IMPLEMENTATION OF THE AGREEMENT
ON THE CONSERVATION OF POPULATIONS OF EUROPEAN BATS

National Report of France

2001 – 2005

A. GENERAL INFORMATION

Name of Party: France
Date of report: July 2006
Period covered: 2001 to 2005
Competent authority:

Ministère de l'écologie et du développement durable
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- Ms. Nathalie LACOUR, Direction de la Nature et des Paysages, 20 avenue de Ségur, 75302 Paris 07 SP, Tel. +33 142 19 19 39, Fax : +33 142 19 19 30
- Mr. Stéphane AULAGNIER, University of Toulouse, scientific advisor for the National Museum of Natural History, 57 rue de Cuvier, 75231 Paris cedex 05 (IWGs : Geographical scope of the Agreement, Guidelines for the issue of permits for the capture and study of captured wild bats, Guidelines on bat monitoring methods to assess population trends, Autecological studies for priority species (convenor), Protection of overground roosts).

Other persons involved in Intersessional Working Groups:

- Ms. Marie-Jo DUBOURG-SAVAGE, Société Française pour l'Etude et la Protection des Mammifères (IWGs : Impact on bat populations of the use of antiparasitic drugs for livestock, Wind turbines and bat populations, Conservation and management of critical feeding areas and commuting routes).
- Mr. Laurent TILLON, coordinator of the network for non-ungulate mammals of the Office National des Forêts (IWG: Bat conservation and sustainable forest management).
- Participation on request of regional coordinators of the SFEPM Chiroptera Group.

B. STATUS OF BATS IN FRANCE

1. Information on species present in France

Three new bat species are now known to be present in the European territory of France, bringing the total here to 33.

- *Myotis alcathoe*, which presence had been suspected for some years, was confirmed in 2001 (Ruedi *et al.*, 2002 - *Rev. suisse Zool*. 109 : 643-652 ; Jourde, 2003 - *Plecotus* 13 : 1 ; Dieuleveut, 2003 - *Plecotus* 13 : 2 ; Dietz, 2005 - *Rhinolophe* 17 : 7-10 ; Jourde, 2005 - *Rhinolophe* 17 : 137-138 ; Hervé, 2005 - *Naturale* 0 : 19-22).
- *Myotis punicus* has been clearly identified in Corsica (Beuneux, 2004 - *Mammalia* : 68 : 269-273 ; Evin *et al.*, 2004 - *Bat Res. News* 45 : 110 ; Evin *et al.*, 2005 - *Bat Res. News* 46 : 91).
- following the description of a new form in the French Alps (*Plecotus alpinus*), *Plecotus macrobullaris* has been raised to the rank of species thanks to genetic analyses (Kiefer & Veith, 2001 - *Myotis* 39 : 5-16).

Of the 33 species, 31 are known to breed within the European territory of France (*Myotis dasycneme* is only observed in hibernation and *Pipistrellus nathusii*, although present all year round, is migratory).

2. Species status and population trends

Due to the large size of the country and the great number of species, it is difficult to estimate the populations. However a census in winter and summer roosts has been performed in 1995 and updated in 2004, taking stock of the situation for the priority species of Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Annex 2).

Table 1: Seasonal census of bat roosts in France at a nine-year interval, after Roué *et al.* 1997 - *Arvicola* 9 : 19-24, and unpublished data (*Rhinolophus ferrumequinum* has been surveyed also in 1999 (Ros 2002 -); *Myotis myotis* and *Myotis blythii* are sympatric in the South and even form mixed maternity colonies; as it is not always possible to tell them apart, three different tables have been presented).

Species	**Year**	**Winter**		**Summer**	
		Bats	**Sites**	**Bats**	**Sites**
Rhinolophus ferrumequinum	*1995*	*21 268*	*810*	*6 430*	*270*
	1999	*28 422*	*1433*	*10 572*	*210*
	2004	42 043	1823	19 171	291
Rhinolophus hipposideros	*1995*	*5 930*	*909*	*10 644*	*578*
	2004	15 268	2 199	31 212	1 496
Rhinolophus euryale	*1995*	*2 899*	*51*	*3 616*	*49*
	2004	9 367	117	6 524	48
Rhinolophus mehelyii	*1995*	*5*	*1*	*0*	*0*
	2004	1	1	0	0
Myotis myotis	*1995*	*13 035*	*681*	*37 126*	*252*
	2004	15 520	1 363	52 449	311
Myotis blythii	*1995*	*1 116*	*9*	*8 685*	*32*
	2004	2 537	118	21 362	97
Myotis myotis/blythii	*1995*	*14 151*	*690*	*45 011*	*284*
	2004	18 057	1 481	73 811	408
Myotis capaccinii	*1995*	*541*	*35*	*1 525*	*21*

	2004	720	78	3 803	14
Myotis dasycneme	*1995*	*18*	*5*		
	2004	23	6	0	0
Myotis emarginatus	*1995*	*9 670*	*345*	*7 681*	*123*
	2004	18 240	751	35 251	198
Myotis bechsteinii	*1995*	*732*	*239*	*191*	*30*
	2004	823	528	135	8
Barbastella barbastellus	*1995*	*1 983*	*239*	*1 155*	*51*
	2004	4 886	528	3 141	200
Miniopterus schreibersii	*1995*	*211 109*	*45*	*114 056*	*95*
	2004	74 786	52	57 515	50

As data from some areas or for some species had not been communicated at the time of compilation, species analysis could not be carried out. But some comment can be made for *Miniopterus schreibersii*.

After the exceptional mortality that affected *Miniopterus schreibersii* in France, Portugal and Spain in 2002, a population decline on a national scale has been observed, but is still difficult to evaluate in the absence of a national monitoring of all hibernation and maternity roosts. For this species, the absolute protection of its roosts seems to be the prerequisite which will allow its population to recover, in peace and quiet.

For the other species there is no indication of change in status since the last report. From the 3 species which have been added to the list of bats in the European territory of France, only *Myotis punicus* can be assessed (3000 counted individuals in 2002, population stable over the last ten years); for the other two species the state of knowledge is still sketchy.

3. Habitats and roost sites

To promote the conservation of the forest habitats of bats a French translation of Meschede's and Keller's book has been published in 2003 in the Swiss journal *Le Rhinolophe* (n°16: 1-248)

The 1995 list of protected underground roosts and the list of those needing protection were updated in 2004 by adding new sites to them. This work was particularly useful for Natura 2000 pSICs. A total of 608 roosts have been classified in international, national, regional or local importance according to the number of assessed species and the number of individuals in hibernation, transit (or swarming) or in maternity colonies.

4. Threats

The main threats affecting bats are the following:

Closing of access to hibernation or breeding roosts

The closing of access to quarries, mines and caves is one of the reasons of the decrease in bat populations as well as the disappearance of roosts as a consequence of old buildings renovation and felling of old trees with cavities.

For security reasons, the old abandoned mines, often used by bats for hibernation, are gradually closed, filled in or blown up by the local government department in charge of the issue.

Efforts are made to bring the regional decentralised services of the Ministry for Infrastructure to inform their counterparts of the Ministry of Environment of such closing

operations. Some closures have been made which continue to allow animal access, but permanently stop human entry.

Disturbance

Numerous underground roosts for bats are still visited by an increasing number of potholers, youngsters from leisure centres, participants in rave parties in underground quarries (even with killing of bats, either through carelessness or vandalism).

Use of chemicals

In some circumstances, the use of chemicals in agriculture or forestry can be toxic for bats but also timber treatment for framework.

Habitat alteration

Habitat modification through land re-allotment, construction of new roads, water pollution and decreased grazing have also a negative impact on food resources and therefore on bat populations.

Wind farms

The development of wind farms represent a new threat, mainly in the south of France where the increase in the number of wind turbines can seriously affect some species which congregate in large numbers in a few roosts and whose commuting flyways to their foraging habitats extend over a few dozen kilometres (*Myotis myotis, Miniopterus schreibersii*, …).

The French mammal society (SFEPM) has produced guidelines for good practice for impact assessment of wind farm projects, according to EUROBATS generic guidelines. Exchange of information at European level, thanks to meetings of Parties of the EUROBATS Agreement, is necessary to be able to follow up the consequences of the setting up of wind turbines and the proposed measures of mitigation.

5. Data collection, analysis, interpretation and dissemination

In France bat monitoring started a few decades ago and allowed to give information on the drop of numbers for some species, especially for *Rhinolophus euryale* (Brosset *et al*. 1988 – *Mammalia* 452: 100-122). However monitoring of populations concerned only a few sites and was often performed only on a regional scale.

