FCPPMA

LIFE PROGRAM « CONSERVATION OF THE TROUT

MACROSTIGMA IN CORSICA »

(07/01/2003-10/31/2007)

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I-Introduction

Thanks to a series of studies undertaken in the 1990's, the environment actors (notably the missed Bernard Roché) have realized that the island's endemic trout, the macrostigma, had become an endangered species mostly because of the poaching, hybridation with introduced trouts and the degradation of its habitat. Therefore, the corsican fishing and aquatic environment protection federation, concerned about the preservation of the corsican fishing and aquatic patrimony, has decided to start, thanks to the support of its partners: the European commission (CE), the Environment Regional Direction (DIREN), the Corsican Environment Office (OEC), the National Forest Office (ONF), The Corsican Regional Natural Parc (PNRC), the Hunting and Wildlife National Office (ONCFS) and the Aquatic environment and water National Office (ONEMA ex CSP); the Life program "preserve the Macrostigma trout in Corsica".

This program has four objectives: improve the knowledge of the characteristics and the distribution of the macrostigma trout, experimenting reproduction in semi-natural environment, protecting the populations and the habitats, and finally informing and making the public aware of the importance of this species.

II- What is a LIFE program?

LIFE => **L'I**nstrument **F**inancier pour l**'E**nvironnement (the Financial Instrument for the Environment.)

Launched in the 1992, LIFE is one of the strong points of the Community's environment policy.
The LIFE co finances environmental actions in the European Union and in some other "third" countries.
LIFE NATURE =>The precise aim of this LIFE chapter is to contribute to the setting up of community rules on the protection of nature: the instruction "Bird" of 1979 and "habitats" of 1992, and notably the creation of the European network of protected areas "NATURA 2000"aiming at the management and conservation "in situ" of the faunistic and floral species and the habitats of the European Union.

III-The Corsican endemic trout (Salmo Trutta Macrostigma):

Species description: The corsican trout is a sub species of the common trout (Salmo trutta) or Fario trout. In Corsica,Duméril (1858) then Spillman (1961) have qualified the savage trouts of our rivers as belonging to the Macrostigma sb species on the basis of their morphometical characteristics and mainly their punctuation. The recent genetical test campaign led in Corsica has conforted the distinction between the corsican trouts and those found on mainland France (atlantical, mediteranean and rainbow).

Species Ecology: The macrostigma trout is now mainly found in certain basins and lives according to a holobiotical cycle: it does its biological cycle wholly in fresh water.She moves betwen three zones which make its living domain: resting zone, growing zone and reproducting zone.
The trout reproduces itself during thr winter period betwen november and january. The eggs are burried in the gravelly substratum found in the spawning areas. The young fishes feed themselves thanks to their vittelin stocks for around 20 days. Being a meat eating and territorial spieces the adult trout hunts at sight. When lacking small fishes it mainly eats insect larvas, worms, molluscs, small shellfishes and flying insects.

IV-Improving the knowledge of the characteristics and of the distribution of the Macrostigma trout.

A) Studying the pure Salmo trutta macrostigma populations

The pure population study undertaken at the begin of the LIFE program in “Val d'Ese”, “pozzi di Marmano”,”Marmano”,”san Antone”,”Uccialinu”,”Veraculonga”and “Calderamola”started in April 2004.
To meet the general goals of this action, one must proceed each year to a sampling of the fish population following standardized methods, on a correctly selected network of permanent stations.
Six inventory stations were selected at the beginning of the program. The introduction areas of these stations were determined according to data which confirmed the presence of corsican trout populations.
The sampling is caught thanks to an electric fishing method (Picture 1) and all the captured fishes are mesured (Picture 2), weighted (Picture 3) in order to evaluate the effective population and the biomass. Moreover, the topography of the waterbed is studied (length ,width and depth) in order to determine the number of trouts per surface unit.

