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Original French version prepared for the Regional Activity Centre for Specially Protected Areas (RAC/SPA), by:

**Pierre BEAUBRUN**  
Ecole Pratique des Hautes Etudes  
Montpellier, France

Translated into English by: Anne Murray



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## PREAMBLE

Certainly, with their friendly or fascinating quality, cetaceans do form a particularly mediatized animal group! From advertisements to research bodies, via profit making enterprises or newspapers trying to satisfy the dreams they conjure up, lots of people want to go and watch THEM, photograph THEM, display THEM, swim with THEM, touch THEM or.....study THEM.

The scientific community, in its wider sense, is not untouched by this passion, as can be seen in the abundant, very heterogeneous and dissipated literature devoted to the subject. The example of the Mediterranean, which this report is about, illustrates this well. If we look at seven recently published works:

- the Proceedings of the last four annual conferences of the ECS (1994 to 1997),
- the Proceedings of the last two CIESM Congresses (1995, 1998),
- the volume of summaries of papers given at the World Marine Mammal Science Conference (Monaco, 1998),

we notice that almost 160 references deal with the Mediterranean cetaceans, a relatively large number. Their degree of appositeness is extremely variable, since this ranges from the author's act of faith (the author says what he will speak about at the meeting but has never given the complete text of his paper) to work of a very high level (especially in the field of acoustics, where there is a high proportion of 'good' articles, but this is not the only field), plus things that are incomplete (only studying cephalopods of one diet) or absolutely disconcerting, like venturing to talk about 'identified' individuals, relying on simple sketches of dorsal fins done freehand. This heterogeneous quality, and sometimes the low reliability of the result, can easily be imagined, since the works I have cited are not classified in journals recognised as having great scientific value and having an appropriate Referees. They have, however, the enormous merit of existing, of being quickly published (the following year, for the ECS), and therefore of rapidly spreading information.

But the seven documents cited are only an example, and not the only ones where information is published; a lot of work appears in specialized journals (sometimes local, thus hard to obtain), in the reports of associative activities (not always known) or in internal reports made for administrations ('dull' literature reserved for a few initiates). Faced with this disparity noted in our example, and despite the abundant literature, works that synthesize the available information are not easy and very few have been attempted. They can only be long and exacting, taking up time and energy, and even perhaps useless today in certain fields, so disparate is this information.

This leads to my proposing a first point to think about:

*Working meetings (workshops) should be more numerous, for they are certainly important. Bringing together some of the most qualified people in the concerned fields, these meetings would allow true syntheses to be developed and mature reflection on the themes to be tackled and activities undertaken. Sets of themes could be defined around:*

- one species or category of species
- one region
- one issue.

Without trying to be exhaustive on this point, let me cite certain meetings which were held and where, without any papers, strictly speaking, being given, major ideas emerged that could quickly be applied and prove useful.

- \* In January 1995, under the aegis of the Bern Convention, of the Council of Europe, of the UICN and of the UNEP/MAP, the MEDMARAVIS Association brought together 35 NGOs and delegates from 20 Mediterranean countries to produce the Alghero Convention (1995) on coastal and marine biodiversity in the Mediterranean'. Appendix 5 of this text gives the criteria accepted for ensuring conservation of the marine mammals of the Mediterranean and the Black Sea. Appendices 6 to 9 add regional supplements indispensable to these criteria. Also organised by the same Association, a second forum was held in late November 1997, which took account of recent knowledge to suggest complementary measures to be added to the 1995 Convention, both for species and for regions.
- \* In January 1996, a CIESM Workshop brought together some twenty experts to define, in the context of its activities, the main lines of five research programmes that riparian countries could apply to reach a better knowledge of the distribution of Mediterranean cetaceans.

Forums like those of the Plenary Assembly-Congresses of the CIESM (since 1992 held every three years) or the ECS (annual) are thus indispensable, but they should go further than the mere communicating of results. Ideas Workshops (whether in the context of these bodies or not) could define the main lines to be followed, which would result in better channeling of energies, bringing these together in one common interest. Something has been done in this direction, but these initiatives must be expanded.

Knowledge, description and study of marine mammals is one thing. But we must not forget to put them back in their ecological context, for, right at the top of the food chain, they integrate almost all the parameters of the environment in which they evolve. Now they are not the only ones living in, or off, the marine domain; many other stakes exist, economic, political, social, legal, etc. All too often those aspects are not mentioned in the Ideas Workshops, and the meetings to set up the Corsica-Liguria-Provence Sanctuary have taught us to what extent they should be taken into consideration, right from the very start, in order to reach the desired objectives. Workshops bringing together scientists, decision makers and consumers must be instituted if we really want things to advance: the opinions of all and sundry are necessary for everybody to plan and carry out activities of general interest.

Bearing in mind what I have just said, this report does not claim to be an exhaustive synthesis of our knowledge of Mediterranean cetaceans; this monumental work is still waiting to be done. I shall restrict myself here to presenting a rapid appraisal of the information available, taking the following elements as bases for reflection:

- A first succinct statement of our knowledge (BEAUBRUN, 1994) given at the Pan-Mediterranean Symposium organized by MEDMARAVIS in September 1992 at Chios (Greece).
- The aims and priorities defined in the Action Plan for the Conservation of Cetaceans in the Mediterranean Sea.
- Recent scientific work on Mediterranean cetology which has been published (on the essential basis of the example seen above: the seven documents which appeared between 1994 and 1998). Here the reader will easily understand that a complete bibliography cannot appear here - I hope the unmentioned authors will forgive me!- but I shall illustrate my comments, as

needed, by what seem to be the most appropriate references (often the first or latest publications on the subject).

- The conclusions reached by meetings of experts who were aiming at a better knowledge of, or better protection for, cetaceans in the Mediterranean (the Alghero Convention, the CIESM's various workshops, the meetings preparatory to the drafting of certain legal texts...).

## 1- THE MAIN LEGAL INSTRUMENTS IN FORCE, OR COMING INTO FORCE

### 1.1 - Concerning the riparian countries

Few new elements have been provided by riparian countries in their own legislation. In particular, it seems that cetaceans are not always identically protected by all national texts, but it is indisputable that the ACCOBAMS Agreement (see below) will change things.

### 1.2 - Conventions, and modifications of them

Today several texts cover all or part of the Mediterranean, and four of these are essential for ensuring the protection of species or environments. Bearing in mind the progress made and decisions taken at other international gatherings, some of them have had to be modified and supplemented.

To conform to the decisions taken at the 1992 Rio de Janeiro United Nations Conference, the Barcelona Convention (protecting the sea from pollution, a Mediterranean sphere of activity) was revised in 1995. In particular, the idea of 'sustainable development' was built into it, and a new protocol, "Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean", was signed. Three annexes to this Protocol were adopted by the plenipotentiaries on 24 November 1996 in Monaco.

The first of these annexes gives a definition of the common criteria which a protected marine and coastal area must satisfy to be included in the list of Specially Protected Areas of Mediterranean Interest (ASPIM) established by the Protocol. The second draws up a list of species considered to be endangered or threatened: all species of cetaceans known in the Mediterranean (plus the monk seal) are expressly mentioned in this document. The third appendix does not concern cetaceans, at least directly, in that it gives a list of species whose exploitation must be regulated; yet it does have a real importance because a regulating of fishing that is well suited to certain of the species mentioned (Bluefin Tuna, Swordfish) may have a positive effect on cetacean populations via a reduction of accidental captures.

The three other major legal instruments that permit a helping towards, or ensuring of, protection of cetaceans are the Habitat Directive (protecting species by protecting their habitats), which is restricted to the European Union, the Bern Convention (conservation of wildlife, with a European sphere of activity), and the Bonn Convention (conservation of migratory species, with a global sphere of activity). These two last Conventions both authorize the preparing of Agreements with States not Party to these Conventions.

So that the texts and these various instruments should be consistent, certain points in the Bern Convention had to be brought up to date and revised. In particular, a list of marine or brackish species considered as threatened or endangered (BOUDOURESQUE Ch-F. and VAN KLAVEREN M.-C. and P., 1996) was suggested at the Strasbourg meeting held from 2 to 6 December 1996 for them to be included in Appendices I, II or III of this Convention. Six species of cetacean were on the list (*Balaenoptera acutorostrata*, *B. borealis*, *B. physalus*, *Kogia simus*, *Mesoplodon densirostris* and *Physeter macrocephalus*) to be included in Appendix II (strictly protected animal species). All of them were accepted for the Mediterranean, the Fin Whale even being accepted (not without difficulty!) for all the seas covered by the Bern Convention (and let me in passing thank the Principality of Monaco for the energy and skill it deployed to bring these negotiations to a successful conclusion).

### 1.3 - The ACCOBAMS Agreement

To harmonize, homogenize and correspond to the aims desired and defined by the various legal instruments which we have just seen, the Secretariats of the three above mentioned Conventions held joint meetings simultaneously. Two major elements concerning the protecting of cetaceans emerged, after these consultations:

- in October 1992, (Athens) an Action Plan on Conservation of Cetaceans in the Mediterranean Sea, which had been adopted in Cairo (October 1991) in the context of the Mediterranean Action Plan (UNEP-OCA/PAC), was set up. The Regional Activity Centre for Specially Protected Areas (RAC/SPA) based in Tunis was made responsible for coordinating activities anticipated or envisaged by this Plan;
- on 24 November 1996, the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS Agreement) was opened up for signing and ratifying by the Concerned Parties.

We shall linger a little while over this last document, which on more than one account offers elements that are particularly interesting in the present context.