A first compiling of data was done in 1976 and completed by the 1995 census to clarify the status of the 12 species listed in the annex 2 of the Habitats Directive. This work was possible because of the big increase in the number of people concerned by bat conservation.

The first Bat Recovery Plan planned the monitoring of 8 species of Directive 92/43/EEC in winter and/or summer for the period 1999-2003. In view of the large number of roosts for 6 of these 8 species, only 2 roosts per region and per season have been monitored. During those years some sites have been abandoned due to the disappearance of the colony or of the roost itself or because of the lack of volunteers to continue monitoring. Monitoring methods are the same for all species except for *Myotis capaccinii* (also found in mixed colonies) and *Miniopterus schreibersii* (a species which forms huge colonies).

The list of collected data concerned the characteristics of the site (location, roost type, protection and disturbance), the date of monitoring, and the number of bats as well as other elements such as presence of swarms, isolated individuals, dead bodies, etc.

Winter monitoring was planned from 15/01 to 10/02 and summer monitoring from 01/06 to 15/07, i.e. before the fledging of young in order to be able to count them once the adults have gone foraging.

Table 2 : Monitoring programme of the populations of 8 priority species within the scope of the National Bat Recovery Plan 1999-2003

Species	**Winter**		**Summer**		**Method**	**Regions**	**Number of roosts**
	North	South	North	South			
Rhinolophus ferrumequinum	√		√		generic	10	20
Rhinolophus hipposideros	√		√		generic	10	20
Rhinolophus euryale *	√	√			generic	12	28
Myotis capaccinii *				√	specific	3	14
Myotis emarginatus	√		√		generic	11	22
Myotis myotis			√		generic	8	16
Barbastella barbastellus **	√				Generic	6	6
Miniopterus schreibersii *	√	√			Specific/	10	22

*** (all roosts if possible) ; ** (only roosts with numbers > 100 individuals.)**

C. MEASURES TAKEN TO IMPLEMENT ARTICLE II OF THE AGREEMENT

The Ministry of ecology and sustainable development (MEDD) set up a Bat Recovery Plan for 1999-2003. It has been subjected to an evaluation and a new plan will be drawn up for 2006-2010 (Annex 1: Terms of reference for drafting the Plan).

These Recovery Plans develop several working lines, some of which follow the EUROBATS proposals exactly. The new plan, which aims at being more operational than the previous one, plans notably to set up a platform grouping of not only the Plan coordinator but also several experts in different fields.

6. Legal measures taken to protect bats, including enforcement action

All bat species are protected in France by ministerial order of April 17th, 1981 which lists the protected mammals on the entire territory in accordance to Directive 92/43/EEC, the Convention on the Conservation of Migratory Species of Wild Animals (the so-called Bonn Convention) and the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).

Twelve bat species of the Annex II of Directive 92/43/EEC are present in France. A total of 607 Sites of Community Importance concerning bats have been proposed to the European Commission to incorporate the Natura 2000 network. Table 3 shows the number of sites for each of the 12 bat species which are present in France.

Table 3: Number of Natura 2000 sites for the 12 bat species of Annex II of Directive 92/43/EEC, present in France.

Code	Species	Number of Natura 2000 sites where the species is present
1304	Greater horseshoe bat (*Rhinolophus ferrumequinum*)	434
1303	Lesser horseshoe bat (*Rhinolophus hipposideros*)	400
1302	Mehely's horseshoe bat (*Rhinolophus mehelyi*)	3
1305	Mediterranean horseshoe bat (*Rhinolophus euryale*)	113
1308	Barbastelle (*Barbastella barbastellus*)	242
1324	Greater mouse-eared bat (*Myotis myotis*)	400
1310	Schreiber's bat (*Miniopterus schreibersii*)	167
1307	Lesser mouse-eared bat (*Myotis blythii*)	135

1323	Bechstein's bat (*Myotis bechsteinii*)	210
1316	Long-fingered bat (*Myotis capaccinii*)	45
1318	Pond bat (*Myotis dasycneme*)	7
1321	Geoffroy's bat (*Myotis emarginatus*)	309

Furthermore, before March 31rst 2007 French authorities will pass on 37 new sites or enlargements of sites with bat roosts. Annex 3 shows as an example a location map of the Natura 2000 sites for one bat species. More information is available on the website at:

http://natura2000.ecologie.gouv.fr

Moreover, any capture or destruction of species is subject to a permit, granted by the relevant authorities only after examination of a duly argued scientific case study. This study is evaluated by a council made up of various experts appointed by the Minister of ecology and sustainable development. The council delivers its views on the core of the request. On the base of the Council's opinion, the authorities decide whether or not to grant the requested permit.

7. Identified and protected sites which are important to the conservation of bats

Roost protection was the first goal of the previous Recovery Plan. It was achieved by the purchase of sites, by statutory or contractual protections, physical protections (gates or fenced perimeters) as well as by designation of Sites of Community Importance for the Natura 2000 network. Protection of roosts used for hibernation, transit or maternity will be one of the priority objectives of the second National Recovery Plan for Bats (in the process of drafting).

An inventory of important sites, realized in 1996, listed 520 sites already protected or needing protection. Updating of this inventory started in 1999 and was achieved in 2004. During this work a new type of grading was set up according to different criteria: species rarity, importance of the bat colony and status of the roost (birth giving, wintering, transit or summering).

The final report presents the list of 616 sites which still need protection; this list is longer than the previous one presented in the 1995 inventory as in the meantime many new sites have been discovered.

In the end, these two inventories have served to highlight 21 sites of international importance and 42 of national importance, so that priority actions can be listed for the coming years, especially for the sites of international importance.

8. Specific measures concerning habitats which are important to bats

Objective 2 of the National Recovery Plan 1999-2003 was aiming at specific measures and a certain number of actions have been carried out.

***Mapping of potential foraging habitats for* Rhinolophus hipposideros**

Faced with the decline and the splitting up of the populations of the Lesser horseshoe bat (*Rhinolophus hipposideros*) in some French regions, the Chiroptera Group of the Société Française pour l'Etude et la Protection des Mammifères (SFEPM) started a project to protect and restore foraging habitats for this priority species.

To map the foraging habitats of Lesser horseshoe bats, researchers worked on 57 sites. On each of the selected sites, foraging areas and commuting corridors for each nursery have been defined within a 2 km radius from the roost (a distance which corresponds to the commuting range of the species).

Using aerial photographs and G.I.S., the surface area of each site has been evaluated. A grid of squares of 1 x 1 cm (i.e. 1.56 ha) was placed on top of the IGN topographical map (scale 1:25000). The theoretical acreage of the foraging area of the colony has been determined by referring to bibliography and according to the size of the maternity colonies. Then a field study took place to characterize the main habitat and ascertain the index of homogeneity for each square, so that a map could be drawn of the different habitats around each colony. Thanks to the protocol of the study, another map showed visually the quality of the habitats, revealing the conservation issues around each site.

Forestry and bat protection

The Office National des Forêts (ONF) has now a representative dealing with forest management and conservation of biodiversity. Important work is being done to define best practice clearly which are the best practices in forest management to take account of bats. Another goal is the strengthening and the organization of a bat workers' network within this state institution.

A leaflet on tree occupancy by bats has been published to make forest managers and the services responsible for the maintenance of roads and other public structures aware of the presence of these species in trees and to give rise to good practices in woodland and hollow tree management in order to conserve habitats for bats.

9. Public awareness and advertising

Promoting public awareness of bats is one of the objectives of the National Recovery Plan, but the actions listed below are not all part of the Plan.

- Numerous booklets, pamphlets giving general information on bats such as "Les chauves-souris, des mammifères fascinants et menacés" (Bats: fascinating and threatened mammals) have been published and circulated in the different regions. Aimed at the general public they are meant to better inform about bats and make people appreciate these animals.
- A leaflet on bats in bridges has been distributed to the services responsible for the renovation of bridges.
- Posters are sold or given free of charge.
- An "educational trunk" has been conceived and duplicated by the Natural History Museum in Bourges. It is lent to schools, for the children to discover the world of bats. It was often pointed out that the parents' awareness of certain subjects is frequently aroused by their children and this is why this action is carried out every year.
- Every year different events are organized for the European Bat Night. In 2005 for instance the results have been really constructive as nearly 3 000 people took part in 86 events organized in 47 "départements". Outside the European territory of France, New Caledonia also organized a Bat night on the theme of the fruit bats. On this occasion the general leaflet on bats was distributed and the event received a large media coverage. The TV channel TF1 broadcasted a report during the national evening news, and another one was broadcast on the cable television channel Direct 8 (TNT). On the radio, ultrasonic sounds from Michel Barataud's CD "The Inaudible World" were broadcast and numerous interviews were made (Europe 1, Radio Monte Carlo and Radio France), local radios also contributed to the coverage of the event. On Internet, the webpage www.nuitdelachauvesouris.com listed all the necessary information for the event and some other websites had a picture of bat as their day photograph (Wanadoo, Sciences et Vie Junior). Specialized magazines (Terre Sauvage, La Salamandre) and the local press also relayed the event.

