/2018 (page 2)*

**Photographic support number 1**

- 23/07/2018

| View 1 | - | - |
|---|---|---|
|  | - | - |

- 10/09/2018

| View 1 | - | - |
|---|---|---|
|  | - | - |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

## *ANNEX 10: Photographic monitoring of the Charny-sur-Meuse secondary channel 10/09/2018 (page 3)*

**Photographic support number 2**

- 23/07/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- 10/09/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

*Secondary channel of Charny-sur-Meuse – post-work monitoring - Photographic monitoring*

## *ANNEX 10: Photographic monitoring of the Charny-sur-Meuse secondary channel 10/09/2018 (page 4)*

**Photographic support number 3**

- 23/07/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- 10/09/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

*Secondary channel of Charny-sur-Meuse – post-work monitoring - Photographic monitoring*

## *ANNEX 10: Photographic monitoring of the Charny-sur-Meuse secondary channel 10/09/2018 (page 5)*

**Photographic support number 4**

- 23/07/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  | |

- 10/09/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

*Secondary channel of Charny-sur-Meuse – post-work monitoring - Photographic monitoring*

## *ANNEX 10: Photographic monitoring of the Charny-sur-Meuse secondary channel 10/09/2018 (page 6)*

**Photographic support number 5**

- 23/07/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  | |  |

- 10/09/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

## *ANNEX 10: Photographic monitoring of the Charny-sur-Meuse secondary channel 10/09/2018 (page 7)*

**Photographic support number 6**

- 23/07/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- 10/09/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

*Secondary channel of Charny-sur-Meuse – post-work monitoring - Photographic monitoring*

***ANNEX 10: Photographic monitoring of the Charny-sur-Meuse secondary channel 10/09/2018 (page 8)***

**Photographic support number 7**

- 23/07/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- 10/09/2018

| View 1 | View 2 | View 3 |
|---|---|---|
|  |  |  |

- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

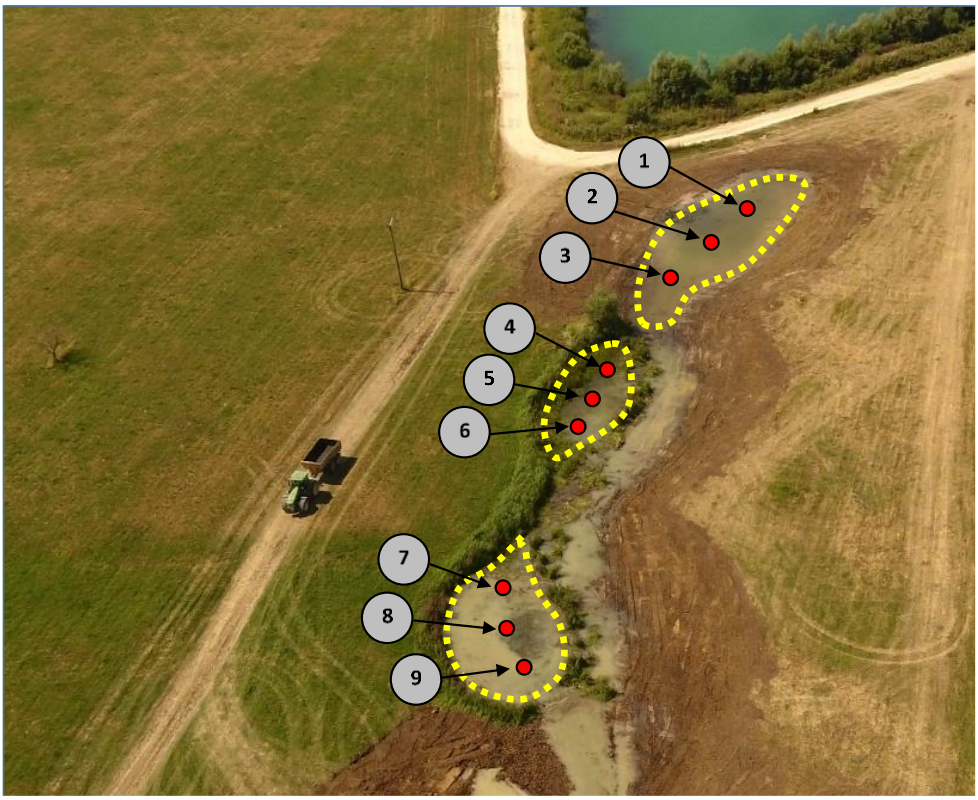
- XX/XX/XXXX

| View 1 | View 2 | View 3 |
|---|---|---|
| | | |

*Secondary channel of Charny-sur-Meuse – post-work monitoring - Photographic monitoring*