- First of all, it was drafted, in a way that was sometimes bitter but most constructive, in a little more than just one year: two meetings sufficed (Monaco, 26-30 September 1995, and 18-24 November 1996), interrupted by one year of informal consultations. This Agreement is thus a concrete expression of the sincere and profound interest shown by all the countries bordering on the two seas (Mediterranean + Black Sea) in protecting their species and their environments by submitting to measures that are even more repressive than those set out in the texts that had formerly been adopted. Thus there exists a great and generally felt awareness of the issues.
- The Agreement's geographical coverage speaks volumes: the area concerned includes not only the Mediterranean and Black Sea together, but extends quite far into the Atlantic, up to an imaginary line joining Cap Saint Vincent (Portugal) and the Casablanca lighthouse (Morocco). It thus offers an opening onto the procedures already specifically set in place in that ocean.
- It combines and coordinates activities undertaken or to be started over the entirety of the concerned area, while conserving the originality distinctive to each of the two seas, since the



two sub-entities Mediterranean and Black Sea are expressly recognised in it and may each work separately for its own interest.

- By this Agreement, each country obviously tries above all to protect cetaceans by implementing an Action Plan, but also to protect biodiversity and the Mediterranean environments generally. Now the cetacean/halibutic resources relationship has become absolutely clear, and so the Agreement very directly tackles the question of fisheries by looking at the harmful effects these can have on cetaceans (accidental captures, diminishing stocks of prey-species...). In protecting cetaceans, the Mediterranean countries therefore hope not just to submit to very restrictive fishing measures but also try to get these implemented by third party countries. The issue is not a simple one because, whether the question is one of fisheries or of other types of human activity, it is trying to solve the crucial point of 'regulations' in international waters, which today take up almost all the Western and eastern Mediterranean.
- Another important point is that, in order to be sure that this Agreement works, the countries are being wise enough to refuse the creation of new structures. They thus wish to avoid the multiplication of structures in an already fairly complicated context.
- Finally, all the species of cetacean are taken into consideration, including those which so far have never yet been reported in the area.

From the above mentioned points, and many others that are equally original, the drafting of the ACCOBAMS Agreement was an enormous advance in safeguarding the Mediterranean cetaceans and the Mediterranean. But we must not stop there; we must hope that it comes into force quickly. The final Act of the Agreement itself anticipates that this will only become effective when 7 riparian countries (of which at least 5 must be Mediterranean and 2 Black Sea) have ratified it. Where have we got to now?

On 30 April 1998 (inf. Interim Secretariat of the Agreement) 12 countries have signed the final Act; only the Principality of Monaco has ratified it, but other states seem to be on the point of doing so. It is therefore important to set up all the available procedures to ensure that the ratification processes be as brief as possible, but especially that this Agreement go beyond the 'paper stage' to enter rapidly into the phase of real application.

#### **1.4 - The Corsica-Liguria-Provence Sanctuary**

Well before the setting up of the ASPIMs or the ACCOBAMS Agreement were envisaged, a procedure had been launched to protect cetaceans in one sector, certainly vast but geographically confined to the east of the North-western Mediterranean. This action, in many ways extremely innovative, deserves particular mention.

Following on research done by French and Italian scientific teams between the years 1975 and 1990, the importance of this sector was clearly demonstrated by the summer presence of big cetacean populations (Whales and Striped Dolphins in particular). Supported by scientific observations, it became obvious that this area should be made into a sector with privileged species protection status.

Various initiatives and stages followed one another; several authors meticulously trace the ins and outs of the story in the document 'Operation PELAGOS', published by the Rotary Club (1997). I shall sum it up very succinctly by saying that, strongly supported by the NGOs

Greenpeace, Europe Conservation, the Rotary European Association for the Environment, and then RIMMO after 1992, the PELAGOS project (officially presented on 2 March 1991 in Monaco) suggested making this area into a Biosphere Reserve. Great interest was shown in this project by the French, Italian and Monacan governments; after many official announcements (Antibes and Genoa, October 1992) and working meetings (Genoa, December 1992; Nice, January 1993), the Joint Declaration Relative to the Institution of a Mediterranean Sanctuary for Marine Mammals was signed in Brussels on 22 March 1993 by several ministers from the three states. This approach offered two advantages:

- It was innovative in that the countries promised to fight against the threats to cetaceans (pollution, deliberate or accidental capture of animals, dwindling trophic resources, deterioration of habitats...) not only in the waters under their jurisdiction but also on the high seas.
- The rapidity of the decision making showed what an urgent nature the envisaged steps had - and still have!- Unfortunately, the French Secretary of State for the Sea, expected to be a signatory of this Declaration, was absent on the day of the ceremony, and the many reshuffles which followed in both the Italian and French governments have meant that his signature has still not been collected, up to this very day. But the urgency remains. It seems in fact to be increasing, in that the use of drift nets seems to be being stepped up: are there not rumors of 70 boats thus equipped where there were only about ten when the negotiations started?

The last informal information we have had suggests that the talks between the ministers concerned should get under way again shortly. So the situation will probably sort itself out, and everything must be done for this to happen as quickly as possible. It would indeed be most harmful for cetaceans if such an important document remained a mere Declaration of Intent.

### 1.5 - From the RIMMO 'ZEP's to the recent Spanish 'EEZ' initiative

Among the ideas which have been suggested to successfully protect cetaceans in the Mediterranean, I must mention what was done in that direction by the RIMMO (International Reserve for the Western Mediterranean Sea) Association, set up by the Antibes Marineland in 1992. In the first three of the annual meetings held by this body, forums bringing together jurists and scientists came up with a clever idea: the Protected Ecological Zone (or ZEP), to be a sort of counterpart of the EEZs (Exclusive Economic Zones) which are defined in all the oceans except the Mediterranean. We must regret that this type of basic idea was then totally neglected, because in their day the ZEPs, better developed, could have been an appropriate, quickly applicable formula.

The EEZ (Exclusive Economic Zone) principle was adopted and codified by the United Nations Conference on the Law of the Sea (Montego Bay, 1982). A EEZ is thus a 200 nautical mile strip off a coast in which exploitation and protection of resources is under the legal control of the country bordering on it. Beyond the 200 nautical miles the province of 'international' waters starts, free - to a certain extent- for its resources to be exploited.

The EEZs have never been implemented in the Mediterranean because it would be especially difficult to divide this sea up, bearing in mind (among other things) the large number of states, the splitting up of its coasts and the closeness of one country to the next. Be that as it may, application of the EEZs in the Mediterranean would reduce the province of its international waters to a tiny area in the centre of the Western Mediterranean, where third countries would have no interest in pursuing activities. Now is not this just what we are looking for as regards

cetaceans, since also the riparian states have just agreed to draft the ACCOBAMS Agreement? Therein, perhaps, lies the solution.

Anyway, this is the direction in which Spain has recently made a step: by the Royal Decree no. 1315/1997 of 1 August 1997, it has just decided to implement its jurisdiction over an area restricted by her border with France, the Punta Negra-Cabo de Gata and the equidistance with riparian countries. In this zone (article 2) "el Reino de España tiene derechos soberanos a efectos de la conservación de los recursos marinos vivos, así como para la gestión y control de la actividad pesquera, sin perjuicio de las medidas que sobre protección y conservación de los recursos haya establecido, o pueda establecer, la Unión Europea".

The consequences of this initiative, the lessons it offers, and its developments should be followed very closely.

## 1.6 - Present day marine reserves in the Mediterranean

Let me mention, for information only, that nearly 45 protected marine areas are today listed in the Mediterranean. For their present surface areas, the unequal nature of their distribution in the sea, the fact that they are situated in territorial waters, and the diversity of the protection measures taken there, they can not significantly contribute to the protection of cetaceans.

## 2- POPULATION AND DISTRIBUTION OF SPECIES

### 2.1 - Population

Twenty species (or about one/quarter of the world's known cetaceans) are mentioned in the literature as having been seen, dead or alive, at least once in the Mediterranean *sensu stricto*. This count excepts the Biscay Whale (*Eubalaena glacialis*), which has not been observed since the last century, but of which a recent mention (G. NOTARBARTOLO di SCIARA inf.) would need to be authenticated, the Blue Whale (*Balaenoptera musculus*) only known in the -probably Atlantic- sector of the Strait of Gibraltar, and Sowerby's Mesoplodon (*Mesoplodon bidens*), whose sighting must remain unconfirmed.

Conclusion: This population is, when all is said and done, relatively diversified for a sea that is geographically so isolated. The population still remains, however, quite ill known, and several remarks must be made here:

- The diversity of this population seems to decrease as one goes from west to east: 18 species listed in the Western Mediterranean and 13 in the Eastern Mediterranean. It is extremely probable that this is true, but does this not merely reflect a lack of prospecting in the Eastern Mediterranean?  
So there is work to be done.
- The impact of intensified prospecting has been clear in the Western Mediterranean: work undertaken by many specialist teams, and the creation of networks of voluntary observers who are increasingly well informed (both for research at sea and for follow-up of stranded animals) have meant that 6 new species have been noted in the sea during the last ten years. The last of these is the Arctic Hyperoodon (*Hyperoodon ampullatus*), spotted in 1996 by a Spanish team (CANADAS and SAGARMINAGA, 1997).

- One of these species is only known by its genus name: *Mesoplodon*. Although two individuals, on the point of being stranded near Cannes (France) in August 1996, were taken in hand to be returned to the open sea, no examination was carried out on the spot to allow the animals' species or sex to be identified. What is more, the samples taken for analysis were destroyed even before being completely exploited. Certainly, the animals were saved, and that is good. But improved communication with real scientists would have allowed, without any more effort than had already been made, very precious information to have been obtained on these exceptional species. It is to avoid such situations that it now proves indispensable to install, in every country and on a Mediterranean scale, sound and competent intervention networks (cf. chapter on 'Strandings').

## 2.2 - Species, their distribution and their status

Within this population, all species do not have the same status or the same distribution.

Eight are accidental, and only a few mentions (often strandings) bear witness to their presence. They only appear exceptionally, entering via the Strait of Gibraltar, the Suez Canal and the Sea of Marmara:

Rudolph's Whale	<i>Balaenoptera borealis</i>
Baleen Whale	<i>Megaptera novaeangliae</i>
Dwarf Sperm Whale	<i>Kogia simus</i>
Narwhal	<i>Monodon monoceros</i>
Mesoplodon (indeterminate)	<i>Mesoplodon spp.</i>
Arctic Hyperoodon	<i>Hyperoodon ampullatus</i>
Pacific Hump-back Dolphin	<i>Sousa chinensis</i>
Harbour Porpoise	<i>Phocoena phocoena</i>

Twelve species thus constitute the basis of the Mediterranean population: 8 are common or frequent, and 4 much rarer.