- A course organized by the Atelier des Espaces Naturels (ATEN) and the Office National des Forêts gives the opportunity to Natural Reserve managers and to Civil servants to improve their knowledge about bat species and their ecological needs. The two sessions of the course, in summer and in winter, outline the problems of bat conservation as a whole.

10. Responsible bodies, in accordance with Article III.5 of the Agreement, nominated for the provision of advice on bat conservation and management

A steering committee is in charge of the Recovery Plan implementation. The Chiroptera Group of the Société Française pour l'Etude et la Protection des Mammifères (SFEPM) has an operational network in the field and supplies numerous advice and information on conservation and management of bats.

11. Additional action undertaken to safeguard bat populations

The European territory of France has been declared free of rabies as a consequence of terrestrial rabies eradication. Bat rabies however is still present and two or three new cases are identified every year. The Agence Française de Sécurité Sanitaire des Aliments (AFSSA Nancy) launched a study in 2002 to clarify the epidemiological situation in France. Although it is not possible to quantify the risk that EBLVs imply, this risk is considered as being low to moderate for the public, and moderate to high for people such as the scientists having contact with these viruses (bat workers essentially). But thanks to vaccination against rabies this risk can be reduced to a negligible, low or moderate level. Recommendations have been made on this subject and passed to the groups concerned.

In anticipation of the very negative consequences that human contamination by a bat would have, a leaflet on bats and rabies has been widely distributed and information has been broadcast on the radio to inform the public of the risks of rabies transmission by bats.

12. Recent and on-going programmes (including research and policy initiatives) relating to conservation and management of bats

Bat roosts in woodlands: characterization in view of conservation management

The number of available roosts is supposed to be the limiting factor for bats in forests. A study investigated at three levels the deciding criteria for the use of cavities: the plot (analysis of the stand characteristics), the tree (immediate surroundings and tree structure), the cavity (morphology, location, microclimate conditions). In the forest of Rambouillet, description of 3942 trees and 565 cavities in 6 zones (4.5 to 10 ha) suggested parameters which are positively selected by all species of bats. The roost characteristics have a strong influence on its selection, but the form of the tree and its diameter are also deciding factors. The number and density of roosts as well as the number of decaying trees within 30 m of a cavity all serve to attract bats. This study will enable the implementation of bat friendly management measures within the framework of the new management plan of this forest (Tillon 2005 - Mémoire E.P.H.E.).

Selection of roosts and foraging habitats by* Myotis bechsteinii*, implications in forest management

Myotis bechsteinii is a species which is considered as rare and living in large deciduous forests with mature to old stands. In the Limousin region however the only known colony inhabits a semi-open landscape with scattered and young woodlands, but nevertheless its numbers increased by 110% in five years. Radio-tracking of 10 individuals and diet analysis of the colony have confirmed typical behaviour of a forest-dwelling species which roosts mainly in woodpecker holes and selects the windfall openings made by the 1999 storm. The wealth of insects found in the herbaceous and shrubby layers and the saproxylic insects

(living in dead wood) characterize its diet. The special conditions created by the storm should be sustained for species-friendly management.

Ecological requirements of Rhinolophids in the Cevennes National Park: proposals for the monitoring of populations and for conservation management

The ecological characteristics of hibernating sites of *Rhinolophus ferrumequinum* and *R. hipposideros* have been studied at two levels: the roost (33 caves) and the location within the roost (254 places). Extensive caves with several openings on south facing wooded slopes are favorable to large gatherings of *Rhinolophus ferrumequinum*. The numbers of *Rhinolophus hipposideros* increase with the cave size and especially with collapsed blocks which multiply the suitable places. These criteria led to finding new hibernation colonies in the area by referring to speleological inventories and by checking topographic maps.

The study of *Rhinolophus euryale* foraging habitats encountered some difficulties due to the species unpredictable behaviour and the uneven terrain. Use of several roosts during the season and a preference for wooded habitats have been the main results leading to large scale orientations for conservation management: securing the tranquility of roosts with numerous bats and maintaining the forests within four kilometers of the used caves.

Estimation of* Rhinolophus hipposideros *population parameters using non-invasive techniques

In order to reduce disturbance produced by the capture-mark-recapture method for monitoring bat populations, techniques using the genetic identification of the animals (DNA extracted from the guano) have been evaluated on *Rhinolophus hipposideros* colonies. First of all, 586 samples were analyzed for 8 microsatellites and 165 different genotypes were identified with a low identity probability (<0.0014). Bayesian methods were used to estimate numbers in each colony and they proved to match the visual count (Puechmaille & Petit 2005 – Bat Res. News 46(3): 119-120). Then complementary analyses helped determine the sex of individuals - confirming the absence of males in maternity colonies - the survival rate based on repeated sampling year after year and the provisional use of classical models of CMR (Scala 2006 – Mémoire D.E.S.U.P.S., Toulouse). This research makes way for the study of many species with non-invasive techniques according to their conservation status.

LIFE-Nature: Conservation of three cave-dwelling species of bats in the south of France

In April 2004 a LIFE programme started in the south of France on the three priority species for autecological studies (action 8 of EUROBATS Action Plan): *Rhinolophus euryale, Myotis capaccinii* and *Miniopterus schreibersii*. Its aim is to stop the decline of populations of these cave-dwelling species but also of the ones which share the same ecological niche (*Rhinolophus ferrumequinum, R. hipposideros, Myotis myotis, M. blythii, M. emarginatus*…) and to favour the increase of their numbers. In total 13 technical partners and 19 co-financiers including the European Commission (50%) are involved in this programme which will end in April 2008. It concerns 5 regions in the south of France (Aquitaine, Midi-Pyrénées, Languedoc-Roussillon, Provence-Alpes-Côte d'Azur and Rhône-Alpes) and 13 Sites of Community Importance (Natura 2000) for the conservation of the three species, totaling 26 bat roosts (for hibernation, transit, maternity). Actions concern 3 fields of research: knowledge (monitoring of populations, identification and characterization of foraging habitats in view of conservation management), protection (legal, conventional and/or physical with land purchase, access grilling or perimeter fencing…) and education to make the local protagonists and the public aware of bat conservation (setting up information boards, distribution of leaflets, creation of an exhibition, production of a film on bats, organization of special meetings for the bat workers of southern France…).

13. Consideration being given to the potential effects of pesticides on bats and efforts to replace timber treatment chemicals which are highly toxic to bats

A list of forbidden chemicals and products submitted to regulated use exists in France. Consideration of substitution of timber treatment chemicals has started.

D. FUNCTIONING OF THE AGREEMENT

14. International co-operation

The main co-operation concerns Switzerland and Spain.

The Museum of Natural History in Geneva (Switzerland) evaluated the Bat Recovery Plan. The second plan will benefit from their analyses: importance of setting up a technical group bringing bat experts together, of looking for a better coordination of actions, a better dissemination of information relating to the Recovery Plan execution and a better partnership with the regional bat coordinators and the DIRENs (regional directorates of the Ministry of ecology and sustainable development) to implement the planned actions.

Part of the LIFE programme field work did benefit by the enlightened advice of Spanish colleagues dealing with conservation of the same species (*Rhinolophus euryale, Myotis capaccinii).* Following this programme, bilateral projects should evolve.

15. Measures taken to implement Resolutions adopted by Meetings of Parties

Resolution 2.2 - Consistent monitoring methodologies

In France, population monitoring of priority species follows EUROBATS recommended methods. For *Myotis capaccinii* and *Miniopterus schreibersii*, French bat workers recommended specific methods which will be included in the revised version of the consistent monitoring of populations which will be finalized for the 5th MoP, and in the same document they proposed, as an example, a synthesis of population-monitoring activities.

Resolution 2.3 - Transboundary Programme – Species

France is home of only one (and really marginal) hibernation site of *Myotis dasycneme*. For *Pipistrellus nathusii* studies are under way to determine the exact status of this species in the country: no breeding site has been found although reproduction was proved (Rideau 2004 – Symbioses N.S. 10: 63-64). Contacts are established with bat banding centres in Eastern Europe to pass on the information on marked individuals that have been observed, the distance record being 1905 km between Pape (Latvia) and Béziers (south of France - Brosset 1990 – Mammalia 54 : 207-212).

