



RAC/SPA



PROGRESS REPORT ON THE MEDITERRANEAN DATABASE OF CETACEAN STRANDINGS (MEDACES)

Prepared by **Celia Agustí**

Marine Zoology Unit
Institute Cavanilles of Biodiversity and Evolutionary Biology
University of Valencia, Spain
E-mail: celia.agusti@uv.es

**With the collaboration of MEDACES and the following Organizations/Institutions
(in alphabetic order according to country):**

- Department of Biology-Chemistry, Faculty of Natural science, University of Shkodra (**Albania**)
- Groupe d'Etude des Cétacés de Méditerranée (**France**)
- ARION-Cetacean Rescue & Rehabilitation Research Centre (**Greece**)
- Israel Marine Mammals Research and Assistance Center (IMMRAC) (**Israel**)
- “Naturalist group Guelaya” (**Morocco**)
- National Institute for Marine Research and Development "Grigore Antipa" (**Romania**)
- Morigenos-Marine Mammal Research and Conservation Society (**Slovenia**)
- Aula del Mar de Málaga (Andalucía); Centro de Recuperación de Fauna Silvestre “El Valle” (Murcia); Conselleria d'Agricultura i Pesca del Govern de les Illes Balears; Consejería de Medio Ambiente de la Ciudad Autónoma de Ceuta; Consejería de Medio Ambiente (Melilla); CRAM - Fundació per a la Conservació i Recuperació d'Animals Marins; GRAMPUS (Colectivo para el Estudio y Conservación del Medio Marino, Huelva); Guardia Civil de Melilla; Sociedad Española de Cetáceos (**Spain**)
- Biodiversity and Protected Areas Directorate, General Commission for Environmental Affairs, Ministry of Local Administration and Environment (**Syria**)
- Faculté des Sciences de Sfax; Institut National des Sciences et Technologie de la Mer - INSTM (**Tunisia**)
- Turkish Marine Research Foundation (**Turkey**)

April 2008



Table of Contents

1. Introduction: The MEDACES project

- 1.1. Origin and history of MEDACES
- 1.2. The Database
- 1.3. The MEDACES web-page
- 1.4. Obtaining the data

2. The stranding data

- 2.1. Collaborating institutions
- 2.2. Stranding data
- 2.3. Special events

3. Comments/Recommendations

- 3.1. Objectives/advantages of MEDACES
- 3.2. Weaknesses of MEDACES
- 3.3. Recommendations to improve MEDACES and participation levels
- 3.4. Additional comments/suggestions

4. List of references



1. INTRODUCTION: THE MEDACES PROJECT

1.1. Origin and history of MEDACES

According to the recommendations listed on Annex VII of the 11th Ordinary Meeting of the Contracting Parties of the Barcelona Convention and its Protocols of the Mediterranean Action Plan, UNEP (Malta, 27-30 October 1999), relating to the ulterior implementation of the Action Plan for Cetacean Conservation in the Mediterranean Sea and other initiatives, the co-ordination of the information of stranded cetaceans on the coast of the Mediterranean countries is required for a better knowledge of cetaceans and their eventual protection and conservation.

Cetacean strandings represent an important tool for the development of scientific programmes addressing the issue of cetacean conservation. The occurrence of stranded dolphins and whales provides an invaluable opportunity to gain insight on aspects of their population biology, as well as to investigate causes of mortality or the impact of human activity, that will help to assess the importance of potential threats. Altogether, these data can be used to determine the health status of cetacean populations and to identify conservation problems and reveal unusual mass mortality episodes (Geraci and Lounsbury, 1993).

In countries where the concern for the protection of cetaceans has been high, stranding networks have been developed over the last decades. The establishment of the stranding networks and the submission of data to a centralised database facilitate the collection and dissemination of information.

The establishment of standards to keep the information and samples from cetacean strandings in the Mediterranean waters is very important. In this context, it is necessary to compile all details of cetacean strandings, including an inventory of the samples taken, in a single database maintained by a Mediterranean Database of Cetacean Strandings (MEDACES).

In November 2001, the 12th Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Mediterranean Sea against Pollution and its Protocols, within the “Biological Diversity and Specially Protected Areas” section, recommended the implementation of an Action Plan for the Conservation of Cetaceans in the Mediterranean Sea, to approve the offer by Spain with regard to the establishment in Valencia of a Mediterranean database on cetacean strandings (MEDACES). The Regional Activity Centre for Specially Protected Areas (**RAC/SPA**) is the depositary for the database, whose management is entrusted to the University of Valencia’s