## *ANNEX 11: Post-work monitoring: monitoring the habitat of the mud loach protocol*

| | | | |
|---|---|---|---|
| **Fréquency** | Once a year | **Période** | May / June |
| **Agencies responsible for monitoring** | | FDPPMA 55 – MFR of Damvillers | |



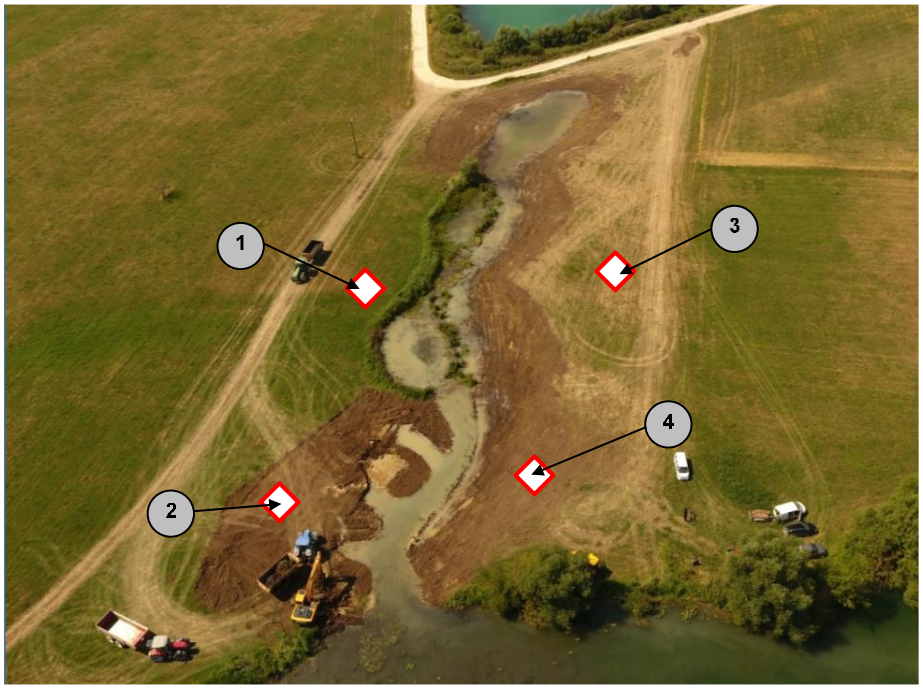

**<u>Operation to realize</u>**

Measure the water height and the mud thickness from a boat using a graduated scale for the points listed in the table below. Estimate the percent recovery of aquatic vegetation in the three depressions and identify the species present.

| Measuring point number | Lat/Long - WGS84 |
|---|---|
| 1 | N 49°11'49.6" E 005°21'33.1" |
| 2 | N 49°11'49.7" E 005°21'33.5" |
| 3 | N 49°11'49.8" E 005°21'33.9" |
| 4 | N 49°11'50.3" E 005°21'35.4" |
| 5 | N 49°11'50.4" E 005°21'35.7" |
| 6 | N 49°11'50.6" E 005°21'36.0" |
| 7 | N 49°11'51.2" E 005°21'37.2" |
| 8 | N 49°11'51.3" E 005°21'37.4" |
| 9 | N 49°11'51.5" E 005°21'37.5" |

## *ANNEX 12: Post-work monitoring: phytosociological monitoring protocol*

| | | | |
|---|---|---|---|
| **Fréquency** | Once a year | **Période** | May / June |
| **Agencies responsible for monitoring** | | FDPPMA 55 – MFR of Damvillers | |




**Operation to realize**

In quadrats of 16m², count and identify all species of trees and shrubs. Also identify the species of the dominant herbaceous layer and determine the habitat of the area (according to CORINE Land Cover code). The list of quadrats to realize is presented in the table below.