Resolution 2.5 - Geographical scope of the Agreement

Study of migration

Between 1936 and the 1970's about 100 000 bats were ringed in France with the aim of studying migrations. In the sixties a decline of the largest colonies appeared which was partly connected to this activity (Brosset 1978 – *Courrier Nature*, 55 : 17-22; Faugier 1983 – *Bièvre*, 5: 1-26). Banding was therefore suspended. However contacts with the banding centres of Eastern Europe ensure feedback on the ringed animals found in France.

Resolution 4.3 - Guidelines for the protection and management of important underground habitats for bats

Protection

Statutory protection of important underground habitats for bats relies on three main tools:

- the National Nature Reserve (the most restricting and lasting measure but also the longest to implement), a perennial class subject to a preliminary enquiry by the Direction régionale de

l'environnement and set up by decree. This type of protected area comes under the Prefect's authority (under the territorial authority in Corsica where it is called Nature Reserve of Corsica),

- the Regional Nature Reserve (previously called Voluntary Nature Reserve) is a category with limited duration and subject to the owner's agreement. It is submitted for approval to the Prefect of "département", a territorial division under the administrative authority of the Regional Council,

- the "Arrêté Préfectoral de Protection de Biotope", a prefectoral order on the State initiative, which lists the forbidden activities in this protected area (they vary according to the habitats and their use).

Physical protection of sites for hibernation or for small maternity colonies is based on the setting up of gates with heavy horizontal bars or on a solid fencing around sites with *Miniopterus schreibersii* colonies or large breeding colonies of *Myotis myotis/M. blythii* or *Rhinolophus ferrumequinum*.

A third way of ensuring protection is by contractual agreement between the site owner and mostly a nature conservation society (e.g. a Conservatory of Natural Areas or another conservation body). In a written document both agree, the former to conserve the site in a favourable state for bats and the latter usually to monitor its bat populations for a certain length of time.

Management

According to EUROBATS recommendations, that France has amended and translated, the management of important underground sites for bats is entrusted to a curator in the case of nature reserves and to a nature conservation society for other types of protection.

Resolution 4.4 Bat conservation and sustainable forest management

Identification of threats

In a country which has one of the biggest surface areas of forest in Europe, the methods used in forestry are crucial for the conservation of bats which live there. It is therefore necessary to take account of the biodiversity which is associated with dead and hollow trees and to limit clear cuttings. That awareness of this is growing was evidenced by papers presented during the conference in Chambéry (France) in October 2004. These papers were published in "D. Vallari *et al*. (coord.) 2005 - *Bois mort et à cavités. Une clé pour des forêts vivantes.* Lavoisier, Paris". Conifer plantation in dense monoculture stands is another threat for forest-dwelling bats.

Raising awareness

See point 8 of the present report.

Key areas

In the forests managed by the state, besides the actions developed in point 8, designation of State biological reserves is a way of protecting old trees in unmanaged areas. In the logged plots it is recommended to take into consideration the trees which have cavities suitable for bats.

Resolution 4.5 - Guidelines for the use of remedial timber treatment

This resolution has been translated into French to be passed on to the relevant departments (Ministry responsible for agriculture) and to implement the recommendations.

Resolution 4.6 - Guidelines for the issue of permits for the capture and study of captured wild bats

Invasive activities in relation with bats are strictly limited to licensed bat workers. Permits for the capture of bats are delivered for one year by the departmental authorities after preliminary investigation by the Regional directorate for the environment (the competence of the applicant is considered as well as the relevance of the project) and permission from the National

committee for nature protection. Licences for the two endangered species in France: *Rhinolophus mehelyi* and *Myotis dasycneme* are only issued by the Minister responsible for the environment. State institutions are entitled to issue permits to their personnel providing that they check their ability and send a report of activity to the national authority.

Resolution 4.7 - Wind turbines and bat populations

Each wind farm project is subject to an Environmental Impact Assessment.

The Chiroptera Group of the SFEPM has produced and disseminated recommendations for assessing the impacts for bats (annex 2). These recommendations have been published by the Ministry of ecology and sustainable development and the Agency for the environment and mastery of energy (ADEME) in the Guide for the environmental impact assessment of wind farms which moreover will be revised in 2007.

ANNEX 1: TERMS OF REFERENCE FOR DRAFTING THE 2006-2010 ACTION PLAN FOR BATS

The present terms of reference fix the minimum framework for the action plan which has been requested by the DNP (directorate for nature and landscapes), a department of the Ministry of Ecology and Sustainable Development.

I. OBJECTIVES

The aim of the plan is to conserve and restore the populations of bats living in the European territory of France. This action plan comes within the framework of the statutory measures relating to bat protection and follows the rules of conduct of the international Agreement for bats (EUROBATS) signed by France. It will also help estimate the state of populations of bat species in annex 2 and 4 of the Habitats Directive and propose requisite measures to ensure their conservation at favourable status in accordance with the articles 12 and 16 of this Directive.

The plan will fix the measures to be implemented, including the organizational ones, to achieve its aim, favouring the most efficient measures whenever possible. It will seek the most economically attractive measures to ensure a sustainable maintenance of species, aiming for concrete, realistic, feasible and measurable objectives. The plan will determine the function of the national technical coordinator to be appointed, as well as his necessary means. The plan will define the terms for information collection regarding its completion. The plan will fix the terms for monitoring and evaluation thanks to the setting up of indicators which will measure its efficiency. It will foresee the development of regional action plans under the aegis of the Regional directorates for the environment (DIRENs) which should dedicate from their global budget a specific sum to the action plan.

The plan will concern all the bat species living in the European territory of France. The type of action can vary according to the conservation status of the populations or of the species concerned. Actions for overseas “départements” and territories will be the target of a specific plan at a later stage.

The action plan will take into account:

- the actions from the 1999-2003 recovery plan, their results and their evaluation,
- the recommendations adopted by the meetings of Parties of the EUROBATS Agreement.

II. CONTENT OF THE PLAN

The preliminaries of the plan will consist of an introduction and a summary of the plan issues and objectives, which will be translated into English.

The document will then be divided in three parts:

- Part one will review the present state of knowledge and research, the results of conservation measures and of management actions that have already been enforced.
- Part two will state more clearly the issues for the conservation of bat species and the regional, national or European priorities to be implemented at national level and in each region.
- Part three, the operational stage, will specify the national actions and the minimum ones to be included in the regional plans. For each action there will be a written section indicating the priority level, the financial assessment, the 5 year time-table for its implementation and the estimated financial plan.

A list of references showing the documents used and those for further reading to implement the action plan (according to Action plan I and additions) will be presented at the end of the draft.

1. Current state of knowledge and available measures for the protection of bats

The plan will present:

- a description of the Chiroptera order (according to Action plan I),

- elements of systematics (according to Action plan I and additions),

- different status of species. IUCN criteria, associated Red lists and Species of the Annex 2 and 4 of Directive 92/43/EEC will be listed,

- a synthesis of the biological and ecological requirements of species that need to be taken into account for bat conservation: breeding, feeding, habitat, predation, dynamics of populations and recovering ability. In view of the important number of species and for economies of scale, the biological aspects will be presented, if possible, in groups of species which have a similar biology (according to Action plan I),

- a distribution map for each species showing the population status (population size) and the administrative regions. This map will focus on France but world distribution will be mentioned in order to know which connections have to be set up, especially with neighbouring countries. Moreover the population trend will be detailed: a graph showing the change of numbers over time and maps detailing the changes in space and over time (according to Action plan I and regional feedback),

- a generic and synthetic information on the conservation status of species, populations and bat habitats (sites for swarming, hibernating, breeding and foraging), showing the priority species concerned by the actions (according to Action Plan I and regional feedback),

- for each species or group of species, a graded presentation of threats to populations and habitats (according to Action Plan I and regional feedback),

- the cultural elements which might hinder bat conservation or on the other hand which might be a driving force for it,

- a census of available experts in France and abroad who might contribute to the carrying out of the Action plan (according to Action Plan I and additions),

- a census of actions already conducted for bat conservation and those in progress and an indication of their efficiency and the possible problems encountered; a census of the existing means and tools that might be used to carry out the new action plan (according to Action Plan I and regional feedback).