The common or frequent species are:

- \* The **Fin Whale** (*Balaenoptera physalus*) is rare in the Eastern Mediterranean and common throughout the Western Mediterranean. This is very probably an endemic population. (BERUBE et al., 1994;...; VENTURINO and ZANARDELLI, 1997) of which nearly half the individuals gather, in summer and with great fidelity, in very localized feeding grounds in the north-east of the Western Mediterranean (RELINI et al., 1992; ORSI RELINI and GIORDANO, 1992; ORSI RELINI, 1997; ZANARDELLI et al., 1998). We really know almost nothing about this species outside the summer period and the Corsica-Liguria-Provence area. Prominence should be given to its movements in the Mediterranean, its secondary feeding grounds and reproduction grounds should be sought out, probably in the south of the Western Mediterranean, or in the Eastern Mediterranean, since individuals have been sighted in winter near the island of Lampedusa (MARINI et al., 1995b).
- \* The **Sperm Whale** (*Physeter macrocephalus*) is considered as frequent. No biological study has been done on it, unless by means of the acoustic research carried out especially, and since 1991 (BORSANI et al., 1992; ...; PAVAN et al., 1998) by Italian teams. Yet the Mediterranean population peoples both parts of the Mediterranean, is probably very isolated

(genetic studies should be made), few in number and showing evident signs of decline. Particular attention should be paid to this species.

- \* **The Cuvier's beaked whale (*Ziphius cavirostris*).** As everywhere else in the world, this extremely cosmopolitan animal is mainly known in the Mediterranean through its strandings only. This indicates that the species, which lives on the continental slope, or on the deep sea beds, and often avoids boats, would be more abundant than the sea sightings imply. Well known right to the far eastern end of the Eastern Mediterranean, it seems more frequent off the North African coasts and near the Balearics, in the Tyrrhenian Sea: 15 individuals stranded on a few kilometres of Ligurian coastline in May 1963 (HEYNING, 1989, in NOTARBARTOLO di SCIARA and DEMMA, 1994), and especially in the Ionian Sea: a recent sighting (FRANTZIS and CEBRIAN, 1998) of 12 specimens stranded in a 48 hours period in May 1997 in the Gulf of Kyparissiakos (Greece). We know nothing at all about its biology at sea, except that in the Ionian Sea it gathers on sea bottom at 650 -1,000 m., seems to be faithful to the sites it frequents, and easily lets itself be approached by boats (PULCINI and ANGRADI, 1994; POLITI et al., 1994; PULCINI, 1996).
- \* **The Long-Finned Pilot whale (*Globicephala melas*)** seems restricted to the Western Mediterranean (although there is some mention of it in the Central Mediterranean), where it seems to prefer areas where the slope is broken up. The Strait of Gibraltar and the Sea of Alboran are identified as areas of major importance for the species (HASHMI and ADLOFF, 1991; CANADAS and SAGARMINAGA, 1998).  
In the Corsica-Liguria-Provence basin it is frequent and shows great seasonal variation in numbers: it is almost absent in the winter, gathers in groups of 5-30 individuals from June on, may constitute big concentrations in July, and starts dispersing towards the south west in August.  
This species, often, it is true, lethargic in the daytime, has only been treated in a few publications; it remains, therefore, ill known despite having a particular place in the ecosystem.
- \* **Risso's Dolphin, (*Grampus griseus*)** prefers waters with a range of depths between 500 and 1,500 metres. Generally speaking, it is met quite near to the coasts, and it is amazing that it is so little studied in the Mediterranean. The species is known throughout the Western Mediterranean, where it is common in southern Italian waters, in the Corsica-Liguria-Provence basin, and off the Gulf of Lions (BOMPAR, 1997; GANNIER A. and O., 1994; PODESTA et al., 1997). It might perhaps be less rare than one thinks in the Eastern Mediterranean, according to some sightings made in the Aegean Sea and the Ionian Sea (FRANTZIS, 1996). The distribution of the Risso's dolphins is not homogeneous; one meets with isolated couples, more frequently with little groups, and in late summer they can form groups of several hundred individuals. However, though we know that certain groups can make vast journeys looking for the cephalopods they are so fond of, we have no idea about exchanges of individuals which may happen between groups. The photo-identification technique, already adopted by Italian, French and Spanish teams, though not yet adopted on a wide scale, and that of genetic analysis (still to be done) should offer us a wealth of information to enlighten us on these phenomena.  
One case of mass stranding, a fairly rare phenomenon for the species, was recently signalled in the north east of Spain: 5 individuals were found on 17 April 1994 near the Ebro delta (ALEGRE et al., 1995).
- \* **The Bottlenose Dolphin (*Tursiops truncatus*),** indisputably the coastal of all the cetaceans, is therefore the one most exposed to pollution, to the rise in tourist pressure, and to the hostility of fishermen, who see it as a rival. Although it is accepted that it populates all the

Mediterranean coasts, its most abundant populations are situated around the big islands in the Western Mediterranean (Corsica, Sardinia, and the Balearics), in the east coast of Tunisia, where a sound system has been used to keep the dolphins off the nets (CHAKROUN, 1994), around Lampedusa (PULCINI et al., 1997; PACE et al., 1998) and Malta (MICALLEF, 1996; VELLA, 1998), in the north of the Adriatic, where certain groups have been very well studied for several years by Italian and Croat teams (AZZALI et al., 1994; HOLCER, 1994; BEARZI et al., 1995;...). It seems amazingly uncommon in the east of the Ionian Sea, where the species is sympatric to the Common Dolphin (POLITI et al., 1998), in the Aegean Sea except north of Crete (MARINI et al., 1995a), and we have no information about the southern shore of the Eastern Mediterranean. Some isolated individuals which do not refuse contact with humans (the famous 'ambassador' dolphins, usually females) are signalled in France and Spain (MULLER, 1996) and Greece (BEAUBRUN, 1995).

- \* **The Striped Dolphin (*Stenella Coeruleoalba*)** is indisputably the most common species in the Mediterranean as a whole. It is particularly abundant in the Western Mediterranean, and sighted population densities are much higher in the northern part than off the coasts of North Africa. It seems to become less frequent as one moves towards the eastern end of the Eastern Mediterranean. The fact that it has never been mentioned along certain sectors of the western shores (BEAUBRUN, 1995), and very infrequently in the north of the Adriatic (AZZALI et al., 1995), shows convincingly that the species is essentially pelagic, making some journeys, however, which, in the Ligurian Sea, bring it close in to the coasts at night for feeding (GANNIER and DAVID, 1997). Studies carried out in France on the animals' growth (DI MEGLIO and COLLET, 1994; DI MEGLIO et al., 1996) showed that the Atlantic and Mediterranean populations were different, and this was confirmed by the mitochondrial DNA analyses made by a Spanish team (GARCIA MARTINEZ et al., 1996). Moreover, the genetic diversity is such even within the various samples studied in the Mediterranean (GARCIA MARTINEZ et al., 1994) that the Mediterranean population of *Stenella* may be considered as unique.

An abundant literature describes the mass death recorded for this species between 1990 and 1992 (e.g. PASTOR and SIMMONDS, 1992;...; AGUILAR and RAGA, 1993;...; DHERMAIN et al., 1994;...; DOMINGO et al., 1995;...). This morbillivirus epizootic started on 10 July 1990 in the Gulf of Valencia (Spain) then, step by step, from west to east, with summer outbursts (July October) until 1992, it affected the Eastern Mediterranean, reaching Greece (ANDROUKAKI and TOUNTA, 1994; CEBRIAN, 1995) and Turkey. An examination of stranded individuals shows that the sub-adult age group was the least affected. The epidemic did not move into the Atlantic (RAGA and AGUILAR, in PASTOR and SIMMONDS, 1992). Let me say that an analogous phenomenon, but one which affected the Bottlenose Dolphin, Common Dolphin and Porpoise populations, was recorded in 1994 in the Black Sea (BIRKUN et al., 1995).

- \* **The Common Dolphin (*Delphinus delphis*)**, given the estimated abundance of its numbers, is certainly the second most commonly met species if considered on a 'Mediterranean' scale. However, although it may be sighted in both parts of the Mediterranean, its distribution is far from homogeneous. In the Western Mediterranean, it is found especially south of latitude 40 degrees north, where it is particularly abundant and regular in the Sea of Alboran and along the African coasts (BOUTIBA, 1992; FORCADA, 1995; SAGARMINAGA and CANADAS, 1996). North of this line, the species becomes progressively rarer, often mixing with the Striped Dolphin, and becomes exceptional in the most northern latitudes. Certain animals, seen (stranded or dead) over the last few years along the French coasts, could perhaps be signs that the species is returning to a sector where it is often said to have been more frequent 'in the past'. In the Eastern Mediterranean the Common Dolphin is probably

omnipresent: it is frequent in the northern part, but we have no information about the southern sectors as a whole.

Much less pelagic than the Striped Dolphin, the species generally frequents waters of a depth of a few hundred metres (SAGARMINAGA and CANADAS, 1998) and may even, as in Greece (POLITI et al., 1994) turn out to be thoroughly coastal, even, as in the east of the Ionian Sea (POLITI et al., 1998) being in greater numbers than the Bottlenose Dolphin. It is really regrettable that we have known almost nothing about its biology or its ecology in the Mediterranean, and it is high time that this species was carefully studied. Indeed, *Delphinus delphis* is one of the three most frequent species of little *delphinidae*, and can be found in sympatry with one of the two others, or both, in many places in the Mediterranean. An in depth study of the relationship it has with the others is therefore vital for improving our understanding of how the ecosystem functions and of the phenomena of inter species competition.