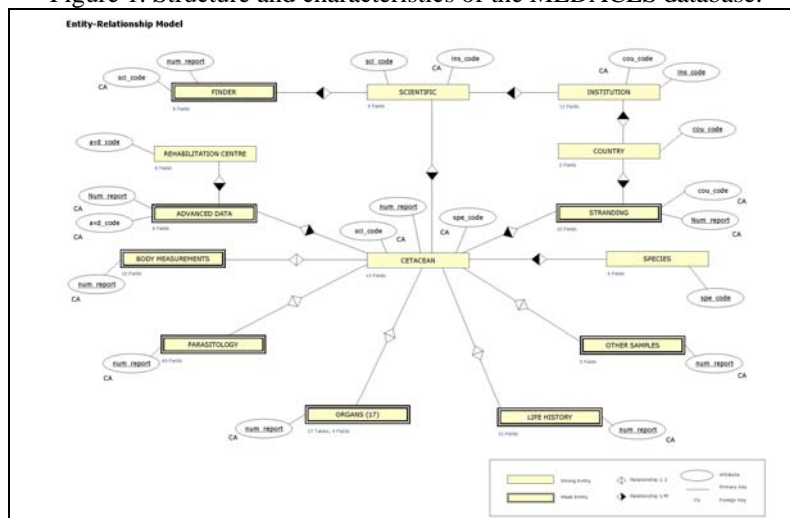
Cavanilles Biodiversity Institute (**ICBIBE**), with the financial support of the Spanish Ministry of Environment (**MMA**). This database strictly adheres to a deontological code.

The Mediterranean Database of Cetacean Strandings has been expanded to cover regions adjacent to the Mediterranean, i.e. the Black Sea and the contiguous Atlantic waters, as defined in the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (**ACCOBAMS**).

1.2. The Database

The construction of the MEDACES database and its web-page (<http://medaces.uv.es>) has been completed and both are operational. MEDACES is a relational database, i.e., the information of every stranding record is stored in different, related tables. For instance, data regarding the institution sending the stranding information, cetacean measurements as well as samples taken for life history studies will be stored in three different tables. The main advantage of using a relational database is that it facilitates the search of complex information within the database that otherwise would be difficult. The structure and characteristics of the database are shown in the Figure 1. “Cetacean” has been established as the main entity of the database, containing the basic information along with the geometry for the geographical location of the stranding. The tables related to this entity contain the basic information regarding the institution sending the data, the cetacean species, body measurements, etc. The advanced data contain information on the organs kept for different types of life-history studies (toxicology, histology, reproductive state, digestive contents, etc.). The stranding records are unambiguously identified by the primary key “num_report” (report number), and other keys allow the relation among the different tables containing the stranding information.

Figure 1. Structure and characteristics of the MEDACES database.





MEDACES is managed as a geodatabase (*Geographic database*), of the ArcGis™ family from ESRI®, and is made using the Microsoft Access software. The geodatabase is able to represent geographical data of the strandings, being able to get the location of any event in a map. It is also possible to get the information of this stranding through the interface of the map.

1.3. The MEDACES web-page

The MEDACES web-page provides information about the MEDACES project and the collaborating institutions. Moreover, the web-page allows downloads which give users access to forms and programs that help to submit stranding data to the MEDACES database.

The MEDACE web-page has two specific tools that are accessible for users: a search function for information related to the strandings, and a graphic visualization of strandings using basic cartography.

The search tool contains searching criteria by species, sex, date, country, province and locality. The output is a printable list of records fulfilling the searching criteria. Moreover, by clicking the number of the report, all the information of a stranding on the list is available.

During the last year, the MEDACES web-page has been updated:

- New documents and press official notices on cetacean strandings, including those related with the striped dolphin die off have been added.
- The database has been updated with the last records available.
- The section ‘Data-Dataset’, that show the stranding data on maps, is currently being updated.

1.4. Obtaining the data

Stranding data has been sent to MEDACES by national stranding networks, national authorities, research and conservations institutions as well as RAC-SPA and ACCOBAMS. MEDACES provide three different options to facilitate the gathering of stranding data from the different institutions:

**1. Database Extract:**

The *Database Extract* option allows submission of extracts of large data sets. This is especially relevant for institutions with an extended experience and large amount of records on strandings in their own databases. Submitted data are later transferred to the MEDACES database.

2. MEDACES Form Excel:

The *MEDACES Form Excel* option allow data to be filled in and stored in a excel file format. The excel file can be sent to MEDACES by ordinary post (floppy disk or CD) or by e-mail. This option is particularly useful for institutions or organisations without access to Internet. The excel file can be downloaded directly from the MEDACES web-page or obtained by request to the MEDACES managers.

3. Paper Form (MEDACES form.pdf):

Stranding data can also be filled into a paper copy of a PDF document we have prepared. This possibility is aimed at institutions with limited access to computer facilities.