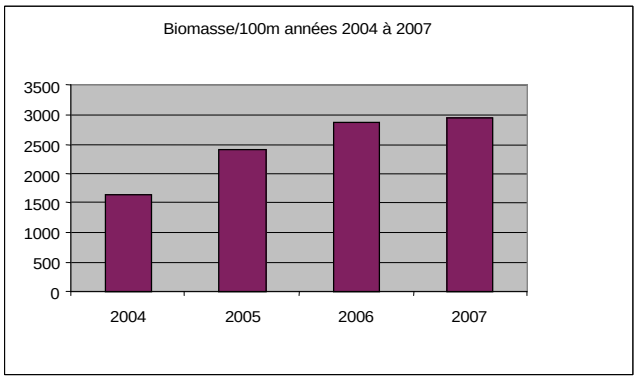
Picture n°1 : Electrical fishing

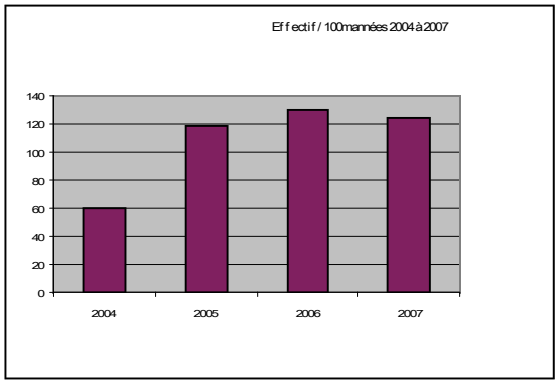
Picture n°2 :Measuring the trouts

Picture n°3 :Weighing the trouts

Picture n°4: Topographical measuring

So, thanks to fishings results from 2004, 2005, 2006 and 2007, a comparative of cumulated effectives (figure n°5) and cumulated biomasses (figure n°6) was put together .





Picture n°5:comparative of cumulated effectives

Picture n°6: cumulated biomasses

For the beginning of the program, cumulated effectives have more than doubled. One observes a light setback of the effectives growth in 2006

The site of Uccialinu, who has known a drastic collapse of his effectives in 2007 probably because of the dryness, influences directly upon this parameter. It's interesting to note that the effectives of adult grow everywhere . The capacity of reproduction raises and the recruitment ought to be superior than that of the previous years .The cumulated average biomasses have almost doubled in 4 years.

The « prohibited fishing area » effect is perceptible since one notes globally a raising of the average individuals weight.

B) Identification of new populations

As a part of this action, genetic analysis must be made on new sites to better evaluate the quantity and the repartition of Macrostigma's populations in Corsica. So,since march 2004 45 streams have been prospected and 15 new pure populations have been found (in addition to those found since the beginning of the LIFE).

The genetic monitoring is made by Patrick Berrebi (Reseach Director to the National Scientific Reseach Centre of Montpellier).A piece of tail-fin is levied on captured trouts and preserved in the alcohol to be sent to the laboratory.

The latter has begun analyses in September 2004.Those allow to know the percentage of genes of counterfoil types of trout present in Corsica (Atlantic or fish farming, mediterranean and corsican) in studied populations (the rainbow type , of North American origin , is easily recognisable and does not reproduce in Corsica, and then there is no hybridization with the other types of trout present in Corsica).It is to note that Atlantic and rainbow type were introduced by the man, while corsican and mediterranean types are naturally present in the island.

The table I, presented hereafter, summarizes the results from analyzed sites. The determination of those percentages is directly issued from AFC which have classed the individuals and the alleles too.