2. Diagnosis of the priorities and needs for bat conservation

For an efficient conservation and the recovery of bat populations the main actions will concern, as a priority, the conservation of natural habitats. This part will present:

- the interests at issue for species conservation following on from the analysis of the state of knowledge,

- a graded summary of the optimal needs necessary for the conservation of the different species, including financial needs,
- the strategy proposed by the operator for the duration of the plan and the definition of the minimum actions to be carried out in each administrative region which will allow approval of the regional action plans by the state.

3. Requisite actions at national and regional levels

From the point of view of conservation issues, taking into account species requirements and national regulations regarding the protection of the species concerned, the last part of the recovery plan lists the measures to be implemented and the organizational methods for:

- the programme of actions to be implemented at national level,
- the actions of the regional plans.

For operational reasons, the plan develops its main aim into several individual objectives that are concrete, realistic and feasible.

Moreover, each action of the national plan that will be enforced at national or regional level will be the object of a written section indicating:

- the action name,
- the action number,
- the action objective and the domain into which it fits (research, education and public awareness, protection),
- a commentary on the action, indicating notably the type of process to be enforced,
- its priority level (three priority grades will be used)
- the target species with the indication of the species directly concerned by the action and those which will indirectly benefit from it,
- the concerned regions (geographical and administrative),
- the schedule for the implementation of the action within the framework of the plan (specific action which is not renewable or programme running over several years),
- indicators to monitor the progress of the action,
- a search for tools, actions, partners likely to contribute to the success of the action will be undertaken with the purpose of finding manpower resources or funds to implement the actions,
- the partners likely to be concerned by the implementation of the action.

The timing of the recovery plan will be summarized for each action in a table to give a global overview of the plan. This calendar will incorporate the assessment/analysis stage, which should start during the last year of the implementation of the plan.

Another table will present a global budget estimate for the cost of each action. For the priority 1 actions, it should be possible to make a more precise estimate of the costs of the first 3 years of implementation.

3.1 Actions to be implemented at a national level

a) Research

Research should allow to the monitoring of populations (important sites for bat conservation, especially for roosting and for bat protection, important foraging habitats and maternity roosts). The spotting of the most important colonies in each region should be included in the surveillance which will concern the important sites for bat conservation, notably the roosts themselves and the sites needing protection, the important foraging habitats for bats and the breeding sites.

It will be advisable to re-examine the population surveillance methods already in force, e.g. regarding the frequency of monitoring (yearly, winter and/or summer visit) and regarding the selection of species to monitor.

Finally, the procedure for data collection, transfer, gathering, synthesis and disseminating of the information related to the actions of population surveillance has to be determined in the plan, linked to the commitments resulting from Directive 92/43/EEC and EUROBATS Agreement.

Non-invasive methods, i.e. methods which do not involve capture, will be preferred. This monitoring will integrate the spotting of the most important colonies in each region. Coordination, synthesis and feedback to the regions will be the task of the DIREN of Franche Comté with the assistance of its technical coordinating team.

The research methods that have already been selected are the following:

- the list of target species, the methods for monitoring (frequency, methods of counting…), for the transfer, gathering and synthesis of the requisite information for monitoring at national level the evaluation of populations and the roosts, according to the commitments for the Natura 2000 network and EUROBATS Agreement;
- the local, regional and national coordination to ensure population and roost monitoring by winter and summer counts carried out in the different regions at a fixed date, for the species of the Annex 2 and 4 of the Habitats Directive;
- the production of technical frames of reference (on mines, rabies, wind turbines, foraging habitats…) and support for the commissioning of fundamental and applied research in priority problems (exceptional mortality of *Miniopterus schreibersii*, eco-toxicology, public health, species biology, research on new species…).

b) Actions of protection

The actions of protection aim at reducing the threats to bat populations and at conserving their habitats. This includes the issues of the impact of wind turbines and the closure of abandoned mines for public safety.

c) Education and public awareness

Communication initiatives aim to stimulate the awareness of concerned organisations and the public as well as coordinating the actions.

In this connection, the need to recognize the help and contribution of the network of volunteers has to be taken into account. In order to do this, a technical group will be created to bring together all the human and technical resources. It will also be commissioned, among other things, to guide and motivate the bat workers' network. Within this group the Société Française pour l'Etude et la Protection des Mammifères (SFEPM) will recruit someone to take care of the coordination.

The plan will specify the institutional tools of communication to be produced during its implementation. They will mention the partners' contribution to the plan and the volunteers' involvement. These tools of communication will be published under the logo of the national strategy for biodiversity.

Among other things the coordinator's tasks will be:

- to drive and assist the network of the SFEPM regional co-ordinators and ensure the exchange of information within this network;
- to assist the regions technically to define their regional action plan;
- from regional feedback, to synthesize regional experience and actions in conservation;

- to follow-up the implementation and the evaluation of the national conservation plan, as well as the evaluation of the regional action plans;
- to compile the final document that will testify to the implementation of the National Recovery Plan for Bats.

d) Specific actions of protection

Specific actions of protection for the most threatened species and populations of bats must be implemented. They will concern, for instance, the conservation of specific habitats and the preservation of food resources.

It is also necessary to define the priority actions specific to each region in order to reduce the threat factors to bat populations and to preserve their habitats.

e) Lines of research

The areas of research to be supported must be defined with bat protection in view by relying on already published results. It is certain that, several research projects need to be undertaken on species whose biology is little-known (e.g. on the new species recently discovered in France).

3.2 Actions at a regional level

The implementation of some priority actions falls under regional responsibility. To be approved, a regional action plan should contain the following actions:

- the inventory of knowledge and actions that have been conducted at regional level,
- the assessment of human and financial means devoted to the protection of species during the last 10 years and those means that could have led to the noteworthy destruction of colonies,
- specific actions of protection, including statutory ones to be implemented on priority roosts for which the regions have a national responsibility (see the inventory of sites to be protected, updated 2004),
- essential improvement of sites such as cavities and foraging habitats for priority populations,
- carrying out of winter and summer census
- implementation of the objective documents for the sites that have been designated to join the Natura 2000 network,
- exchanges of information at a national level.

Moreover, it is desirable to promote actions such as “SOS chauves-souris” (network of volunteers to solve problems with bats in houses). Specific actions of communication and training, participation in the “Bat night” may be considered as optional as carrying them out implies a greater mobilisation of regional funding.

III. TERMS OF ORGANIZATION AND EVALUATION

1 Methods of organization

As the implementation of this plan foresees a link between responsibility and levels of organization, the different roles have to be determined.

1.1 Role of the Direction de la nature et des paysages (Directorate for Nature and Landscapes)

The Directorate for nature and landscapes (DNP)

- initiates the plan,

- organizes a consultation of the different ministries concerned,
- approves the plan and disseminates its content,
- appoints the coordinating DIREN,
- informs the Prefects of the objectives of the plan (of its organization and methods of implementation), of the role of the coordinating DIREN, the role of the other DIRENs to elaborate and validate the regional action plans, of the needs of short term regional feedback: appraisal of populations and regional actions (June 30th, 2006),
- relays information to the Association des Régions de France, the Assemblée des Départements de France, the State institutions and the European authorities,
- assigns the requisite funds (provided by the State) for drafting and carrying out the plan.

1.2 Role of the coordinating DIREN

To lead to the achievement of the plan, the MEDD will rely on a coordinating DIREN to

- operate the delegated running of the plan,
- be the privileged partner of the coordinator and of the technical group,
- to ensure with the Direction de la nature et des paysages, recruitment of the technical group, in cooperation with the chosen operator,
- to bring into play the funds that will allow the financing of the technical group,
- to bring together the members of the steering committee and ensure presidency of this committee,
- to supervise enforcement of the plan,
- to approve the annual programme with the financial partners and to disseminate the programme with the agreement of the associated DIRENs,
- to take responsibility for the drawing up of the annual report on the actions of the plan drafted by the operator, and for dissemination of the report,
- coordinate with the steering committee actions of external communication,
- ensure the forwarding of information to the MEDD,
- ensure correct feedback to the different regions.

To succeed in these different missions, the coordinating DIREN will have right of access to scientific data for a strictly internal use.

1.3 The role of the operator and of the technical group

The selected operator's task will be to recruit and accommodate a technical group which will allow

- drafting the National Recovery Plan,
- ensuring the implementation of national actions,
- coordinating the execution of actions with regional responsibilities,
- being the privileged partner of the MEDD and of the coordinating DIREN,
- supplying thorough technical advice for implementation of the plan,
- taking responsibility for the secretariat for the steering committee,
- providing monitoring indicators and ensuring their measurement,
- drawing up the annual report of actions for the coordinating DIREN,
- drafting the final document which will testify to the implementation of the National Recovery Plan for Bats.