So far, the more used option for sending data to MEDACES has been the *Database Extract* form, i.e., the different countries have sent an extract of their own database in Excel or Word format.



2. THE STRANDING DATA

2.1. Collaborating institutions

The MEDACES database currently contain stranding information from the coasts of Albania, France, Greece, Israel, Morocco, Romania, Spain, Syria, Tunisia and Turkey.

So far, the following institutions are actively collaborating with their stranding data with MEDACES:

Albania

- Department of Biology-Chemistry, Faculty of Natural science, University of Shkodra (Denik Ulqini)

France

- Groupe d'Etude des Cétacés de Méditerranée (Marseille)

Greece

- ARION-Cetacean Rescue & Rehabilitation Research Centre (Petroropolis)
- Environmental Research Bureau (Milos)
- Fisheries Research Institute, National Agricultural Research Foundation (Kavala)
- Hellenic Centre for Marine Research

Israel

- Israel Marine Mammals Research and Assistance Center (IMMRAC)

Morocco

- Naturalist group Guelaya: data sent by Niki Entrup (Whale and Dolphin Conservation Society)

Romania

- National Institute for Marine Research and Development "Grigore Antipa" (Constanta)

Slovenia *

- Morigenos-Marine Mammal Research and Conservation Society (Ljubljana)
- Adriatic Project Society (Ljubljana)



* Slovenia established a first contact to MEDACES expressing the intention of sending their stranding data, some time ago. This contact was established through the 'Adriatic Project Society' (contacting person: Vanja Svetina). During 2007, Nina Štrus wrote to MEDACES on behalf of Morigenos (Marine Mammal Research and Conservation Society from Slovenia) showing their interest in joining MEDACES and sending their institution data for a formal registration.

Spain

- Sociedad Española de Cetáceos (SEC)
- CRAM - Fundació per a la Conservació i Recuperació d'Animals Marins (Cataluña)
- Departament de Medi Ambient de la Generalitat de Catalunya
- Conselleria de Territori i Habitatge de la Generalitat Valenciana
- Universitat de València (Comunitat Valenciana)
- Conselleria d'Agricultura i Pesca del Govern de les Illes Balears
- Fundació Marineland (Illes Balears)
- Centro de Recuperación de Fauna Silvestre "El Valle" (Murcia)
- Consejería de Medio Ambiente de Murcia
- Ecologistas en Acción Almería-PROMAR
- Aula del Mar de Málaga (Andalucía)
- Consejería de Medio Ambiente de la Junta de Andalucía
- GRAMPUS (Colectivo para el Estudio y Conservación del Medio Marino, Huelva)
- Consejería de Medio Ambiente de la Ciudad Autónoma de Ceuta
- Septem Nostra (Ciudad Autónoma de Ceuta)
- Equipo de Protección de la Naturaleza (SEPRONA), Guardia Civil de Melilla, Consejería de Medio Ambiente (Melilla).

Syria

- Biodiversity and Protected Areas Directorate, General Commission for Environmental Affairs, Ministry of Local Administration and Environment (Damascus)

Tunisia

- Faculté des Sciences de Sfax
- Institut National des Sciences et Technologie de la Mer -INSTM

Turkey

- Turkish Marine Research Foundation (Istanbul)



2.2. Stranding data

2.2.1. Total data in MEDACES / Contribution of each collaborating country

Ten riparian countries are contributing with their data to MEDACES (see Table 1 and 2). The database contains information on strandings dating back to **1941** (from Tunisia). In total, data from **6,235** strandings are registered in the MEDACES database.

Table 1. List of countries contributing to MEDACES, period and number of stranding recordings.

COUNTRY	YEARS	NUMBER OF STRANDING DATA (%)
Albania	2005	1 (0.02)
France	1968-2008	1,786 (28.64)
Greece	1944-2006	1,175 (18.85)
Israel	1993-2008	138 (2.21)
Morocco	2005	1 (0.02)
Romania	2002-2004	197 (3.16)
Spain	1960-2008	2,883 (46.24)
Syria	2005	1 (0.02)
Tunisia	1941-2006	48 (0.77)
Turkey	2000-2002	5 (0.08)
	TOTAL	6,235

Figure 2 shows the relative contribution of stranding record submissions from each of the participating countries. France, Greece and Spain are the countries with the highest number of submitted strandings. It should however, be taken into account that stranding numbers, among other things depend on, the length of coast line, the size of cetacean species populations in adjacent waters, the period of time from which data have been submitted and the performance of the existing stranding networks.

Figure 3 shows the relative contribution of stranding record submissions from each of those countries with more than ten stranding records sent to MEDACES, corrected for the length of coastline.

Figure 2. Contribution of each country to MEDACES.