| Quadrat number | Lat/Long - WGS84 | Characteristics of the survey area |
|---|---|---|
| 1 | N 49°11'50.4" E 005°21'37.0"<br>N 49°11'50.5" E 005°21'36.9"<br>N 49°11'50.6" E 005°21'37.0"<br>N 49°11'50.5" E 005°21'37.2" | Area that has not been subject to earthworks and on which there will be no maintenance (natural evolution and spontaneous development of vegetation). |
| 2 | N 49°11'51.7" E 005°21'39.4"<br>N 49°11'51.8" E 005°21'39.2"<br>N 49°11'51.8" E 005°21'39.3"<br>N 49°11'51.8" E 005°21'39.5" | Zone has been subject to earthworks and on which there will be no maintenance (natural evolution and spontaneous development of vegetation). |
| 3 | N 49°11'51.3" E 005°21'36.0"<br>N 49°11'51.2" E 005°21'35.8"<br>N 49°11'51.4" E 005°21'35.8"<br>N 49°11'51.3" E 005°21'35.8" | Area that has not been subject to earthworks and on which there will be a maintenance by late mowing. |
| 4 | N 49°11'52.0" E 005°21'37.2"<br>N 49°11'52.1" E 005°21'37.1"<br>N 49°11'52.0" E 005°21'37.0"<br>N 49°11'51.9" E 005°21'37.1" | Area that has been subject to earthworks and on which there will be a maintenance by late mowing. |

*ANNEX 13: Article published 06/04/2018 in the 'Est Républicain" newspaper - Verdun edition*

# Une annexe hydraulique en restauration

À Charny-sur-Meuse, la fédération travaille sur la restauration d'une annexe hydraulique de la carrière GSM dans le cadre d'un concours international « The quarry life award ».

L'objectif de ce challenge scientifique et éducationnel est de soulever l'attention sur la valeur organique des carrières d'exploitation et de partager les bonnes pratiques avec la communauté scientifique, les ONG, les autorités et les équipes opérationnelles.

Le projet meusien a retenu l'attention du jury et fait partie des six finalistes français. « Nous avons 8 mois pour le développer avec l'ensemble de nos partenaires afin de remettre un rapport en septembre 2018 qui sera pris en compte dans l'évaluation », expose Sébastien Cormont.

L'objectif est d'augmenter la capacité de reproduction du brochet du site (zones de frayères) et sa capacité d'accueil pour la loche d'étang (zone d'habitat).

Plusieurs opérations seront mises en œuvre :

**Sébastien Cormont présente le projet en lice pour un concours international qui verra le jour à l'annexe hydraulique de la carrière.** Ph. F.L.

– création d'un large fossé enherbé entre la ballastière et le fleuve Meuse pour permettre l'évacuation du surplus d'eau de la ballastière directement dans le fleuve ;

– terrassement d'un chenal en pentes douces d'environ 20 m de large et 50 m de long pour créer une connexion entre l'annexe hydraulique et le fleuve ;

– création d'une zone de forêt alluviale de 1000m2 entre l'annexe hydraulique et le fleuve ;

– présentation du projet et de ces enjeux aux salariés de la carrière pour les sensibiliser à ce type de milieu.

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*ANNEX 14: Article published 27/07/2018 in the 'Est Républicain" newspaper - Verdun edition (page 1)*

DIEUE-SUR-MEUSE Motard contre voiture : un blessé léger

L'EST RÉPUBLICAIN

Vendredi 27 juillet 2018

LE JOURNAL DE VERDUN

Photo ER

NORD MEUSIEN

Du changement à la compagnie de gendarmerie de Verdun

> PAGE 5

# Travaux d'envergure pour la fédé de pêche

CHARNY Des travaux ont été lancés en début de semaine sur l'annexe dite des « Petites Viaires ». Reconnue comme « dégradée » depuis dix ans déjà, cette zone humide avait besoin d'un coup de neuf. Photo ER

> PAGES 2 ET 3



*ANNEX 14: Article published 27/07/2018 in the 'Est Républicain" newspaper - Verdun edition (page 2)*

MEUSE

# L'annexe hydraulique se refait une santé

Reconnue comme « dégradée » à la suite d'un diagnostic réalisé sur la période 2008/2009, l'annexe hydraulique de Charny-sur-Meuse est en pleine restauration.

« Nous avions connais sance des problèmes depuis dix ans. C'est un milieu en très forte pression », Sébastien Cormont peut désormais souffler. Alerté par un diagnostic réalisé sur la période 2008/2009 désigné l'annexe hydraulique de Charny-sur-Meuse comme « dégradée », le chargé de mission de la Fédération de la Meuse pour la Pêche et la Protection du Milieu Aquatique assiste à la restauration du site depuis le début de semaine.

Perturbée par les écoulements de la ballastière, sa faible connexion avec le fleuve et le piétinement du bétail, celle qu'on dénomme également « annexe hydraulique des Petites Vilaires » se refait doucement une santé. « Nos deux possibilités étaient soit de la maintenir, soit de la rénover. Nous ne sommes pas en capacité d'en recréer une. C'est un peu la main de l'homme qui façonne » expose Sébastien Cormont, en charge du projet de rénovation.