Species that are rarer on a Mediterranean scale are:

- \* The **Minke Whale** (*Balaenoptera acutorostrata*), considered as a rare species. Its unobtrusiveness makes it highly probable that it is more abundant than one might think, especially in the Western Mediterranean, where new born specimens have been found dead. Many cases of strandings are known, and thus the species remains to be studied in both parts of the Mediterranean, although its presence east of the Sicily Tunisian Strait is very little documented.
- \* The **Killer Whale** (*Orcinus orca*) is a rare species on a Mediterranean scale. It enters the Mediterranean through the Strait of Gibraltar, generally chasing shoals of tuna. It is therefore especially met with between Spain and Morocco, and in the Sea of Alboran. Certain erratic individuals were seen long ago up to the Ionian Sea in the east (and perhaps as far as Israel) and rare individuals have gone right up to the Ligurian and French coasts. Nothing substantial has yet been published on the species, not even near the Strait of Gibraltar, where its interactions with Tuna Trap-net are often reported (BAYED and BEAUBRUN, 1987).
- \* The **False Killer Whale** (*Pseudorca crassidens*) might well be less rare than the known mentions imply, mainly in the Strait of Gibraltar and the Sea of Alboran. In the Western Mediterranean, the last sightings tell of the stranding of a male in March 1988 in the Balearics (CASTELLS and MAYO, 1994), and the sighting of 8 individuals in the Sea of Alboran on 3 September 1995 (SAGARMINAGA and CANADAS, 1996; SAGARMINAGA, 1997). Over the last few years the species has curiously been cited as frequently in the Eastern Mediterranean: 1 stranding in the Peloponnese in 1993, 7 individuals photographed swimming between the Island of Chios and the Turkish coast in 1992, and 1 stranded near the Bay of Izmir in 1995 (FRANTZIS, 1996).
- \* The **Rough-toothed dolphin** (*Steno bredanensis*). Concerning this species, the Preliminary Atlas of Distribution of Mediterranean Cetaceans (BEAUBRUN, 1995) says: "...the only irrefutable sighting of living animals (tells of) eight schools with a total of 160 individuals of all sizes, met on 4 September 1985 in the south east of Malta (WATKINS et al., 1987)." There follow 5 references citing unconfirmed sighting made in the Strait of Gibraltar, the Corsican and Sicilian Canals, the Gulf of Tarente and the Ionian Sea, and stranded animals in France, in the Tyrrhenian Sea and on the coasts of Israel. Finally, "according to these data, the species does not seem exceptional in the Mediterranean. Prospectings are far too few in number to know whether it is rare or uncommon, and whether a little population would be

living in the South Italy North Tunisia sector. Knowledge of the species is extremely thin at world level, a fortiori in the Mediterranean."

### 3- CENSUS TECHNIQUES AND NUMBERS

#### 3.1 - Census techniques recognised and implemented today

They will be considered here as inventory techniques only those techniques which allow either the numbers, or the density, of a species in a well defined geographical sector to be obtained. These techniques thus differ according to the species targeted, the surface areas envisaged, and the degree of precision sought.

In the Mediterranean, three main types of technique are applied today, on variable scales, according to whether one is trying to find out:

- the number of a stable and localised population (e.g. a group of *Tursiops*)
- the more or less 'instant' number, over very large areas, of an unstable population (e.g. number of fin whales, in the summer, in the Corsica-Liguria-Provence Sanctuary)
- an estimate of a vast population (e.g. How many Fin Whales are there in the Mediterranean?)

The individuals are then:

- counted one by one (visually or by photo-identification)
- calculated by applying the Line Transect method (sampling allowing the statistic calculation of a population)
- assessed by applying the capture recapture method, i.e. by calculating the proportion of recognised animals (thus already photo-identified or bearing specific marks) in a population whose numbers are unknown.

To these ends, two methods are applied by different teams in the Mediterranean as a whole, both of which rely on visual sighting of animals:

\* Photo-identification, consisting of obtaining the animal's identification sheet. For this, several images are needed (different parts of the body, right and left profiles) to allow the certain identification of an individual (by its special pigmentation, or the marks or scars it bears) and to be able to recognise it infallibly if it is met again. The technique is lengthy, and often tedious in the field because the animal is not always complaisant. It can only be done by seasoned teams (care in procedure, as little disturbance as possible) and one must never believe people or bodies which claim to apply it and then just photograph one dorsal fin from an angle that is not always the right one.

This technique is used on certain localised schools of *Tursiops*, or on species for which individuals can be sufficiently identified by their marks (Fin Whales, *Grampus*, even Pilot whales and sperm whales). Several teams make it common practice in Croatia, Spain, France, Italy, Greece and Sardinia (e.g. BEARZI et al., 1995; CANADAS and SAGARMINAGA, 1996; GANNIER and GANNIER, 1997a).

*It must be stated that, whatever the species concerned or the geographical scale studied, this technique only gives the full measure of its effectiveness when the results obtained by various*



teams are gathered together (increased numbers of known individuals and 'recontact' cases). It is thus essential:

- to encourage teams to practise and develop this technique,
- but especially to work for the setting up of global data banks.

\* Line Transect, which consists, following an especially draconian procedure, in counting the animals on straight lines in particularly strict sighting conditions. Only its rigorous application authorizes the results obtained to be processed using the "Distance" computer programme (BUCKLAND et al., 1993) with recognised reliability. The Line Transect instrument is thus very tricky to handle and *one must beware of conclusions hastily drawn from applications where it has been incorrectly used.*

Rare are the teams which have applied or genuinely use this method in the Mediterranean:

Spain :	Greenpeace International The University of Barcelona Alnitak Project (Madrid)
France :	GREC (Groupe de Recherche sur les Cétacés, Antibes) Ecole Pratique des Hautes Etudes (Montpellier)
Italy :	Tethys Research Institute (Milan)

Three kinds of surveying boat have for the time being allowed it to be applied:

- one "heavy" unit: the Sirius, a Greenpeace boat, in 1991 and 1992. This type of platform is perfect (high speed, raised look out point, very numerous seasoned observers), but very expensive.
- lighter units all the other times (slower speed, lower look out points, fewer observers) because there is not much in the way of funds. This procedure proves to be much less costly. It must be said that such means are not to be proscribed right away: it has been shown (GANNIER, 1995) that the results obtained with this type of device bearing in mind the precision sought for the time being are far from being so far off the truth as is implied.
- a four seat sea plane (BEAUBRUN et al., 1997; GANNIER et al., 1997), which has for the first time in the Mediterranean allowed the method to be tested covering the entire north west of the Western Mediterranean.

### 3.2 - Other techniques applied

\* Zig zag journeys have been made, simultaneously with a sailing ship and a dinghy, to assess Bottlenose Dolphin populations over the entire western coast of Corsica, in mid August 1993 (BOMPAR et al., 1994). The same technique was applied to the whole of the Corsican coast in late May 1994 (TERRIS and VIALE, 1995) by 19 observers on board 19 different boats. This method does not claim to reach an exhaustive count, but if the zig zags are sufficiently near together, and the observers seasoned, it may allow in the precise case of *Tursiops* the numerical size of a population to be assessed.

- \* No inventory has for the time being been made in the Mediterranean using acoustic methods. However, technological progress is such in this discipline that French and Italian teams are already working on integrating it into the visual inventory on Line Transects (GANNIER A. and O., 1997b; GANNIER, 1998; MANGHI et al., 1998). The first results obtained are very promising, and use of this technique is therefore to be warmly encouraged and developed.

### 3.3 - Two comments

- \* The 'Marine Mammals' Work Group of the CIESM, at its January 1996 workshop, clearly stressed the importance to be given to the estimating of the numbers of Mediterranean and Black Sea cetacean populations. As such operations require particularly heavy and costly material and human means, they can only be envisaged on scales that usually go beyond the context of one research team or one country. Moreover, they can only be designed once their methodology has been carefully planned. Now application of the Line Transect method is intimately dependent on our knowledge about the abundance of animals in one sector at one given moment. That is why it was recommended that everything possible be done to gather the maximum of information on the relative abundance of individuals present, whatever the period or the sector. A methodology that takes account of the riparian countries' special features was therefore drawn up (I have it to hand for those who are interested) to manage to assess the number of cetaceans seen according to the prospecting effort (indices of relative abundance per sector). Such work is to be promoted over the Mediterranean as a whole. For the time being, work is very regularly being done between June and September in the Corsica-Liguria-Provence area (Tethys Institute, Ecole Pratique des Hautes Etudes, the Antibes GREC), in the Gulf of Lions (Ecole Pratique des Hautes Etudes) and over the Spanish sector stretching from Almeria to Cartagena (Ainitak Project).
- \* Experience has very clearly shown that it was perfectly unrealistic to hope to obtain estimates of numbers by involving persons 1) who are untrained and/or 2) whose activity is other than the prime aim. 'Sporting yachtsmen', for example, have other things to do on their boats than observe cetaceans, and fishermen have sectors and routes which do not sample a zone correctly. As to large scale media operations that bring hundreds of amateur sailors into action, these should be proscribed for their total lack of interest: no methodological bias is controllable there, and the results which are published of them breed confusion rather than anything else, since they lack even the smallest degree of scientific rigour.

### 3.4 - Population numbers known today

Work dealing with assessments of population numbers are extremely thin on the ground, not to say non existent, and I have grouped them together in Table 1.