1.4 Role of the different DIRENs

The implementation of the plan will rely on the Directions Régionales de l'Environnement (DIRENs) in charge of the enforcement of the plan in their region. For this reason they will:

- guide and motivate the plan in their area,
- put the Circular into practice,
- supply the technical group with the regional inventories prior to finalizing the action plan,
- oversee the definition of the regional action plan, ensuring the integration of its priority objectives with the help of bat workers, of local authorities and of state commissions and agencies,
- define the practical means for the implementation of the regional plan and of its actions,
- present the plan for approval to the CSRPN (Regional scientific council for natural heritage)
- approve the regional plan and pass it on to the coordinating DIREN and to the technical group,
- guide the regional monitoring committees,
- make sure of the correct implementation of the regional plan and report on its implementation to the coordinating DIREN and the technical group.

1.5 Local authorities

Within the framework of their responsibilities (agreements with the State, regional nature reserves, regional natural parks…) regional councils will be privileged partners. The same applies to departmental councils which could find in the regional action plans a means of implementing their policy towards the "Espaces Naturels Sensibles". These local authorities will be associated in the drawing up of the regional action plans and in their implementation.

The local authorities in charge of the implementation of the Natura 2000 objective documents on populations or on important sites for bats can also be associated with the plan.

1.6 State institutions

The state institutions (ONCFS : national office for hunting and wildlife, CSP: higher council for fishing, ONF: national forestry office, CRPF: regional council for private forest property, and Agences de l'Eau: water agencies) will be associated if necessary in the working out and implementation of the regional action plans.

1.7 Bat workers' network and SFEPM bat coordinators

The guiding of the bat workers' network and of the regional bat coordinators will be supported nationally. They will be the privileged partners of the DIRENs and of the technical group for carrying out the actions.

1.8 Scientific advisor

The scientific advisor will be selected by the MEDD together with the coordinating DIREN after consultation with the operator and he will be independent of all partners. If he cannot be fully independent he will have maximum autonomy.

He will advise the steering committee on the choice of actions necessary for the conservation of individual species within a scientific context.

1.9 National steering committee and regional committees

The national steering committee is the organ of strategic and financial decision making. Its task is:

- to monitor and evaluate by means of indicators the execution of the plan,
- to define the priority actions to be implemented
- to examine and give its opinion on the regional monitoring committees.

The recovery plan specifies the composition of the steering committee.

A sub-committee may be nominated from the steering committee. Finally a scientific committee may be formed to give scientific and strategic perspectives to the steering committee.

Similarly, regional steering committees will be formed to monitor the tasks specific to the implementation of regional action plans for bats.

2 Methods of evaluation

At the end of its implementation, this plan will be analysed and evaluated to try to assess its effectiveness. Trying to get an impartial and objective judgment, preferably a third party will be entrusted with the analysis of the results, but the final appraisal, based on intermediate assessments, might be the task of the technical group on behalf of the operator.

For this analysis/evaluation, national terms of reference have been set up for the evaluation of recovery plans.

Besides all the information to appear in the annual reports and the final report, in order to fulfil the different requirements of the terms of reference for evaluation, the compiler of the plan will define all the indicators which will allow the assessment of the plan on one hand, and each action of the plan on the other hand.

IV. THE DRAFTING OF THE PLAN AND TECHNICAL SPECIFICATIONS

1. Different stages for setting up the recovery plan

- once they have taken the initiative for the bat recovery plan, the central services of the MEDD appoint the coordinating DIREN,
- the MEDD and the coordinating DIREN create a steering committee which brings together the partners concerned,
- the operator and the technical group draft the plan,
- the first draft is considered, then after amendments it is approved by the steering committee,
- the MEDD seeks advice from the other ministries,
- after amendments the plan is presented to the National council for the protection of nature and its habitats (“commission faune”), for advice,
- after amendments, the plan is approved by the MEDD and disseminated.

2. Monitoring the plan

The steering committee meets once a year for the annual monitoring of the action plan. In order to prepare for this meeting, the technical group produces an intermediate annual report to enable the evaluation of the actions which have been achieved.

In the framework of this annual monitoring, the plan determines the methods of collecting information relating to the carrying out of the plan and the ways of setting up indicators for measuring its efficiency.

The list of topics to develop in this report has to be made clear in the recovery plan.

The steering committee follows the updating of the indicators, approves the intermediate reports and the final document.

3. Schedule

The recovery plan has to be returned within a period of 6 months.

The operational timing is the following:

- beginning of June 2006, first meeting of the steering committee: first road map for drafting the national recovery plan,
- June 2006: the CNPN is kept informed of the progress towards drafting the second recovery plan for bats,
- July 2006: appraisal of bat populations and of the actions realized at regional level,
- June to August 2006: assessment of the situation , objectives, primary expectations of regional plans,
- September 2006: second meeting of the steering committee: progress report and plan objectives,
- October 15th, 2006: end of the drafting of the plan and passing on by the DIRENS, to the coordinating DIREN and to the DNP, of the regional roadmap for the drafting of regional action plans,
- November 2006: end of the drafting of the national plan,
- November 2006: third meeting of the steering committee, approval of the national plan,
- December 2006: approval by the CNPN,
- December 2006: MEDD validation and dissemination of the plan.

In preparation for each meeting of the working group, the compiler of the project plan will produce an intermediate document which will be handed on to the commissioning body.

4. Return

In order to be readable, the final document will have 50-100 pages. 30 printed copies will be provided, 5 of which will go to the DNP. An unbound original copy will also be provided.

Digital data files for PC will be provided on CD-ROM. Text files will be in WORD 6 format or a later version, tables on EXCEL 5 or a later version.

In order to be able to put the document on line on the MEDD website it will be supplied with the following specifications:

- the document will be supplied in PDF (in addition to the WORD file),
- the document will be split up into PDF files, whenever possible less than 1 Mo (2 Mo max.) respecting its structural logic and plan,

- a table with the contents of the document and the corresponding PDF files together with their size will be provided in html or WORD format.

Some pages which might be over 2 Mo will be treated on their own in PDF.

ANNEXE 1: PROPOSAL OF MEMBERS FOR THE NATIONAL STEERING COMMITTEE

The members of the national steering committee are the following:

- 1 delegate from the Ministry for ecology and sustainable development (MEDD)/Directorate for nature and landscapes (DNP),
- 1 delegate from the Ministry for Agriculture,
- 1 delegate from the Ministry for Infrastructure,
- 1 delegate from the Ministry for Industry,
- 1 delegate from the coordinating Regional directorate for the environment (DIREN)
- 1 delegate from one DIREN of the Atlantic biogeographical region
- 1 delegate from one DIREN of the Mediterranean biogeographical region
- 1 delegate from the Association of French regions,
- 1 delegate from the Assembly of French "départements"
- 1 delegate from the Association of the maires of France
- 1 delegate from the National council for the protection of nature (CNPN)
- 3 bat expert biologists, one of them being the scientific advisor,
- 1 delegate from the National natural history museum (MNHN)
- 1 delegate from the National office for hunting and wildlife (ONCFS)
- 1 delegate from the National forestry office (ONF),
- 1 delegate from the National centre for private forest proprietors,
- 1 delegate from the Permanent assembly of the chambers of agriculture
- 1 delegate from France Nature Environment
- 1 delegate from the French society for the study and the protection of mammals (SFEPM),
- 1 delegate from the French federation of speleology,
- 1 delegate from the Architectes des Bâtiments de France.

Annex 2 : Recommendations of the Société Française pour l'Etude et la Protection des Mammifères for the impact appraisal of wind farm projects on bats

SFEPM recommendations for the impact appraisal of wind farm projects on bats

It is now an established fact that wind turbines have an impact on bats and in the framework of the Environmental Impact Assessment that developers are forced to carry out, French bat workers, either members of the SFEPM or not, are now consulted for the appraisal of bat presence in the wind farm area and its surroundings.

Regional bat groups – usually structures independent from the SFEPM – have a general knowledge of their action territory; thanks to their relations with neighbouring regional bat groups they may have an interregional view of bat colonies distribution, an essential fact in the framework of the setting up of wind farms.

In this context and after consultation of its volunteers involved in bat surveys for the wind energy and after a year of work compiling reference and feedback from field work experiences, the SFEPM has decided to present protocols for the different stages of the impact study and the monitoring of wind farms. After all, many associations for the protection of nature found themselves in charge of an appraisal work without really knowing the real regional situation as far as bats are concerned and sometimes without having the necessary competencies for this very specific survey.