Les travaux, réalisés par l'entreprise Hydrotech Etagage, s'inscrivent dans une politique de restauration des cours d'eau et des zones de frayères pour la faune piscicole (les brochets, entre autres), à laquelle aspirent la Fédération et l'Aappma La Goujonnière Meusienne (structure associative de pêche, N.D.L.R.).

Depuis près de 20 ans, les deux entités ont réalisé une dizaine d'opérations de restauration sur les annexes hydrauliques situées entre Charny et Belleville.

**Deux objectifs principaux**

Dans leur quête, la Fédération et l'Aappma bénéficient d'un soutien financier de la part d'une quinzaine de partenaires, dont l'entreprise GSM. « Grâce à nos partenaires, le milieu associatif ne dépense pas un centime. GSM reste notre principal collaborateur, car il est à la fois un partenaire foncier, puisque le terrain lui appartient, un facilitateur des travaux et un soutien financier » énonce Sébastien Cormont.

Le chargé de mission garde en ligne de mire les deux objectifs principaux de ces travaux : favoriser la reproduction du brochet et augmenter la surface d'habitats de la boche d'étang. « Il s'agit de deux espèces patrimoniales, qui viennent se reproduire dans ces milieux. Le brochet est considéré comme une espèce vulnérable par l'Union internationale pour la conservation de la nature (UICN). La boche d'étang est de son côté estimée en danger ».

La restauration, également bénéfique pour d'autres espèces (oiseaux, libellules, batraciens,...), permet entre autres la création d'une troisième dépression et d'un terrassement des berges en pentes douces.

Post-travaux, Sébastien Cormont compte bien protéger l'espace naturel et rénové : « On va tout d'abord installer une clôture, afin de bien délimiter le terrain » explique-t-il, avant de conclure : « On va également entreprendre un suivi écologique, en partenariat avec la Maison Familiale Rurale (MFR) de Damvillers ».

**Florian SERMAISE**



Sébastien Cormont, responsable du projet, en plein échange avec Vincent Guillaume, responsable de l'entreprise Hydrotech Etagage. Photo ER



Le projet de restauration de l'annexe hydraulique de Charny-sur-Meuse nécessite une semaine de travaux. Photo ER

## Un projet de restauration en compétition

Outre ses divers enjeux écologiques, le projet de restauration de l'annexe hydraulique de Charny-sur-Meuse participe au concours Quarry Life Award. Retenu en décembre dernier pour participer à la compétition au sein de la catégorie « recherche », le projet chargé Sébastien Cormont est en concurrence avec deux autres sites retenus en France. « Notre dossier sera monté très rapidement, en octobre et novembre 2017, sur proposition de l'entreprise GSM » restitue Sébastien Cormont.

Le Quarry Life Award est un concours scientifique et éducatif, se déroulant tous les deux ans. Il agit simultanément aux niveaux national et international, avec pour but de sensibiliser aux actions de préservation de la biodiversité dans les carrières et de trouver de nouvelles façons de la valoriser.

Cette année, les participants ont jusqu'au 20 septembre pour faire parvenir au jury leur rapport final de l'opération. À cette occasion, Stéphane Rivière, membre du jury international, s'est rendu sur place le 17 juillet dernier, afin de découvrir le projet.

Une chose est sûre, Rébecca Mansienne n'a pas laissé insensible. « On possède une quinzaine de partenaires, venus soutenir la restauration. Stéphane Rivière m'a dit qu'il n'en avait jamais vu autant », raconte Sébastien Cormont. Rose désormais à attendre les résultats du concours national (14 novembre) et international (5 décembre). À remporter : « Des gains financiers, mais surtout de la reconnaissance ».

En attendant, le public a la possibilité lui aussi de soutenir le projet de Charny-sur-Meuse, en lui attribuant une note (entre 0 et 5 étoiles) sur le site du Quarry Life Award.

**F.S.**



Sébastien Cormont, responsable du projet. Photo ER





***ANNEX 15: Information board presenting the work done***


***ANNEX 16: Questionnaire assessing the work's understanding (page 1)***

**Secondary channel restoration and functional optimization**

**Questionnaire assessing the work's understanding**




***ANNEX 16: Questionnaire assessing the work's understanding (page 2)***

1. **What is a secondary channel?** *(1 point)*

☐ An aggregate extraction area in the major bed of a watercourse.
☐ Wetland in permanent or temporary relationship with a watercourse by either superficial or underground connections.
☐ Wetland that is totally disconnected from the watercourse.