LOT	N	date	action	river	Basin	%C	%M	%P
Lot 4	20	May-04	A2	Ariola	Fiumorbo	7	2	91
Lot 5	20	jun-04	A2	Rina	Fiumorbo	**100**	0	0
Lot 7	20	jun-04	A2	Manica (Asco)	Golo	**100**	0	0
Lot 9	20	jun-04	A2	Teghie Nere	Vecchio	15	0	85
Lot 10	20	jun-04	A2	Paratella	Prunelli	**100**	0	0
Lot 12	20	July-04	A2	Bravona (St Vincent)	Bravona	16	3	81
Lot 13	15	July-04	A2	Chiuva (Frasseto)	Taravo	90	5	5
Lot 15	20	July-04	A2	Fango amont	Fango	25	0	75
Lot 16	20	July-04	A2	Rocce	Fango	90	0	10
Lot 17	16	July-04	A2	Bocca Bianca	Fango	89	0	11
Lot 18	19	Oct-04	A2	Luana	Travo	18	0	82
Lot 19	13	Apr-05	A2	Carnevalle	Prunelli	**100**	0	0
Lot 20	12	Apr-05	A2	Puzzatelli	Vecchio	**100**	0	0
Lot 21	19	Apr-05	A2	Lagnato	Liamone	26	0	74
Lot 22	19	Apr-05	A2	Ht Botaro	Liamone	81	17	2
Lot 23	12	Apr-05	A2	Schileccia	Prunelli	5	0	95
Lot 24	20	Apr-05	A2	Casaluna	Golo	13	11	76
Lot 25	20	may-05	A2	Haut Marmanu	Fiumorbo	**100**	0	0
Lot 26	19	may-05	A2	Latinetta	Fiumorbo	8	0	92
Lot 27	20	jun-05	A2	Piscia in Alba	Taravo	17	7	76
Lot 28	6	jun-05	A2	Teghie Nere (bis)	Vecchio	26	0	74
Lot 29	10	jun-05	A2	Guadu Alla Machia 1	Fiumorbo	**100**	0	0
Lot 30	10	jun-05	A2	Guadu Alla Machia 2	Fiumorbo	**100**	0	0
Lot 31	16	jun-05	A2	E Ventose (Asco)	Golo	**100**	0	0
Lot 32	12	jun-05	A2	I Fossi (Palneca)	Taravo	15	11	74
Lot 35	19	Apr-06	A2	Chjuvone	Rizzanese	**100**	0	0
Lot 36	19	Apr-06	A2	Ciuttare	Liamone	33	33	34
Lot 37	18	Apr-06	A2	Lonca	Porto	13	70	17
Lot 38	8	Apr-06	A2	Coreccia	Liamone	82	0	18
Lot 42	16	may-06	A2	Susinelle-Ruello (part de punta gavina)	Fiumorbo	89	11	0

Lot 43	22	jun-06	A2	Carabona	Taravo	15	0	85
Lot 44	20	jun-06	A2	Prugna (Aff. RG St Antone)	Taravo	**100**	0	0
Lot 45	20	jun-06	A2	Ciaccia (Aff.RD StAntone)	Taravo	**100**	0	0
Lot 46	20	jun-06	A2	Bassetta	Taravo	4	2	94
Lot 48	19	jun-06	A2	Zoïco	Liamone	12	88	0
Lot 49	**20**	jun-06	A2	Renaju	Solenzara		0	65
Lot 52	**20**	oct-06	A2	E Radule	Golo	**100**	0	0
Lot 53	**20**	oct-06	A2	Golu	Golo	0	**100**	0
Lot 54	19	Apr-07	A2	Lette	Fiume Seccu	**100**	0	0
Lot 56	21	Apr-07	A2	Forcinchesi	Travo	62	0	38
Lot 57	20	may-07	A2	Capiaghja	Gravona	9	0	91
Lot 58	20	jun-07	A2	Tartagine	Golo	4	0	96
Lot 59	20	jun-07	A2	Menta	Rizzanese	9	0	91
Lot 60	20	jun-07	A2	Corbica (Asco)	Golo	**100**	0	0
Lot 61	21	jun-07	A2	Coscione	Rizzanese	14	0	86

Table 1: The final estimate of the genetical composition of the analyzed samples.
Legend: %C = Corsican percentage; %M = Mediterranean % and %P = fish farming %
N = Number of analyzed Trout