Furthermore, standardization of the methods meets the demand of developers and this was highlighted in April 2005 during the seminar "Eoliennes, oiseaux et chauves-souris, quels enjeux?" (Wind turbines, birds and bats: what are the issues?) in Châlons-en-Champagne (France).

FRAMEWORK OF THE SURVEYS

- The appraisal work should be realised by competent bat workers with validation of the regional bat group or the regional SFEPM coordinator. Competence and validation are necessary to avoid that the survey with a bat detector is carried out by novices and that the impact on colonies known by local bat workers but not by outsiders in charge of the work is neglected (projects at the edge of administrative regions should be the subject of a concerted approach).
- The commissioning body should commit itself to taking up in full the pre-survey and survey conclusions.
- Raw data belong to the discoverers. Therefore they might be integrated to regional databases and once the planning permission obtained or the project abandoned they might be used for scientific papers.

METHODS

The expertise concerning bats in the framework of the Environmental Impact Assessment of a wind farm project can go through two phases:

- a pre-survey which can be carried out outside the activity period of bats, in which case it will be completed by a field study during the whole bat cycle, if the developer carries on with his project,
- a survey, that is to say field studies stretching over the full cycle of bat activity.

The methodology mentions the number of contacts per hour and by contact you should understand a well defined sequence with duration of less than 5 seconds. If the sequence is longer than 5 seconds, one contact will be counted every 5 sec.[1]

Pre-survey
The preliminary survey can be undertaken at any moment of the year, provided that the study area has already been investigated by local bat workers. The goal of the pre-survey assessment is to make the developer aware of the consequences for bats due to the mere siting of the wind turbines (existence of departmental/regional schemes for wind energy projects, proximity of maternity and/or hibernation colonies, of roosts for swarming and transit, presence of species affected by wind turbines, known flight paths for bats, etc…).

It is therefore necessary to undertake a compilation of existing data and to analyse habitats and landscape features on the map to determine the potential issues for bats.

1. Identification of known roosts
   - List the communes with important bat roosts within 20 km around the wind farm project (consultation of data bases, bibliography, etc.). This area should be increased if colonies of species with a long foraging range are also present nearby (*Myotis myotis/M. blythii, Miniopterus schreibersii*, …) or if migrating species (*Nyctalus sp., Pipistrellus nathusii, Miniopterus schreibersii*) have already been contacted within 30 km. As at regional level some species might have a confidentiality status it will not be possible to indicate the exact location of the roosts.
   - List separately maternity roosts, hibernation roosts and swarming/transit roosts as the impact of wind turbines can be different.

2. Habitats and landscape features
   - Highlight and analyse the potential commuting flight paths within 1 to 2 km around the project area.
   - Highlight and analyse the landscape structures which might have a function as foraging habitat (rivers, stretches of water, marshes, forest edges, hedgerows, forest lanes, riverine forests, pastures, dry grasslands), within 1 to 2 km according to the species present, to their behaviour and to the direction of the prevailing winds.
   - Highlight the habitats which might include bat roosts within 1 to 5 km around the project area (cliffs, old forests, caves, bridges and old buildings).

3. Departmental/regional schemes for wind energy projects
   If such schemes exist, check if they take into account the presence of important bat colonies.

4. Report

[1] Definition from Michel Barataud in the framework of the use of heterodyne bat detectors

The report will clearly state:
- the list of the species present in the area at a particular time of the year,
- the conservation status (national red list) and the protection status (different international conventions) of these species,
- the potential impacts which can affect them,
- the presumed vulnerability of the site and if necessary the need for a complementary survey.

Minimum number of working days for a pre-survey

The number of working days necessary for a pre-survey will depend on the size of the wind farm project. It is obvious that a project of about 30 wind turbines will need more work than a project of 4 to 6 aero-generators.

The following minimum number to recommend is based for 1 to 6 wind turbines grouped together:
- ½ day looking for references and information from regional data bases,
- 1 day looking for roosts within a nearby radius[2] (only possible between May and August) if the area has not been searched for bats previously (more days will be necessary in case of numerous and scattered human settlements in the vicinity of the project area).
- 1 day assessing potential foraging habitats and flypaths around the project area (evaluation of the landscapes features),
- 2 days for mapping the information and for the report (more if necessary).

At the developer's request, some night work with bat detectors can also be carried out at the pre-survey stage (with automatic ultrasound recordings or without), but then it will also be necessary to foresee 1 day to analyse the recorded sequences.

Survey

It is unrealistic to venture an opinion on possible impacts of a wind farm if the assessment of bat presence on the site has not been carried out during a whole year. Although in the framework of a survey priority will be given to try and contact the species during transit and migration, i.e. in spring and from August to October (dates vary according to the region), the fact remains that to determine the various impacts that the wind farm might have, it will also be necessary to check in the project area the presence of resident bat species and this according to 3 criteria:
- the foraging behaviour,
- the commuting routes of the resident species
- the potential transit/migration (in the case of contact with species unknown locally).

If a pre-survey has not been carried out (see above), days for looking for references, may be searching of roosts, and of potential foraging and commuting habitats will have to be included in the survey. To assess their impact on bats the survey will also take into account the infrastructural works closely related to the project (access roads, assembling platforms, transformers, etc.)[3]. It will also be necessary to:

[2] As an option, according to the information available in the regional database or at the developer's request

[3] Most of the time we are asked for a survey although none of this information is available and although the developer does not even know the number of wind turbines, he will finally install. However potential problems that this will bring for bats must be evaluated, even if this is the matter of the EIA and not of our survey.

1. foresee nights to survey bat activity with a bat detector (when temperature and weather conditions are favourable) by means of listening posts of 20 min. duration and by back and forth transects (*some listening posts can be replaced by automatic recordings but according to a standard protocol*[4] *to allow data comparison*). The results of this semi-quantitative survey will be expressed in the number of contacts per hour. Whenever possible foraging activity will be separated from transiting.

2. foresee entire nights of survey (for the number of bat contacts per hour) with automatic recording boxes using heterodyne or frequency division detectors (spring, summer and autumn) on the planned sitting of individual wind turbines, on the potential flight paths leading to the wind farm site and along landscape features in the vicinity of the project (favourable elements for commuting and for foraging). The results of the automatic recordings will allow comparing with a subsequent survey for species identification, the following night, using heterodyne/time expansion detectors and analysis of recorded ultrasounds.

3. foresee height surveys. As the range of bat detectors is limited and varies according to the species (maximum up to 30-50 m) to undertake a correct survey it would be advisable to carry out a height survey to assess passage of bats above the project area. In this case one of the following techniques has to be used:
   - heterodyne detector and digital recorder on board a balloon[5] to obtain ultrasound recordings at a height of 50 m,
   - heterodyne/time expansion or heterodyne/frequency division detector on the highest possible structure in the vicinity of the project area (weather tower, water tower, etc.) and linked to the ground by means of a cable.

   In order to detect the species at risk, the detector frequency will be set according to the group of species which is looked for: *Nyctalus, Eptesicus, Pipistrellus kuhlii* and *P.nathusii* on one hand, *Pipistrellus pipistrellus*, *P. pygmaeus* and *Miniopterus* on the other hand. Beware that the great majority of heterodyne detectors manufactured in the U.K. do not pick up *Tadarida teniotis* ultrasounds.

4. survey the migration flows, according to the available technical means in combination
   - with a thermal imaging camera
   - with an infrared camera and powerful illuminator
   - with a radar.

   Testing of these different means is still under way

Minimum number of working days for a survey

The number of working days necessary for a survey will depend on the size of the wind farm project. It is obvious that a project of about 30 wind turbines, moreover if it is split up in several geographical sub-units, will need more work than a small project of 4 to 6 aero-generators grouped together.

The following **minimum** number to recommend is for 1 to 6 wind turbines grouped together and **comes in addition to the working days planned for the pre-survey assessment**:

- 1-2 days looking for roosts in buildings, in other man-made structures, in caves and in forests, should the habitat be present,

[4] This protocol will come in annex
[5] The results of the tests carried out by the Natural history museum in Bourges are pending

- 2 nights of ultrasonic survey (transects and listening posts in addition to the automatic boxes on the ground and at height) for the spring migration (April, but as soon as mid-February in the south of France for *Miniopterus schreibersii*),
- 1-2 nights of bat detector survey and mist-netting in July to asses which are the resident species foraging in the project area or passing through,
- 4 nights of bat detector survey for autumn transit and migration between 15-20/08 and 15-31/10 according to the region,
- 1 to several days for the analysis of recorded ultrasonic sequences,
- 2 days or more for the report. This number depends on the site and the demand (assessment of the impacts and/or the repercussions on Natura 2000 sites, etc.).