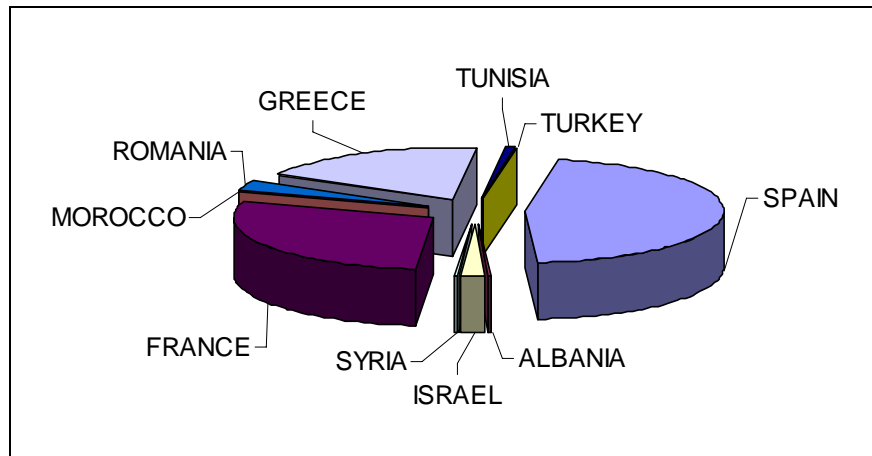
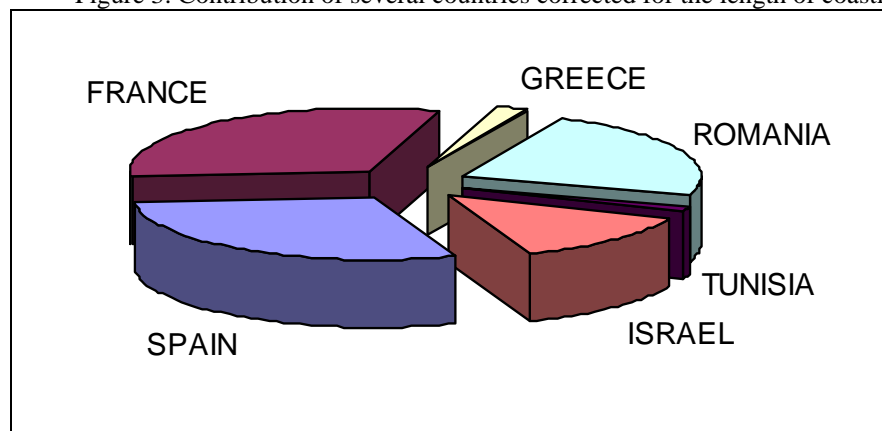


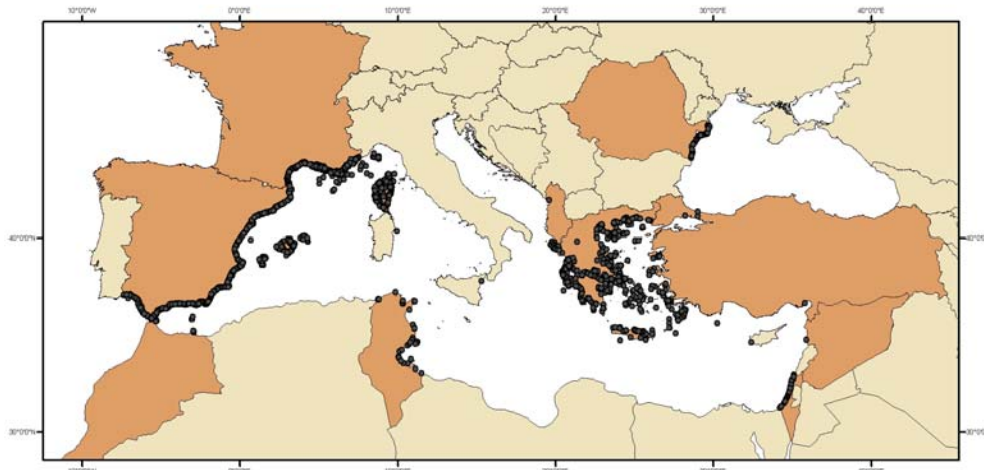
Figure 3. Contribution of several countries corrected for the length of coastline.



2.2.2. Distribution of strandings

Figure 4 shows the distribution of the strandings registered in MEDACES. The countries contributing with data to MEDACES are shown in darkened colour. Annex 1 shows the location of each stranded cetacean species.

Figure 4. Location of the cetacean strandings along the Mediterranean and Black Sea coast of the collaborating countries, using the data collected so far.