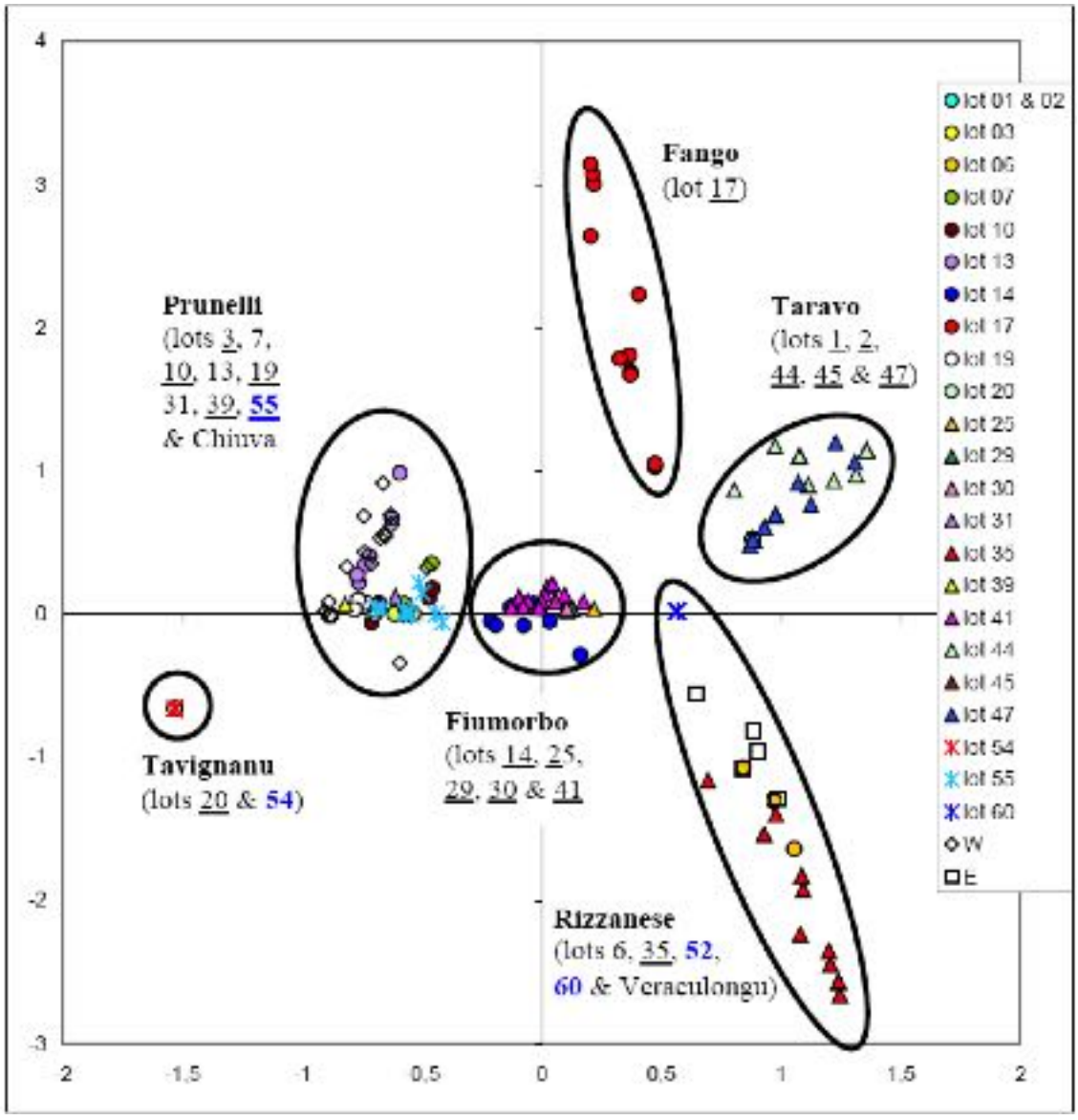
The "purity" of a population is considered as paid off to 96% and above .
Then, after presented results in the **Table 1**, lots 5 (Rina), 7(Manica), 10 (Paratella), 19 (Carnevale), 20 (Puzzatelli), 25 (Haut-Marmanu), 29 and 30 (Guadu and macchia), 31 (Ventôse e), 35 (Chiuvone), 44 and 45 (Ciaccia and Prugna **saint Antoine's tributaries),** 52 (aee Radule), 54 (Lette) and 60 (Corbica) have been considered as being purely macrostigma. Those fifteen **supplemental** resorts are of uppermost interest for the preserving of the macrostigma form.