Table 1 : Populations numbers of cetaceans found in the literature

Species	Region prospected	Year	Number (of individuals)	Coef. Variation (%)	Means used	Bibliographical reference
Fin Whale	North-west Med.	1991	4.291	32.7	big unit	Forcada <i>et al.</i> , 1993
"	Corsica-Liguria-Provence	1992	901	21.7	big unit	Forcada <i>et al.</i> , 1995
"	Corsica-Liguria-Provence	1992	1.012	21.6	big unit	Notarbartolo <i>et al.</i> , 1993
"	Sanctuary	1991-1994	577	15.9	small unit	Gannier, 1997a
"	Sanctuary	1996	839	20.7	small unit	Gannier, 1997a
"	Sanctuary	1996	680	29.5	small unit	Gannier, 1997b
"	North Med. north-west	1996	450	28.7	aeroplane	Beaubrun <i>et al.</i> , 1997
Striped Dolphin	Ligurian Sea	1991	14.003		big unit	Forcada <i>et al.</i> , 1994
"	Provence Basin	1991	30.774		big unit	Forcada <i>et al.</i> , 1994
"	Corsica-Liguria	1992	25.330	32.8	big unit	Notarbartolo <i>et al.</i> , 1993
"	Corsica-Liguria	1992	25.614	25.3	big unit	Forcada <i>et al.</i> , 1995
"	Liguria-Provence	1991	16.800	23.2	small unit	Gannier et Gannier, 1993
"	Liguria-Provence	1992	20.600	23.9	small unit	Gannier et Gannier, 1993
"	Sanctuary	1996	27.445	17.3	small unit	Gannier, 1997a
"	Sanctuary	1996	27.250	22.7	small unit	Gannier, 1997b
"	North-west Med. Western	1991	50.634		big unit	Forcada <i>et al.</i> , 1994
"	Balearics Sea	1991	5.826		big unit	Forcada <i>et al.</i> , 1994
"	South Balearics-Sardinia	1991	18.810	34.17	big unit	Forcada <i>et al.</i> , 1995
"	Sea of Alboran	1991+1992	17.728	32.61	big+small unit	Forcada <i>et al.</i> , 1995
"	South-west Med. Western	1991	39.963	38.19	big unit	Forcada <i>et al.</i> , 1995
"	Western Med.	1991	225.000	27.8	big unit	Forcada <i>et al.</i> , 1992
Common Dolphin	Sea of Alboran	1991+1992	14.736	40.02	big+small unit	Forcada <i>et al.</i> , 1995
Bottlenose Dolphin	West Corsica	1993	>120		small units	Bompar <i>et al.</i> , 1993
"	Whole of Corsica	1994	84-99		small units	Terris et Viale, 1995
Risso's Dolphin	41 degrees N (W. Med.)	1988-1993	2.860	28.5	small unit	Gannier et Gannier, 1994

It seems that it was the 1990 morbillivirus epizootic that prompted further interest by the scientists. Indeed, the moment the epidemic was revealed, the Greenpeace Association and the University of Barcelona very rapidly organised two prospecting campaigns on board the Sirius (5-11 October 1990, then 7-9 December 1990) to discover at sea how the Striped Dolphin populations were reacting (AGUILAR et al., 1991): there was great anxiety about the impressive number of corpses found dead on the coast. Enormous efforts were then made, both to prospect the coastline as well as possible so as to inventory strandings, and to make the necessary analyses. The facts quickly appeared: it was absolutely impossible to assess the impact of the mortality observed since we knew nothing about the numbers of the concerned population. Faced by such a lacuna, Greenpeace then decided to launch the first summer campaigns for estimating numbers: the whole of the Western Mediterranean (excepting the Tyrrhenian Sea) was sailed over in 1991 with the University of Barcelona, and in 1992 particular attention was paid to the Corsica Liguria-Provence basin with the Tethys Institute, and to the Sea of Alboran with the University of Barcelona.

The sightings made during these three cruises on board a big unit (the Sirius) were widely exploited: 3 estimates of Fin Whale populations, 10 of Striped Dolphin and 1 of Common Dolphin were produced, according to the surface area of the geographical area treated (See Table 1) or the author who handled the information.

Besides these three missions carried out with heavy means, I must mention what was done by the GREC (Groupe de Recherche sur les Cétacés, Antibes) to apply the same methodology, especially in the Sanctuary sector and every year since 1991, but on board a much lighter, thus much less costly, unit (sailing boat). The steadfastness of this association must be emphasized, for (despite limited means) such work may allow a grasp of inter annual or seasonal fluctuations, on condition that the same surface area be sampled every year to an identical sampling plan. A quick reading of Table 1 and a comparison of the available figures allows several points to be noted:

- \* No work deals with the Eastern Mediterranean; this must be remedied.
- \* Work has only been done in the summer; here we have other gaps to be filled.
- \* It is regrettable that Bottlenose Dolphin populations, which is very coastal species and thus easily accessible, are so little studied. Only the Corsican population has so far attracted attention. There is still a lot of work therefore to be done on this species; certain studies are under way (in the Adriatic, or the Ionian Sea, for example) but they will be long drawn out because based on photo-identification of individuals.
- \* The Line Transect technique has so far only been applied to four species (Fin Whale, Striped Dolphin, Common Dolphin and Risso's Dolphin), and on widely different geographical scales. Concerning this method, certain findings emerge:
  - Its application with heavy means has never been repeated since 1992 anywhere in the Western Mediterranean. Now the coefficients of variation attached to the calculated numbers are relatively high (between 16 and 40%). So such operations should be started up again, for just repeating them will permit 1) the evaluations made to be refined by reducing the margins of error, and 2) possible changes within one single population to be highlighted.
  - It has been confirmed that the statistical application of the method is quite tricky and sensitive since the same set of results gathered in the field and processed by two different authors or even by the same author can lead to non identical figures.

- A comparison of the numbers obtained with heavy means (rapid but very costly missions) and lighter means (longer but less costly missions) give results that are astonishingly comparable, taking into account the coefficients of variation linked to the declared values. This quality/cost relationship between an operation and its aim should be carefully examined by decision makers, especially from the perspective of a follow up of population.
- The surface areas (when they are provided by the author, which is not always the case) of the geographical zones for which the numbers are given are extremely heterogeneous, even in defined and localised sectors such as the 'Corsica-Liguria-Provence' one. Demarcation of sectors often takes the number of primary sightings collected into account rather than any physical or biological reality. Deep thought is needed in this field, then. Planning sampling plans seems to me to be essential if the work done is to have any real use: relying on gains made, the Mediterranean could be cut up into zones (as is done for meteorological observations, for example) accompanied by their respective prospecting plans.

We shall end this point by remarking that many publications provide estimates of animal "density" for certain sectors. They are not cited here because the authors forget to indicate the precise surface area their calculations focus on. It would be necessary to go back to the basic calculations to assess the corresponding numbers.

### 3.5 - Conclusions

It is urgent that a Workshop be set up on the theme of population evaluation, because:

- our present knowledge in this field is derisory, and it is vital that we fill in the existing gaps, whether these concern space or time. In fact, knowing the size of a population is of prime importance if one wishes to correctly assess the impact of certain harmful things it will have to confront, and, consequently, define the most suitable practical procedures to introduce in order to provide better protection for species.
- if the most appropriate methods are identified today, it is however important to anticipate a vast work, on a Mediterranean scale, of planning for their implementation. This of course concerns the photo-identification, but especially the Line Transect, for which the similarity of results and thus the reliability of conclusions would be increased.
- all research on definition of the indices of the abundance of a or several species over one sector is to be encouraged, for this preliminary stage is essential if later programmed sampling plans to apply the Line Transect are to be better defined and more effective.
- an assessment of cetacean numbers can only be carried out by, or under the strict supervision of, professional scientific teams.

## 4- MOVEMENTS AND SEASONAL FLUCTUATIONS

### 4.1 - Movements

The routes the animals follow, which allow their movements to be known, are very little studied. These journeys are usually analysed over extremely restricted and localized geographical sectors. They are then highlighted:

- either by visual sighting of identified individuals (BEARZI et al., 1995),
- or by acoustic detection of their emissions of sound, which, joined to visual sighting, allows the different frequentations of a sector between daytime and night time to be shown (GANNIER and DAVID, 1997).

Studies applying photo-identification of animals may also provide very interesting information on frequentation of bigger sectors. Thus, fidelity to a region, at least in one season, has been demonstrated for the Fin Whale over its summer feeding ground in the Ligurian Sea (ZANARDELLI et al., 1998) and for the Sperm Whale in the summer in the Ligurian Sea (PAVAN et al., 1998). For Risso's Dolphin, the same method showed that in the south east of Spain (CANADAS and SAGARMINAGA, 1996) or the Ligurian Sea (BOMPAR, 1997) individuals could be faithful in summer not only to one region but also to one partner, and that they could also change social group.

All these photo-identification Files, for the time being disseminated everywhere around the Mediterranean, should urgently be put together: comparison of all the pictures that have been collected will certainly provide a wealth of information on the animals' movements on a scale much bigger than that of one single region. Also, these identification files should continue to be developed out outside the summer period, during which this is generally done.

Highlighting wide ranging movements has only once been attempted in the Mediterranean, by a Corsican team for a Fin Whale (VIALE et al., 1992; VIALE et al., 1996). Technical problems meant that the animal, marked south of Toulon on 22 September 1991, was only followed to the south west of Marseilles (after 41 days of emission). A similar attempt, in June 1993 (VIALE et al., 1995) produced no result because the tag was pulled off by a second individual. Technology having made great strides since then, the experiment should be tried again, but based on a far more substantial programme: it would allow certain animals to be followed to their wintering quarters and reveal what routes they took.

### 4.2 - Seasonal fluctuations of population densities

No count of cetaceans has been done in the Mediterranean, with heavy means, apart from the three mentioned in the last chapter. Seasonal fluctuations of population numbers can therefore not be learned of in this way.

On the other hand, a sailing boat (lighter and less costly means) was used in the Ligurian Sea, over several years and covering every season. The Line Transect method was applied during prospecting and the results, expressed as densities, showed seasonal variations within the population (GANNIER, 1995;...;GANNIER A. and O., 1997c). So without knowing the exact numbers of the studied population, these noted fluctuations give an interesting picture of the movements of individuals in this zone.

Another team, in the Tyrrhenian Sea, employed the same principle on board a ferry on regular trips (MARINI et al., 1991; MARINI et al., 1992). There too the seasonal fluctuations of the populations stand out, expressed as a number of sightings per voyage. Comparison of these results with those obtained by the GREC in a nearby region is most instructive to define population movements in the north east of the Eastern Mediterranean.