2.2.3. Stranded species and number of individuals stranded

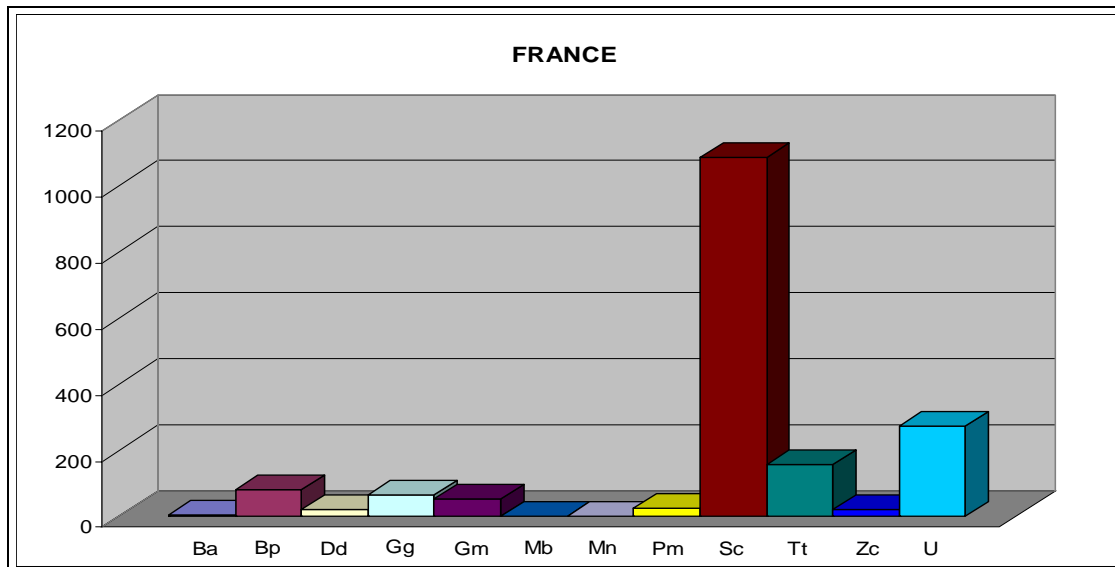
Stranding data from MEDACES are consistent with the well known information about the distribution of cetacean species in the Mediterranean and Black Seas (Notarbartolo di Sciara, 2002 and references therein). The most common **cetacean species stranded** in the **Mediterranean basin** are (see Annex 1 and Figure 5): fin whale, *Balaenoptera physalus*; sperm whale, *Physeter macrocephalus*; Cuvier's beaked whale, *Ziphius cavirostris*; long-finned pilot whale, *Globicephala melas*; Risso's dolphin, *Grampus griseus*; striped dolphin, *Stenella coeruleoalba*; common dolphin, *Delphinus delphis* and bottlenose dolphin, *Tursiops truncatus*. However, not every species appear uniformly distributed along the Mediterranean coast (Annex 1): strandings of *G. melas* are almost exclusive of the Western Mediterranean, whereas strandings of *D. delphis* are more abundant in the south of Spain and in Greece. Strandings of other species have been reported occasionally, like Sowerby's beaked whale (*Mesoplodon bidens*), humpback whale (*Megaptera novaeangliae*), killer whale (*Orcinus orca*), false killer whale (*Pseudorca crassidens*), dwarf sperm whale (*Kogia sima*) and Blainville's beaked whale (*Mesoplodon densirostris*). Strandings of rough-toothed dolphin (*Steno bredanensis*) are not common in the Mediterranean basin but recordings seem to concentrate in the Eastern Mediterranean (see Israel strandings). As the MEDACES database include the contiguous Atlantic waters (South-Atlantic coast of Spain), strandings of several typically Atlantic species appear concentrated in this area, such as minke whale (*Balaenoptera acutorostrata*) and harbour porpoise (*Phocoena phocoena*). In the **Black Sea** (data from Romania), three cetacean species appear in strandings (Annex 1, Figure 5): *D. delphis*, *T. truncatus* and *P. phocoena*. The latter species is the most commonly stranded in this region. Some strandings of this species occurs also in Mediterranean waters contiguous to the Black Sea (Northern Greek waters).

The following graphics (Figure 5) and Table 2 show the different **cetacean species and the number of specimens of each species** stranded along the coasts of each of the collaborating countries.