Besides , for lots 13 (90% of corsican forms) and 17 (89%), trouts compounding those samples are mainly of corsican form but that a few individuals (respectively 2 and 3) are clearly of the Atlantic form, are trouts born in pisciculture and introduced in those rivers less than two years ago.
The « essential » of those populations does not seem hybridized and is then «retrievable».
The discovery of those 15 populations can be considered as a capital result for our program because it allows us to dispose of a “stock” of “macrostigma” supplemental and then to raise chances of Sustainability of the species. Besides , in focus of scientific view it has allowed comparing different populations between them, and so we have been able to define several patterns of “macrostigma” depending on basins of origin.

In his official report 2005, Patrick Berrebi was explaining us that those populations belonged to the pattern « East », « west », or both but that although terms « East » and « west» have been assigned on a geographic basis at the beginning of all the analyses (1995). Its has appeared since the

zoning of both forms is not bounded to mountainside or another, that a more confortable denomination would be defined if possible on the morphology .It was one of the goals of LIFE.

In effect, the protection of biodiversity is over demanding. It is not only necessary to protect the pure macrostigma stations, but also to watch out not to lose differences which separate them,owed to the probably very long isolation which provoked neutral variations and allowed local adaptations .That's why it's important to classify these notable stations in some genetic types inside which they will be able to make translocations or inoffensive repopulations for biodiversity.
So, an analysis involving only these purely Corsican stations was performed (picture 7, on 4 locus).it includes 23 lots: the 20 populations and 3 lots performed within the populations of departure to calculate the size of populations (39, 41 and 55). The structure in 6 sub-units is obvious on picture n°7.



Picture n°7: *AFC analysing the 23 purely Corsican populations. The Corsican individuals of the sample 47 were also used. Samples added since the report LIFE n°8 are pointed out in blue.Two reference samples bring links with the ancient nomenclature based on allozymes: "west" (W = Chiuva [May, 1994]) and "East" (E = Veraculongu [June, 1993]). The numbers of underlined lots are those who gave their names to different types.*

V) Test reproduction in semi-natural environment:

This phase is the most difficult because until this day the different attempts have always failed.Also, over the first two years of the program experiments were led without big success due principally to the lack of Broodstocks in the natural populations, and also due to the fact that this wild trout does not bear living conditions in pisciculture.
Broodstocks' samples (picture n°8) were performed to take a sample of the seeds from the males and females to accomplish fertilization (picture n°9), then to put fertilized eggs in the incubator (picture n°10). The produced young fishes were then released in nursery streams at the ¾ stage of vitelline resorption and at the stage of egg (picture n°11).

Picture n°8:broodstocks' sample

Picture n° 9: fertilization *in situ*

Picture n°10: Eggs in the incubator

Picture n°11: Release of young fishes

Unfortunately, due to lack of broodstocks, the piloting committee decided to stop this stage of program to turn to protection *in situ* not to endanger the natural populations of macrostigma.This decision was validated by the European Commission.

VI) To Protect populations and habitats:

A) Extension of Natura 2000 network and the installation of prohibited fishing areas.

To augment the surface of protected habitats of the trout “Salmo trutta macrostigma” in Corsica, we spread Natura 2000 network so that all macrostigma's sites are inserted there.