But such approaches are rare, and the CIESM Working Group, at its last workshops, has already recommended that this kind of work should be developed and extended to other regions.

## 5- DIETS

The diet of cetaceans in the Mediterranean is extremely ill known: a quick look through the bibliography reveals fewer than 100 publications tackling the subject in the Mediterranean as a whole. Available information concerns eight species which, according to their diets, may be grouped together in the following five major categories:

- one single planktonophagous species (filtering plankton), the Fin Whale, which almost exclusively eats *Meganyctiphanes norvegica* (a little pelagic crustacean),
- three strictly teuthophagous species (feeding exclusively on cephalopods): the Sperm Whale, Risso's Dolphin and the Cuvier's beaked whale,
- one single preferentially teuthophagous: the Long-Finned Pilot whale,
- one mixed diet species on a Mediterranean scale, seeming to be more ichthyophagous (fish) in the southern part and more teuthophagous (cephalopods) in the north: the Striped Dolphin,
- two mixed diet species with a clear ichthyophagous tendency: the Bottlenose Dolphin and Common Dolphin.

The Fin Whale's diet is known by analysis of excrement found floating on the surface. So far it has only been studied in the Ligurian Sea by an Italian team from the University of Genoa (see for example ORSI RELINI (1997) for a synthesis). The diet of all the Odontocetes (toothed whales) can be deduced from an examination, carried out more or less completely, of the contents of the stomachs of animals found stranded on the coast or accidentally killed in their natural habitats.

It is obvious that the number of stomach contents of Mediterranean cetaceans that have been collected and analysed and whose results have been published, is far too low for us to claim to have correct knowledge of the species' diets. On this point there are monumental gaps in our knowledge, and it is vital that they be filled quickly. The following comments have been inspired by work read on this subject, which should be taken into consideration in the forthcoming analyses:

\* The literature shows a great heterogeneity in the analyses that have been published, which makes comparison or synthesis very difficult. In fact:

- the examining of all the prey contained in a stomach is not always done systematically. Certain articles restrict themselves to an analysis of one single category of prey (cephalopods, for example) without giving any indication about the proportion of other prey present, which gives rise to a loss of precious information for mixed diet species;

- the results are not always expressed in the same way. Some are given as numbers of individuals discovered for each prey-species (which is very good); others only indicate the proportions of these prey. Some give the full results of their analyses, stomach by stomach (which is perfect), while others only provide an average calculated from a certain number of stomachs studied. This last case is not anecdotal, sometimes mixing up several periods and several regions, and some of the authors I have contacted have been unable to find the basic data for their calculations.
- \* No stomach contents for the Sperm Whale have really been studied in the Mediterranean, and yet stranded individuals are not rare.
- \* Finally, the bibliography only contains a very little information on the inert elements which, in stomachs, accompany the remains of animal prey. This fact, well known for turtles (and there too very badly documented) seems however to be frequent for cetaceans, but has only been touched on, to my knowledge, in three or four publications. I am thinking especially about human origin waste, like bits of plastic, polystyrene or wood, which often concentrate in certain currents off coasts. These products can be dangerous for the animals which eat them: blockages, perforations, secondary effects due to the permanent presence of a foreign body....

## 6- GENERAL BIOLOGY AND ECOLOGY

Studies on the presence of animals in straits are rare. They deal with Gibraltar (HASHMI and ADLOFF, 1991; WALMSLEY, 1996; HASHMI, 1998) or the Turkish Straits (OZTURK B. and A., 1997).

More substantial are those which relate cetacean populations to hydrological phenomena (VIALE, 1991; VIALE and FRONTIER, 1994; VIALE and COLLET, 1995) VIALE et al., 1996), availability of prey (AZZALI et al., 1994) or variations of the ecological parameters of their surroundings (GANNIER, 1995).

We have seen that the morbillivirus epizootic which affected the Striped Dolphin was abundantly written up. The field of virology has thus been widely documented over the last few years, and many discovered corpses have also given rise to growth studies (CALZADA and AGUILAR, 1994; DI-MEGLIO and COLLET, 1994; DI-MEGLIO et al., 1996; MARSILI et al., 1998), reproduction parameters (DI-MEGLIO and COLLET, 1994) or population genetics (GARCIA-MARTINEZ et al., 1994 and 1996).

Although we knew that cetaceans are subject to many parasitic diseases, little work has been done on the subject: AZNAR et al., (1994) have looked into the identity of a cestode worm for the Striped Dolphin, BOUTIBA et al. (1996) draw up a list of parasites found in four species of cetaceans in the Algerian coasts, MARINIELLO et al. (1994) have re-described a cyamid (amphipod) species, and mention it for the first time in Italian waters, and cyamids in cetaceans of the Western Mediterranean have been reviewed by OLIVER and TRILLES (1994).

In the preceding chapters, I have often resorted to the very recent contributions which application of acoustic methods has provided us with. I shall not reconsider these points, which particularly concerned one species (Sperm Whale) and/or dealt with the distribution of individuals or the reactions of animals to foreign emissions of sound. However, certain supplementary work deserves to be mentioned here.



Several publications study species' vocal signatures: the Sperm Whale's Mediterranean codas (BORSALI et al., 1996), a comparison of Risso's Dolphin vocalisations made between the populations of Scotland and the Mediterranean (BENOLDI et al., 1998), or the setting up of 'sound libraries' for all species (PAVAN et al., 1995). Finally, the Bottlenose Dolphin's acoustic behaviour is being studied in the wild in the north of the Adriatic (OEHEN et al., 1997) and also on animals in captivity (GNONE et al., 1995, 1996 and 1998).

As it was mentioned several times in the above chapters, some of the works which have appeared showed that the study of the animals' behaviour was far from being neglected by various teams. Let's come back here one moment on this point, not to evoke research done on one particular species, or tackling the relations animals had with fishing activities, but especially to insist on the importance of studying species' comparative behaviour over zones where they coexist. The importance of developing such an approach has been shown by the preliminary investigations carried out on various Mediterranean sites:

- in the south-east of Spain, where the Common Dolphin and the Striped Dolphin meet (SAGARMINAGA and CANADAS, 1995 and 1998),
- in the north of the Adriatic, where Bottlenose Dolphins and a Common Dolphin have been signalled together (BEARZI, 1996),
- in the Tyrrhenian Sea and in the Adriatic Sea, where Bottlenose Dolphins and Striped Dolphins coexist (AZZALI et al., 1994),
- in the east of the Ionian Sea, where Bottlenose Dolphins and Common Dolphins live in sympatry (POLITI et al., 1994 and 1998; FERRETTI et al., 1998).

But these sites are not the only ones known in the Mediterranean; many others are identified.

It is essential that questions of inter-species competition to occupy and share ecological niches are elucidated, if we want to get a better definition of how the ecosystem functions overall. A research effort should therefore be developed on this subject.

## 7- RISKS RUN AND HARM OBSERVED

Three major types of threat are identified today: intentional capture, incidental capture, and deterioration of the habitat.

### 7.1 - Deliberate capture

In the Mediterranean, only two whaling industries have functioned, in turn and sporadically, in the Strait of Gibraltar between 1921 and at least 1954: one was Spanish and the other Moroccan. They basically operated in the Atlantic sector near to the Strait.

Since the 1960s, it cannot be said that cetaceans, large or small, have really been sought by fisheries in the Eastern or Western Mediterranean. And yet many illegal activities for the intentional capture of whales for commercial purposes have been recorded in the literature: flesh of little cetaceans used to be sold to restaurant owners, and fishermen used it to bait their lines in Italy (Liguria, Tuscany, Latium, Sicily, Sardinia) and in Spain (Andalusia and the Murcia region). The quantities of animals captured for these purposes are not known; it would be good if an investigation were made to take stock of the present situation as to these practices.

Also, in other times intentional capture had been instanced (essentially in the Adriatic or the Ligurian Sea) for supplying dolphinariums or research laboratories. Bearing in mind the legislation in force today it seems that this no longer happens.

On the other hand, it is certain that little cetaceans are victims (to harpoons, spearguns) of fishermen who see them as direct rivals over their fishing zones and who often lament the damage done to their nets. These acts of destruction target the Bottlenose Dolphin especially. By way of example, recent precise accounts of these incidents have been given for Corsica (BOMPAR et al., 1994), north-west Sardinia (LAURIANO, 1997), Sicily (MAZZOLA et al., 1995), Tunisia (CHAKROUN, 1994), the Maltese islands (MICALLEF, 1996; VELLA, 1998) and the Aegean Sea (MARINI et al., 1995a), but it is certain that it must be far more widespread. No study has been made on the real scale of the damage lamented, and this is a gap that must be filled.

## 7.2 - Incidental capture and harm

Among the indirect threats the cetacean populations have to face in the Mediterranean, the main threat is indubitably linked to the development of fisheries, characterised by their being scattered throughout the Mediterranean and by the multiplicity of the gear they use.

I shall not dwell on this point particularly since it will be dealt with in another information document of the Meeting (UNEP(OCA)/MED WG.146/Inf.4), but merely mention that several teams have undertaken to study some aspects of the question near the Strait of Gibraltar (SILVANI et al., 1995), in the south of the Tyrrhenian Sea (MUSSI et al., 1998), around Sicily (MAZZOLA et al., 1995), near the island of Lampedusa (PACE et al., 1998) and the Maltese islands (MICALLEF, 1996; VELLA, 1998). Such initiatives are to be warmly encouraged and expanded through the whole of both parts of the Mediterranean. Indeed, our ignorance about the impact of these activities and thus their consequences on the dynamics of cetacean populations, is total. Now there are numerous fishing gear and species involved, as Table 2 (in which I have synthesized the various cases of interaction recorded in the literature) shows.