Report

The return of the results implies to use a standard method (the one presented here) and analyses according to a scientific standard.

The report should include:

- the description of:
  - the methods and the type of equipment (detector, automatic recording boxes, radar or thermal imaging camera) and of the software used for sound analyses (the latter only in the case of identification at species level),
  - the site and the study area, the listening posts as well as the transects,
  - the limitations of the method (detection range, capacity to distinguish certain species, human limitations in case of an enormous bat activity on the site, etc.).
- the mapping of the area indicating:
  - the communes with important bat roosts
  - bat-friendly landscape features (the detailed map of foraging habitats does not come into the framework of the survey, even if you are asked for it).
- Detailed timing and results of the field work (dates, hours and the number of contacts per hour). Specify the beginning and the end of the time spent at each listening post.
- critical analysis of the assessment (protocol and realization) and of the produced map,
- table of the risks for each species or a written section on each species (taking also into account the potential species that have not been contacted during the survey). Protection status and biological status (breeding or not, etc.), as well as the local rank of concern for each species should be stated. For an assessment required by the Habitats Regulations, national, regional and local population numbers, if they are known, have to be stated and discussed looking at the anticipated effects of the project.
- the assessment of the impacts, and if necessary an assessment of the accumulated effects of other developments already existing or in project (in the latter case beware of keeping to the confidentiality clause) and the assessment required by the Habitats regulations if it has been asked for.
- The references used for the report (available on the SFEPM CD-Rom on bats and wind energy).

Special recommendations:

- Make sure that the absence of contacts in the study area does not bring you to conclude to the absence of issues for bats!

- Normally, before the start of any survey, the developer should inform you, in theory, about the type of wind turbines, their number and exact sitting. You must insist on getting this information although it is rarely known at the beginning of the project (only a rough idea of the project area is usually given). You should insist on the fact that the survey will be related only to the imparted project area. If any change occurs (type, number or sitting of the wind turbines) a complementary survey will be necessary.
- The minimum distance required between the wind turbine tower and the nearest woodland edge or water bank has to be clearly stated (according to the type of wind turbine and the assessed bat species; the precautionary principle would request a distance of 250 m for *Nyctalus* species and *Pipistrellus nathusii*). The minimum distance to enforce should be equal to the overall height of the wind turbine + 50 m but ideally + 100 m. If you don't know the type of wind turbine, you should produce a table listing the minimum distance for each type (be careful as for some types of wind turbine the height of the rotor axle varies according to the type of tower and the height of the concrete base, so you should ask for confirmation of the overall height before handing over your conclusions). The non-respect of the minimum distance recommended should imply a monitoring of the wind farm at the owner's cost[6].
- The choice of siting can be incompatible with bat conservation, for instance when the site for the project is
  - in the vicinity of roosts for hibernation, breeding and swarming/transit, i.e. within the range of the species,
  - near wetlands which have been identified as foraging habitats for bats,
  - in a deciduous or in a mixed forest
  - along ridges close to commuting or migration routes, whether proved or suspected.

  In each of these cases, as a mitigation measure it will be necessary to consider shutting down the wind turbines during the critical time if planning permission has been given despite everything and also to ask in some cases for a BACI monitoring (before and after installation).
- Specify not to light up the wind farm site or recommend to use a type of light which does not attract insects (therefore no vapour of mercury lamp even hundreds of meter away from the site, recommend rather vapour of sodium lamps).
- If you have to suggest accompanying measures you will have ensure that they do not make the wind farm more attractive to bats ! And if you talk of compensation measures for the loss of foraging habitats don't forget that the compensation must be long-lasting such as for instance, the purchase of land in the surroundings, with a high biological value. Planting hedgerows is not a perennial compensation and do not forget that there is no way of compensation for mortality.
- For the time being do not mention the possibility of installing acoustic devices to scare off bats from a wind farm. No system has been tried and tested successfully and experience from the field showed that the distress calls of a bat attract its congeners.

[6] Even if in a hedgerow landscape it is impossible to keep to this minimum distance, it is important to mention it in your report even if it is only to stress the incompatibility of wind turbines with this habitat.

CONCLUSION

In the present state of knowledge of the biologists working on bats, either European or American, it is impossible to explain why bats are victims of wind turbines, we can only venture hypotheses.

The measures that we can propose at the present time are only mitigation measures to attenuate the impact of wind turbines on these protected species. Only future research will perhaps permit finding solutions to the problems that every country has to solve with the same urgency. In order to manage to combine wind energy development with the commitments of France towards bat conservation, it is necessary that not only wind energy developers but also bat workers respect the standard method for bat survey. Furthermore international cooperation is essential and implies harmonizing the different protocols for bat survey, which is also the goal of the present work.

These protocols are not permanent. They will be further developed and modified according to the increased knowledge resulting from the study of bat behaviour in front of wind turbines. It is however essential that people working on this field provide feedback to the SFEPM working group on wind turbines and contribute to the national database on monitoring and mortality that the SFEPM will bring into operation.

The SFEPM has produced a CD-Rom compiling the existing bibliography on bats and wind turbines. It is available on request at the following address:

SFEPM
c/o Muséum d'Histoire Naturelle
Les Rives neuves
F-18000 Bourges
sfepm@wanadoo.fr

Annex 3 : Example of map locating the 434 Natura 2000 sites proposed to the European Commission for Greater horseshoe bat (*Rhinolophus ferrumequinum*) as well as the projects of sites for the continental region

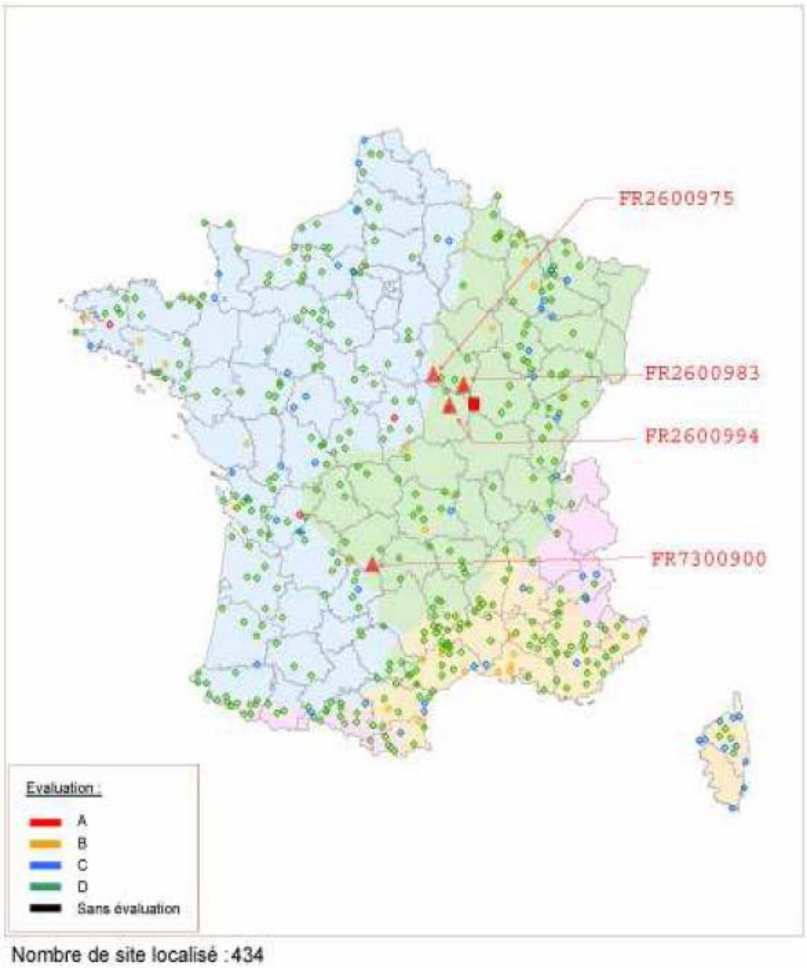
The 4 biogeographical regions present in France are represented on each map:

- Alpine : pink background
- Atlantic : blue background
- Continental : green background
- Mediterranean : yellow background

The already existing sites for the species are located with a small diamond figur whose colour varies according to the size of the species population "p" present in the site with reference to all populations of the species which are present on the national territory.

- A, red : $15 \leq p \leq 100$
- B, orange : $2 \leq p \leq 15$
- D, green : $0 < p \leq 2$
- C, blue : no statistically significant population

The sites, for which a procedure is under way for the considered species, are located on the map by a red triangle if it concerns the enlargement of an existing site or by a red square if it is a new site.



Nombre de site localisé : 434