The prefects of department with the help of The Regional Direction of Environment (DIREN), which are in charge of the installation of Natura 2000 network , consulted local councils and Establishments of Collaboration between the local councils concerned by this extension in accordance with the *article L.414 .1* of the code of environment. Consultations ended in June, 2005. No unfavourable recommendation was issued. So, the extension which concerns 2547,9 hectares is therefore noted on local plan and the Ministry of Ecology and Lasting Development transmitted this extension at the European commission in mid-October on 2005.

Besides the incorporation of sites in the NATURA 2000 network, different rivers have been set aside to allow the populations to regenerate naturally: I Pozzi di Marmanu (Bastelica), the sources of Marmanu (Palneca, Bastelica, CTC), Guaddu went macchia (Bastelica), the sources of the Val d' Ese (Bastelica and Ciamanacce), Calderamolla (five villages), the sources of the saint Antoine and affluents (Palneca, CTC), Uccialinu (Palneca, CTC), a part of Veraculongu (Zicavu, CTC), Sorbaghja (Cambia) sources, Manica (Ascu), Rancichedde (Chisà), E Ventose (Ascu), the 2 lakes of Rina (Ghisoni), sources of Chjuvone (Aullène) and those of Puzzatelli (Vivariu, CTC).

B) The network of surveillance:

The preservation of species passes by the fight against immoderate samples and by an accentuated control of prohibited modes of fishing.This predation, perhaps unaware, weakens populations.So, sites are often controlled. In order to do that, the departmental service of ONEMA is regularly supported by enrollments of the National Service of Hunt and Wild Fauna (ONCFS), the National Service of Forests (ONF), the Regional Nature park of Corsica and the Confederation of Fishing. Besides, there is also an episodic assistance of technicians' reinforcements of the ONEMA who come from the mainland. This action represents 25 % of the total of program.

The total number of fish captured illegaly since the beginning of the program stands to 737. It shows that an immoderate levy is practiced (especially before LIFE).

The distribution of offences is established as follows:

- 18 fishing infractions (for overtaking the quota and for not respecting size regulation , with an average of 32 fish by verbalized fisher);
- 1 fishing offence (for electricity with seizure of 208 fish 175 of which not of the mandatory size) (picture n°12);
- 1 offence for waste dumping;
- 2 offences for working in the river without approval;
- 1 offence for marketing fish without being able to justify origin and no respect for mandatory size (120 on 152 grabbed fish).

The number of procedures is settled to 8 in 2004, 6 in 2005, 6 in 2006 and 3 in 2007. However, it is necessary to notice that in 2006 and 2007 certain procedures do not concern the fishing but works in river, and that none of these verbal trials were not raised in the LIFE prohibited fishing areas .(they

are all downstream from these areas). At the same time, the number of illegal fisher is in decline since the beginning of the program. This phenomenon is indeed linked to augmented surveillance pressure and now known by the fishers (articles of press, meetings). In effect, we notice that on the 737 grabbed trouts, 465 were in 2004.

Picture n°12: Trouts an dynamo

We can think that the total increase of specific density determined during inventories are linked to the augmented surveillance of these sites. Indeed, the fact that the number of trouts grabbed during the surveillances decreased since 2005, seems to confirm this hypothesis.
The creation of protected areas seems to be an adapted measure to insure the permanency of the populations of macrostigma.Indeed, these heads of basins put in reservation and often watched could so constitute a protected area from which the fish would split in downstream part in zones where the capacity of reception is more favorable.

VII) To Inform and make people aware

As part of the program different tools of communication were set up to make the different publics sensitive:

- **scholastic:** a pedagogic briefcase used by the agents of the PNRC in ten schools. This briefcase is composed of a bag of equipment (net surber, binocular, microscope), reference books, the master and the pupils handbook, and a Cd-rom (« The trout macrostigma of Corsica ») was edited in 1000 copies.
- **general public:** an exhibition (with brochures and posters) used by the agents of the PNRC and the Confederation in fairs and schools, an Internet site: www.lifemacrostigma.org <http: // www.lifemacrostigma.org/> (83620 connections), and a film lasting 19 minutes was filmed by France 3 Corsica (« The trout of Corsica »).
- **fisher:** several public meetings were organized in different micro-regions.
- **administrators:** different meetings of piloting comities were organized and reports were given.