It very clearly stands out that the most harmful techniques are those practised either in coastal waters (gill-nets and trawls) or out at sea (long lines and driftnets). Drift nets are certainly the most destructive, but an exact assessment of the losses caused is obviously hard to get out of the exploiters all the more in that these are often non riparian fishing fleets operating outside waters under national jurisdictions. The species affected, especially since the introduction of materials that cannot be detected by echo location (synthetic fibres), are mainly little delphinidae, but also the Sperm Whale and the Minke Whale.

While on the subject of fisheries' indirect impact, it must be said that there are increasingly frequent cases of animals found dead, and sometimes still alive, tangled up in abandoned lengths of net. Legislative measures under way generally take this aspect into account.

Lastly, I shall draw attention to the real risks caused by the general increase in maritime traffic. In the Corsica-Liguria-Provence basin, for example, nobody is unaware of the collisions with commercial boats, in that every year many large cetaceans (especially whales) are rammed by ships and often reported in the press. But the phenomenon has never been quantified. Moreover, this impact is even greater today because of the recent opening of maritime routes along which high speed ships travel, linking Corsica to the French continent and to Italy. Accidents already reported involve direct collisions with animals, but we know nothing about the indirect consequences caused by these devices (sound levels, wakes of air in emulsion)...and about how the animals react. The growth of this type of harm and its impact should be studied quickly and very attentively, for they are situated in a sector that is particularly crucial for the survival of cetacean populations (the Fin Whales' main feeding ground). Such a study must not, however, be restricted to the precise sector I have used as an example, but must be extended to cover the whole of the Mediterranean.

### **7.3 - Modifications of habitat and harm**

Modifications of the habitat, at present identified as being harmful to the durability of cetacean populations, fall into three categories: increasing pollution levels, reduced trophic resources, and development of eco-tourist activities.

General pollution of the waters is a very important factor. Several studies reveal that the toxic element contents accumulated by Mediterranean cetaceans are very much higher than those found in Atlantic individuals (supplementary proof of the degree of isolation of certain populations). We still do not know what doses can be considered as lethal for the species, but the bio accumulated quantities revealed are staggering: doses of up to 4,250 mg./kg. of dry weight of mercury measured in the liver of a Bottlenose Dolphin found stranded in Corsica in 1995 (D. VIALE, verb.). They thus most certainly do have an effect on weakening the immunity system of individuals -perhaps this encouraged in 1990 the outbreak and propagating of the morbillivirus epidemic reported for the Striped Dolphin- and their reproductive capacities, this remains to be proved.

Using the corpses of animals found stranded, or practising biopsies on living individuals, many countries, in the whole of both parts of the Mediterranean, are looking into concentrations of

organo-chlorine compounds and heavy metals. I shall cite, as examples from the literature of the past few years:

Algeria (BOUDERBALA *et al.*, 1997; TALEB *et al.*, 1997)  
Croatia (WILSON *et al.*, 1997)  
Spain (BORRELL *et al.*, 1994; BORRELL *et al.*, 1996; BORRELL *et al.*, 1998)  
France (ARNOUX *et al.*, 1994; AUGIER *et al.*, 1994)  
Israel (RODITI *et al.*, 1996)  
Italy (CORSOLINI *et al.*, 1995; MARCO et CECILIA, 1996; MARSILI *et al.*, 1998)

The main species studied are the Striped Dolphin, the Common Dolphin and the Bottlenose Dolphin; works on Risso's Dolphin and the Sperm Whale are very rare.

Besides the pernicious effects of chemical pollution, the animals also have to avoid the dangers constituted by the frightening quantity of material that continues to exist in suspension: researchers from IFREMER (GALGANI *et al.*, 1995 and 1996) have calculated that nearly 175 million bits of human origin debris is lying on the bed of the continental shelf north-west of the Western Mediterranean over an area of 90,000 square kilometres! Many cases of deaths of cetaceans are attributed to the ingestion of non degradable products (plastic, aluminium...) which bring about suffocation or intestinal blockage. It was recorded that a Sperm Whale had been found dead, whose stomach contained a very large piece of plastic sheeting (several square metres).

An examination of habitat modifications brings us once again to tackle the field of the inter-relations between fisheries and cetaceans, for one must not disregard the importance men's overexploitation of halieutic stocks may have. Confronted with a (foreseeable) decline in available food resources, it is obvious that cetacean (and other!) populations risk paying a heavy price, either naturally (modification of demographic parameters) or artificially (worsened role of competitor for commercialised prey, increased accidental captures). The impact of fishing gears and the dwindling of resources are very worrying points, which, after long debate in the last two CIEM workshops held by the 'Marine Ecosystems and Biological Resources' (Nicosia, May 1997) and 'Coastal Environment' (Marseilles, October 1997) Committees, have been identified as priority themes which should receive speedy, serious attention. They should also attract the attention of cetologists.

When talking about this type of harm one should also mention the harm done which is linked to the development of tourist activities at sea. Sailing, generally, of course, is growing, and boat users, who are increasingly aware of the presence of cetaceans, unhesitatingly seek them out and go very near to them: photographs, underwater diving, even launching jet-skis to circle round them. Though these activities are rather trivial, the development of one activity eco-tourism has to be watched with great attention. The passion for cetaceans has been so well whipped up by the media that a lot of people want to meet them in the wilds and get close to them. The result is an increasingly active movement, led by NGOs and profit making bodies which offer their services to satisfy this demand. Today, for example, countries like Germany, Belgium, Spain, France, Italy or Switzerland equip boats to go cetacean spotting in the Ligurian Sea.

Now this activity, as NOTARBARTOLO di SCIARA (1996) clearly puts it, is a double edged weapon. It has a positive educational and economic side, good because it may even help a certain type of scientific research (CANADAS and SAGARMINAGA, 1994), but it can be fraught with consequence if it expands with no supervision or planning. Some studies have already been done in the Corsica-Liguria-Provence basin, a zone of major importance for Fin Whales (feeding area where there must be as little disturbance as possible) in order to assess the

animals' reaction to certain human actions, and particularly their stress when pursued (NOTARBARTOLO di SCIARA et al., 1996; JAHODA et al., 1996; LAFORTUNA et al., 1998).

Finally I include here some comments recently made involving the activities of the military or allied bodies. I would like first of all to thank these various administrations for the help they are giving to scientists in their research: the National Marines or the Italian and French Customs Services, in particular, and to serve as an example, collaborate very actively

- in regularly conveying their sightings to the CIESM's Sightings at Sea File (BEAUBRUN, 1995; NASCETTI and NOTARBARTOLO di SCIARA, 1996),
- in making their contribution to acoustic research on the Sperm Whale (PAVAN et al., 1996),
- in helping to determine how certain military activities could have an impact on marine fauna (NASCETTI et al., 1996).

However, on several occasions the harmful effects of the emissions of sound they are led to produce outside this work have been reported. RENDELL and GORDON (1996) record vocal behaviour modifications in Pilot whales after sonar emissions in the Ligurian basin, and FRANTZIS and CEBRIAN (1998) show a direct connection between the mass stranding (atypical for the species) of 15 Cuvier's beaked whales in the east of the Ionian Sea and concomitant military manoeuvres.

Nobody doubts that these bodies, when informed of the facts, will look into how to reduce - even stop - this kind of practice in the most sensitive zones, which will be pointed out to them.

#### **7.4 - Conclusions**

The risks run and the harm the Mediterranean cetaceans have to face are numerous. Most of these are identified in their wider outlines, but to this day not one (or very few) study has been done on their respective impacts. Now the problem is crucial and everything must be done to quantify its effects.

Here I wish to draw your attention to the caution we must show when mentioning the effects which these various direct and indirect attacks can have on cetacean populations. Though it is true that the threats exist and that their effects have been noted, it seems completely unreasonable in the present state of our knowledge to formally refer to their impact on the various species' dynamics. Indeed, on the one hand, the numbers of cetaceans present are in the majority of cases unknown to us (and this gap remains to be filled) and on the other, the objective data is too thin (and the information often inaccessible) to correctly assess animal losses. In such a context, any assertion that does not refer to the evolution of precise demographic parameters seems to me to be completely unfounded. This does not mean that events have to be minimised, or difficulties overshadowed, or that one must retreat in sensitive fashion behind the 'principle of precaution'. On the contrary, the task is vital, and it is high time we got down to it rigorously.

Human activities may have (as we have seen) a capital importance on the durability of species, and we know almost nothing about the spatio-temporal distribution of their intensity at sea. And this appraisal shows that the same holds good for the quantitative distribution of cetacean populations.

Confronted by this double acknowledgement, the Tethys Institute (Italy) and the Ecole Pratique des Hautes Etudes (France) teams decided to work together to undertake a joint study on cetaceans and human activity (POSEIDON Programme). The Corsica-Liguria-Provence sector was chosen as the field of experimentation for the defined methodologies, and four years ago the follow-up was completed between the months of June and September. The first results have seemed to be very promising, so much so that the Spanish Alnitak Project team has already been applying it for two summers in the Almeria-Cartagena region. I hope these initiatives will have a snow ball effect.

## 8- STRANDINGS

The field of animals found alive on the coast, on the point of being stranded, or as corpses thrown back to the coast, will only be sketched out here, because another information document of the Meeting (UNEP(OCA)/MED WG.146/Inf.5) deals with this subject. However, I could not leave it out, because of what it adds to our knowledge of cetacean population:

- the rarest species in the Mediterranean are often only made known by the discovery of a dead individual (e.g. the Dwarf Sperm Whale, or the Porpoise inventoried up to Tunisia),
- dead animals often provide abundant material which it is impossible to obtain from live animals; their autopsies and the samples taken from them yield a whole range of invaluable information.

The "strandings" section must thus be envisaged with great care. Many countries have already organised well structured networks which, for many years, have brought out a yearly list of individuals inventoried along their coasts. Unfortunately, this is not the case everywhere, and it is essential that we encourage all the riparian countries to fill in this gap.