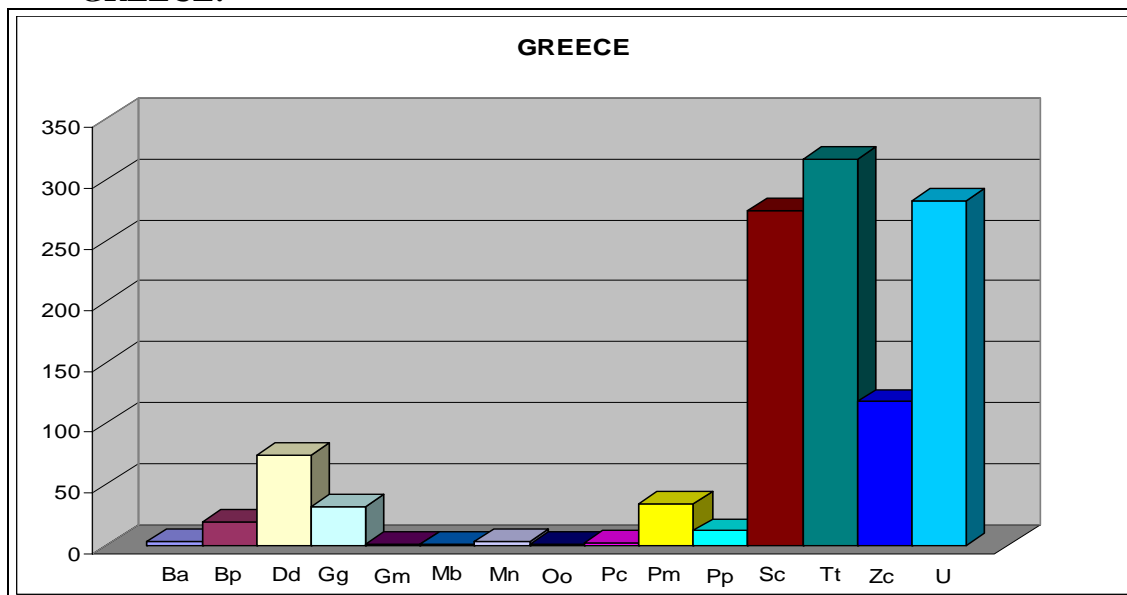
Figure 5. Cetacean species and number of specimens of each species stranded along the coasts of the riparian countries of the Mediterranean and Black Seas. Abbreviations: Ba, *Balaenoptera acutorostrata*; Bp, *Balaenoptera physalus*; Dd, *Delphinus delphis*; Gg, *Grampus griseus*; Gm, *Globicephala melas*; Ks, *Kogia sima*; Md, *Mesoplodon densirostris*; Mn, *Megaptera novaeangliae*; Oo, *Orcinus orca*; Pc, *Pseudorca crassidens*; Pm, *Physeter macrocephalus*; Pp, *Phocoena phocoena*; Sb, *Steno bredanensis*; Sc, *Stenella coeruleoalba*; Tt, *Tursiops truncatus*; Zc, *Ziphius cavirostris*; U, unidentified species.

ALBANIA: 1 *Tursiops truncatus*.

FRANCE:

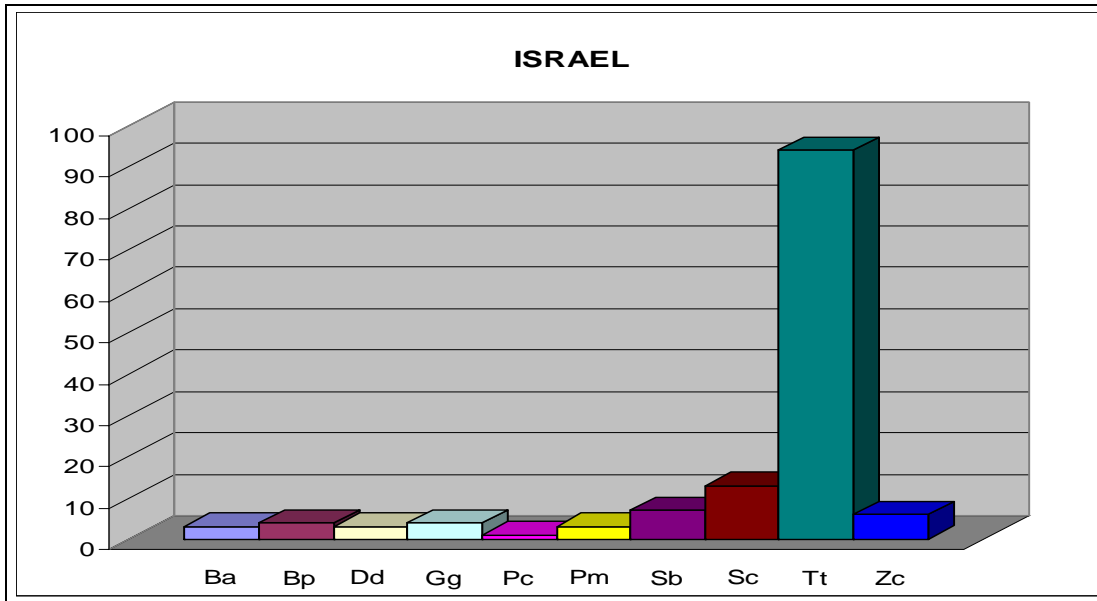


GREECE:



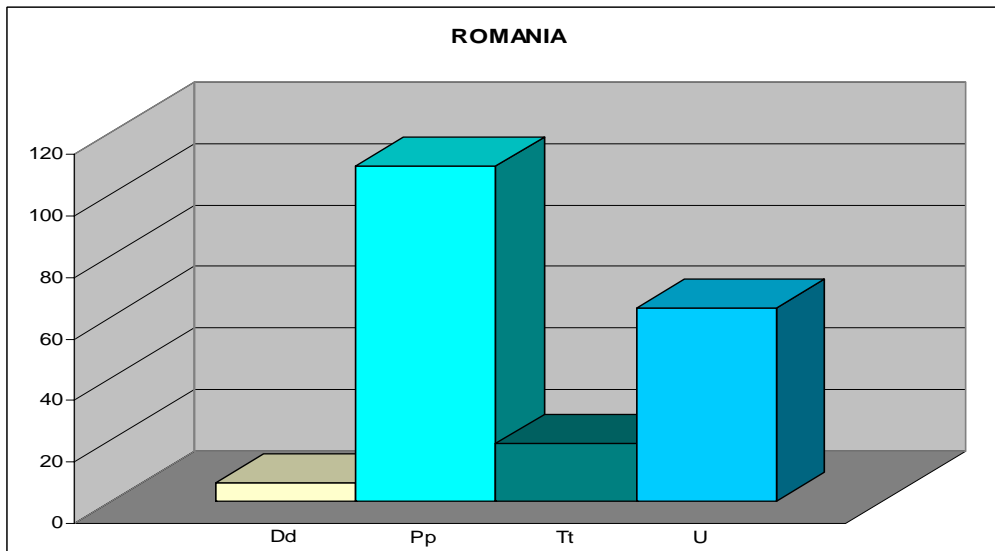


ISRAEL:



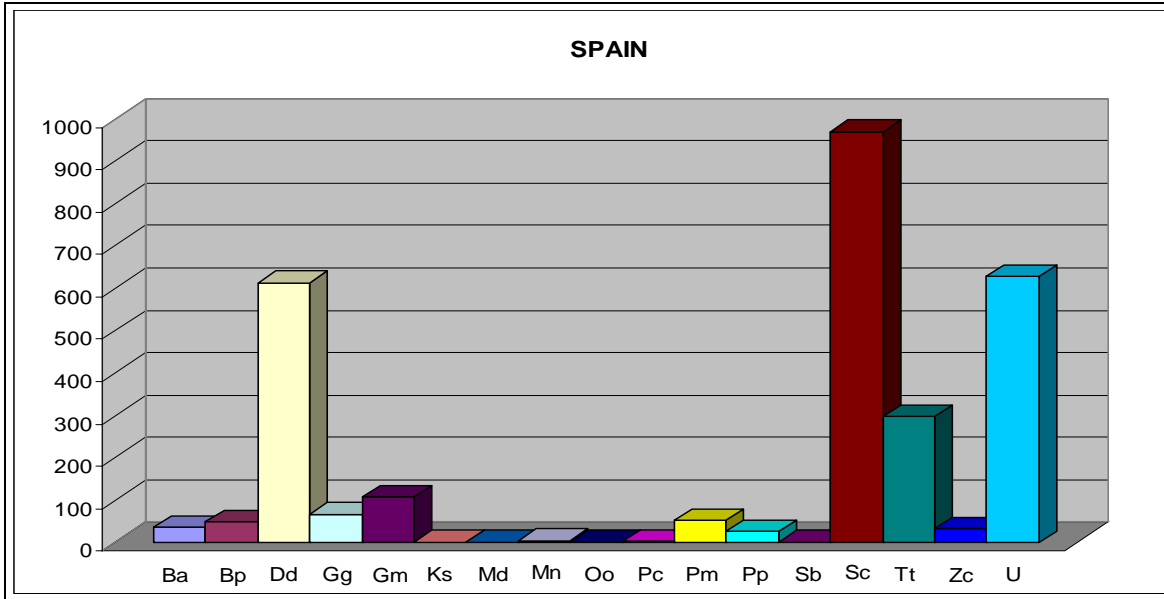
MOROCCO: 1 *Balaenoptera* spp.