VIII) Conclusion:

As part of the implementation of this LIFE program different working priorities were defined. So, our efforts are carried principally on:
- on the mastery of the land and on usage of sites because it is necessary to be able to accomplish actions planned in the program (reserves, developments). This day, thanks to the support of the different owners (villages, CTC, private) all LIFE sites are controlled.
- on the installation of reserves (9 created) including about fifteen watercourses to which are added 2 prohibited fishing sites and extensions of NATURA 2000 (2547 hectares were added to the network to include 5 rivers and others are envisaged for 2008)
- on the study of the pure populations and the identification of the new populations to estimate " the condition " of populations of macrostigma. Also, they could determine an increase of 107 % of the cumulated effectives and 77 % of the cumulated biomasses, and the discovery of the 15 new populations.
- on the first tries of reproduction in semi-natural environment. This part is unquestionably the most difficult of our program due to the different problems met: lack of broodstocks, almost impossible assertion of the broodstocks in captivity and the young fishes do not feed in pisciculture. Because of this it was decided to stop this stage of the program to turn to protection *in situ.*
- on communication to inform the largest public possible on the necessity to protect this fish.

So, we can say that acquired results are very encouraging, but that the permanence of the kind will be able to be assured only with the assertion of our efforts beyond this program ....

IX) Plan of management after - LIFE

To perpetuate the populations of macrostigma it is planned to continue following actions:

➢ **Maintain the pure populations in a state of favorable conservation (cf. texts of directive Habitats and texts of application on national plan)**

🕐 ***Surveillance of sites***

objective: fight against poaching. The preservation of the kind passes by the fight against immoderate samples and by an accentuated control of prohibited modes of capture. In effect, several offences were determined in the course of the surveillance. Also, the assertion of the surveillance of sites appears necessary for the conservation of the kind. Only persistence will pay for a lasting result.

• ***Set up a regulation and strengthen the control of the introduction of young fishes of Atlantic form***
- **objective:** fight against the introduction of other kinds of fario trout to stop hybridization**.**

➢ **Ameliorate the knowledge of characteristics and of the repartition of the macrostigma trout and launch a policy of reconquest of the territory**
• *the genetic monitoring of the pure populations:*
- **objective:** make sure of the purity of the population.

🕐 ***Control the levels of population periodically****:*
- **objective:** follow the evolution of populations.

🕐 ***Research of pure populations:***
- **objective:** identify new populations to estimate at best the state of the available supply and therefore its chances of survival

Besides, in the course of LIFE, analyses showed that there is a difference between the populations of macrostigma from the different basins . It is therefore very interesting to search pure populations on all the island. Indeed, it is important as part of a patrimonial management not to blend the trouts of the different micro-regions to keep the heterogeneity of the macrostigma.

Reconquest of a basin (or of a part)
- **objective:** spread the repartition area of the kind

➢ **information and awareness**
animation in school
- objective: make the children aware in the conservation of the macrostigma and in general of our environment.

animation for the general public
- objective: inform a wider public on the interest of keeping our endemic trout.

➢ **transverse Actions**
Meetings of the piloting and scientist committees
- objective: monitoring of the progress of the program and validation of different actions

Realization of Natura 2000 aims documents on every site.
- objective: setting up the actions of management

Coherence with the Piscicultural Departmental Plan of Management (PDPG)
- objective: setting up a consistent management of the halieutic heritage of the island

Coordination of the actions
- objective: coordinate the set up of the actions

¬ various Actions:
- besides the different actions recalled above, other actions can be set up according to the needs of the moment:
- works in river,
- signalization,
- some studies are to be planned: phénotypes, invertebrates, study of the relation age - size, …

Credits photographs: Jean-Louis Teyssié, ONEMA; confederation of the Fishing.

Trad:MG