It is even more crucial when the case concerns exceptional phenomena that are handled, in a very personal way, by people who are insufficiently informed to glimpse the importance of the information they have had the luck to get hold of (the case of the Mesoplodons cited above). But it is tragic when mass strandings occur (the case of Cuvier's beaked whale in May 1997 in Greece) and when the teams, despite all their conscientiousness and good will, are materially incapable of facing up to what needs to be correctly done.

The importance of structuring efforts and abilities on a Mediterranean scale has not escaped the experts of the CIESM, who discussed this at their January 1996 workshop. Already certain countries have responded to the recommendations suggested there: Georgia, Morocco and Turkey have updated the inventories of their cases of inventoried strandings and have handed them back to the CIESM in the form of computerised files. Other countries are working relentlessly on this (Greece, among others). Others have long kept their files up to date (Spain, France, Italy...) and will certainly not fail to join in the common work. The main lines of the activities to be undertaken, as well as the linking together of operations to put into action to arrive at a uniform data bank/banks of common interest, were sketched out at the last CIESM meeting (Dubrovnik, 1-5 June 1998).

Everything must be put together so that such an enterprise can rapidly give concrete and tangible results. The issue will be discussed during this expert meeting.

## 9- AVAILABLE DATA BANKS

There are already four data banks which bring together on a Mediterranean (even the Black Sea) scale information that is extremely precious to cetologists. The next bank to be set up should concern inventories of animals found stranded.

- \* The **Sightings of Animals at Sea File**, managed by the CIESM (Monaco), is certainly the oldest data bank. Set up in 1984, it groups together all the sightings conveyed to it by scientists or volunteers. This File covers the Mediterranean and the Black Sea, and will soon be open to the 'adjacent Atlantic zone' defined by the ACCOBAMS agreements. Its information has allowed the Preliminary Atlas of Distribution of Mediterranean Cetaceans to be compiled (ed. BEAUBRUN, 1995). Totally computerized, it today contains over 10,000 items of data, access to which is governed by a strict professional code of ethics. The information input software package has just been revised and; joined to a cartographical representation and data processing software package, should shortly be distributed to any team which so desires.
- \* The CIESM keeps up to date a **Publications Bibliography File** on the Mediterranean. This File, available to anyone on floppy disk by writing to the CIESM, first took into consideration the work published in the context of the CIESM Congresses, but any author can develop it by calling up all the references that have appeared in other journals. These references are extremely useful as they do not concern cetaceans only.
- \* A joint RAC/SPA and Tethys Research Institute initiative allowed the **Directory of Marine Mammal Specialists** (Mediterranean and Black Sea) to be published in 1996. This extremely precious inventory can be obtained from the RAC/SPA and draws up a list, by country, author or subject, of the people or bodies identified as being interested in cetology. Because of the rapid development of this discipline, an updating of this document could be envisaged.
- \* Again on the initiative of the RAC/SPA and the Tethys Research Institute, a data bank on the **Photo-identification of Cetaceans** has been designed. This instrument, of major interest, was perfected with photographs of Fin Whales taken by the Tethys Institute team. In use at this very moment, it is essential that it very quickly be filled with pictures taken by all the other Mediterranean teams, and we must already envisage extending it to the other species to which the technique can be applied.



## 10- SPECIALIST TRAINING

It is unthinkable, in this appraisal, not to pay particular homage to all the NGOs which are working to satisfy the needs expressed by so many people to get to know cetaceans better, to watch them, or even understand the way the milieu in which they evolve functions. To cite them all is unfortunately impossible in this succinct approach, but it should be known that in the Mediterranean there are many who give of themselves :

- organising seminars or conferences at all levels,
- running courses where people are introduced to certain techniques (e.g. autopsies),
- offering in the field supervision for people wishing to watch the animals,
- or publishing minor works or small volumes for the wider public.

Besides these training activities that are on offer to all and sundry, I must mention the existence of three kinds of specialist training for a much narrower public of a scientific calling, all three of which enjoy the help of the RAC/SPA:

- \* For four years now, the Ecole Pratique des Hautes Etudes (France) has organised a Training Course in Mediterranean Cetology. This week-long course deals with most of the fields of cetology. It gathered about 20 people, selected from the countries of the Mediterranean and Black Sea as a whole.
- \* For two years, the University of Valencia (Spain) has organised an Education in Cetology course. This one-week event also tackles most of the fields of cetology. It is open, without any particular conditions based on geographical location, to a hundred people chosen from among all those who applied.
- \* Lastly, for several years now the Tethys Institute has been organising Practical Training Courses at sea; these are of variable duration, and they allow the chosen candidates to discover and train in the techniques of in the field studies.

Demand is constantly increasing for these three training courses. They should therefore be kept up, even strengthened and developed.

## GENERAL CONCLUSIONS

Our knowledge of cetacean populations, and of Mediterranean cetology in general, is still in its infancy, although enormous efforts have been made to develop our knowledge over the last ten years or so by cetologists, institutions and administrations.

Certainly, much has been done, and certain people or teams are displaying astounding energy and dynamism to push things on, despite numerous obstacles. These obstacles essentially fall into four categories:

- \* Decision makers are a bit unwilling to venture into promoting research in a field that is unfortunately still out on a limb. And yet, although the species studied are thought by their audience to have a 'very nice' connotation, fully promoted by the media, and although the work sectors or means of travel used for research are similar to the picture some people have of holidays, cetology is not just a product of dreams and poetics. It is high time that people really realized that cetaceans are right at the top of the trophic chain, and thus mirror the milieu in which they live. The importance of getting to know them better therefore becomes a necessity.
- \* Grants are hard to find for research or training, and are handed out too parsimoniously considering the stakes involved. That brings about a dispersion of energy as people working in the field do too many things at once, and causes (according to the means available) very heterogeneous work to be done, not all applying comparable standards. Also, lack of money for training new people, for there are still only a few people interested in cetology: how many countries have more than one person (if that!) to attend to the subject?
- \* The very strong individual personalities of people interested in cetology, even between scientific teams, often leads to their being unwilling to work happily together. And yet our knowledge will only advance if we realise how common our interest is. Today, the tasks of coordination are difficult to assume to move in this direction. Teams which are already in place must be developed, and others set up. Let us hope, for the well being of cetaceans in particular and the Mediterranean in general, that we may find the necessary support from the concerned infrastructures and authorities to harmonise, structure and homogenize.
- \* Associative systems which in many cases are keen on taking on a scientific colouring when in fact their activities are completely unscientific, even incompatible with such work. Yet their role in helping us to make progress cannot be denied, and the contribution made by their real abilities in certain fields can only be immense. But there again with the profound conviction of knowing how to be content with doing what one knows how to do well the spirit of imagination should be dominant to reach a comprehensive aim.

Be that as it may, the record of our present knowledge of Mediterranean cetaceans is pretty thin, and it is essential that this science expand. Certain people are exerting themselves, tenaciously and relentlessly, despite often non existent means, and I pay homage to them all. But what is the future for cetaceans if we go no further than this?

Some discussion groups were recently held on this subject. Their conclusions are unanimous; I shall briefly sum up the major points by way of conclusion.

- No species among the 8 cited as common or frequent in this report can truly be considered as having priority. All have their importance in the biodiversity of the Mediterranean ecosystem, and each has its specific problem.
- All the studies already done must be expanded, provided that their methodologies are rather better planned (thus, there must be dialogue).

Among the centres of major interest to be taken into account in the immediate future, it seems most urgent to emphasize:

At species level

- The Fin Whale: movements, numbers, secondary feeding grounds.
- The Sperm Whale: genetics, numbers.
- The Bottlenose Dolphin: numbers, relationship with human activities.
- The Common Dolphin: numbers, distribution.
- The Striped Dolphin: pollution, assessment of impact of fishing gear.

At regional level

- Sea of Alboran: numbers, species sympatry, movements.
- Corsica-Liguria-Provence sector: creating the 'Sanctuary', continuing studies.
- Eastern Mediterranean: estimate of populations.
- Ionian Sea: species sympatry, species' feeding grounds.
- Aegean Sea: all fields.

At issues level

- The cetacean-human activities relationship, especially in the field of fisheries.
- Sympatric species.
- The role of straits in population exchanges.
- Strengthening inter-team links: help, exchanges, concerted studies.

Lastly, make sure that Whale Watching does not expand in an unplanned manner.

All this, without forgetting that the ACCOBAMS Agreement aims at harmony between the two parts of the Mediterranean.

The quick statement I have just drawn up brings out the following essential points:

At a general level,

- \* The main lines of the Action Plan for Conservation of Cetaceans in the Mediterranean Sea have been respected, at various levels, according to the skills and means available, by most of the Parties. The riparian countries have thus become fully aware that they should protect these species, and the Plan's main lines do not appear to need modifying for the time being.
- \* All the activities undertaken, whatever their focus of interest, have been in keeping with the guidelines of this Plan. But the time has been too short, since the Plan was adopted, for all the priorities and obligations set out therein to be fairly tackled.

- \* The emphasis has therefore been laid on two activities:
  - Implementing legislative instruments. Intense work has been done in this field to help this part of the Plan progress, but we cannot relax our attention: there is still much to be done for the drafted texts to be quickly signed and then ratified...and especially implemented.
  - Strengthening the countries' technical abilities. Theoretical and practical training courses have been set up, but despite everything there are not enough of these to satisfy the constantly growing needs. Work must, therefore, be continued and expanded in this field.
  
- \* The record of our scientific knowledge of the status of species reveals enormous gaps. Certainly, the brief report presented here is essentially based on our experience of the last few years, but all the same it was during this period that the biggest amount of research work was done on Mediterranean cetacean populations and on what steps should be taken to protect them. This part of the Plan, and all the described activities which relate to it, has up to now been neglected and must, as quickly as possible, be given priority. It should be at the heart of the future section of the Plan's concerns if we want one day to hope honestly to fulfil one of the major objectives: The conservation status will be taken as "favourable" when...
  
- \* All the activities that are to be continued, expanded or undertaken in the context of this Plan must obey the four following rules: dialogue with partners, structuring of activities, homogenising of methodologies and harmonising of objectives.

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