2. **Give two examples of secondary channel. (Two types)** *(2 points)*

……

3. **Which of these statements is true?** *(1 point)*

☐ Secondary channels deteriorate the quality of the water due to the presence of silt.
☐ Secondary channels increase the risk of floods.
☐ Secondary channels increase the productivity of a watercourse.

4. **Which of these fish species, unknown and classified as an "Endangered" species on the red list of IUCN France, is present in the secondary channel of Charny-sur-Meuse?** *(1 point)*

☐ The mud loach.
☐ The spined loach.
☐ The stone loach.

5. **Which of these fish species makes important migrations in the Meuse riverbed to breed on submerged grass in the meadows and / or secondary channels between the months of February to April? (1 point)**

☐ The catfish.
☐ Pike.
☐ The brown trout.

6. **Among the following proposals, check the three that correspond to disturbances that were present on the Charny-sur-Meuse secondary channel before the work was done?** *(3 points)*

☐ The presence of a poplar plantation on the plot.
☐ The presence of superficial flows between the gravel pit and the hydraulic extend.
☐ The trampling of livestock.
☐ The embankment deposit in the hydraulic extend.
☐ The weak connection between the hydraulic extend and the Meuse river.
☐ The presence of a direct pollutant discharge in the hydraulic extend.

7. **How has the Meuse Fishing Federation demonstrated that the secondary channel was working as a preferential access channel to the gravel pit for adult pike by flooding (gravel pit in which most remained trapped after the flood periods)?** *(1 point)*

☐ By radio tracking.
☐ By simple visual observation.
☐ By electric fishing.

8. **Which operation was carried out specifically so that the present in the secondary channel loach species could colonize new habitats?** *(1 point)*

☐ The digging of gently sloped banks.
☐ The transfer of silt from the river to the created pond.
☐ The creation of a communication channel between the hydraulic extend and the Meuse river.



## *ANNEX 16: Questionnaire assessing the work's understanding (page 3)*

9. **Where were deposited the works earthy materials mainly?** *(1 point)*

☐ In the gravel pit closest to the study site which belongs to GSM.
☐ In depressions (holes) present in agriculture plots near the study site.
☐ In the Meuse river for the materials to be transported during the next floods.

10. **What will the creation of the hydraulic threshold (grassed ditch) between the gravel pit and the Meuse river enable?** *(1 point)*

☐ Stopping superficial flows between the gravel pit and the secondary channel.
☐ Continuously supply the secondary channel with the quarry water.
☐ Create a second secondary channel next to the existing one that will be more easily accessible for pike during the breeding season.

11. **The Charny-sur-Meuse secondary channel and part of the GSM quarry are in the Natura 2000 "Meuse Valley" perimeter. Which biological compartment is most protected in this area?** *(1 point)*

☐ Fish (eg pond loach, pike, bitterling ...).
☐ Amphibians (eg common toad, green frog, crested newt ...).
☐ Birdlife (eg, curlew, corncrake, swallows of shorelines ...).

12. **Which measure, recommended in the Docob Natura 2000 "Meuse Valley" will be implemented on the remaining meadow in the plot?** *(1 point)*

☐ Late mowing.
☐ Cultivation (preferably corn).
☐ Drainage.

13. **On the 3000m² area there will be neither maintenance nor exploitation to let vegetation grow spontaneously. What type of vegetation should grow in this area eventually?** *(1 point)*

☐ A forest of oaks and beeches.
☐ Poplar trees.
☐ An alluvial afforestation composed mainly of willows.

14. **Which public structure is the main financial contributor to the project?** *(1 point)*

☐ The County Council of the Meuse.
☐ Greater Verdun Urban Community.
☐ The Rhine Meuse Water Agency.

15. **Why does the Meuse County Council finance this project?** *(1 point)*

☐ Because the study site is located in a Sensitive Natural Area.
☐ Because the study site is located in the Natura 2000 "Meuse Valley" area.
☐ Because the study site is located near the Verdun battlefield.

16. **Which easily implemented post-work follow-ups, will be realised to regularly observe the evolution of the habitats?** *(1 point)*

☐ A photographic monitoring from several spots on the site.
☐ A photographic monitoring by drone.
☐ Piezometric monitoring.

17. **Which method, similar to the one used in June 2018, will be used by the Meuse Fishing Federation to carry out post-work fish surveys?** *(1 point)*

☐ Gillnet fishing.
☐ Electric fishing.
☐ Trap laying.



## *ANNEX 17: Bibliographical references*

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