ROMANIA:



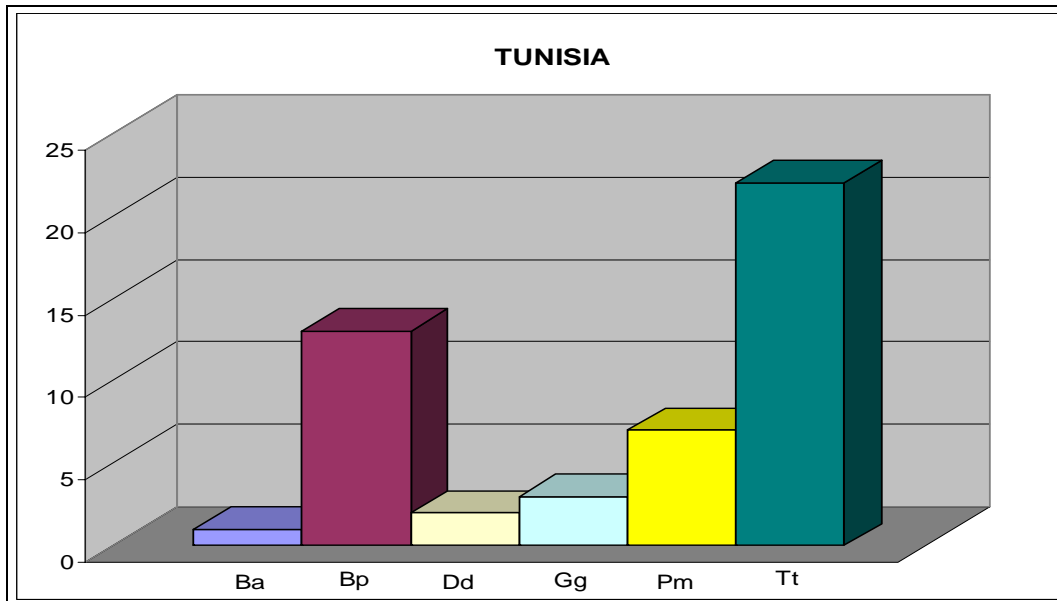


SPAIN:



SYRIA: 1 Unidentified cetacean.

TUNISIA:



TURKEY:

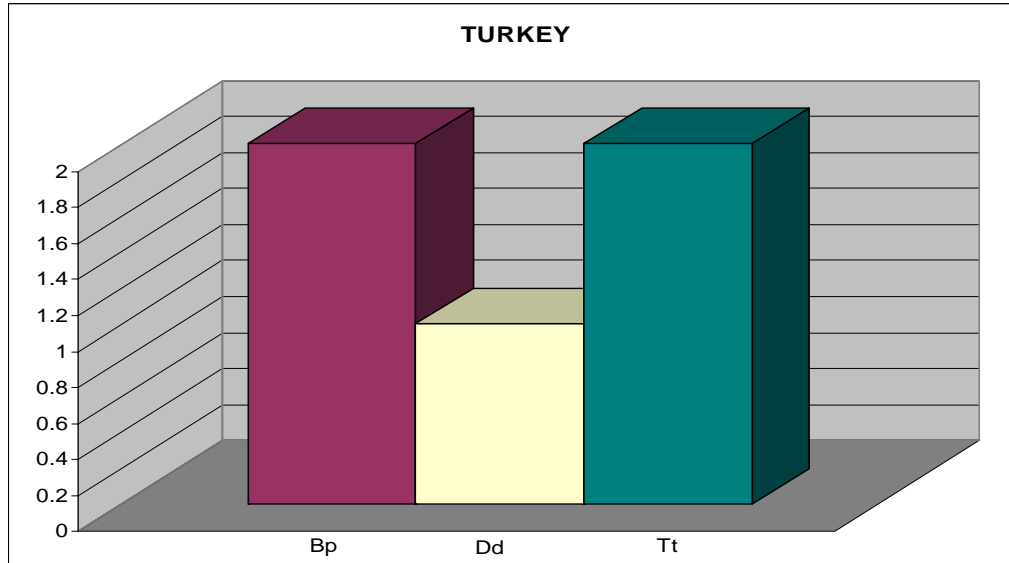


Table 2. Cetacean species and number of specimens of each species stranded along the coasts of the riparian countries of the Mediterranean and Black Seas. Abbreviations: see Figure 5.

CETACEAN SPECIES	ALBANIA	FRANCE	GREECE	ISRAEL	MOROCCO	ROMANIA	SPAIN	SYRIA	TUNISIA	TURKEY
Ba		5	3	3			35		1	
Bp		79	19	4			48		13	2
Mn		1	3				4			
Pm		26	34	3			52		7	
Ks							1			
Zc		19	118	6			32			
Mb		2	1							
Md							1			
Oo			1				1			
Pc			2	1			2			
Gm		52	1				108			
Gg		64	32	4			66		3	
Dd		19	74	3		6	613		2	1
Sc		1088	275	13			969			
Tt	1	158	317	94		19	297		22	2
Sb				7			1			
Pp			12			109	25			
U		273	283		1	63	628	1		
TOTAL	1	1786	1175	138	1	197	2883	1	48	5

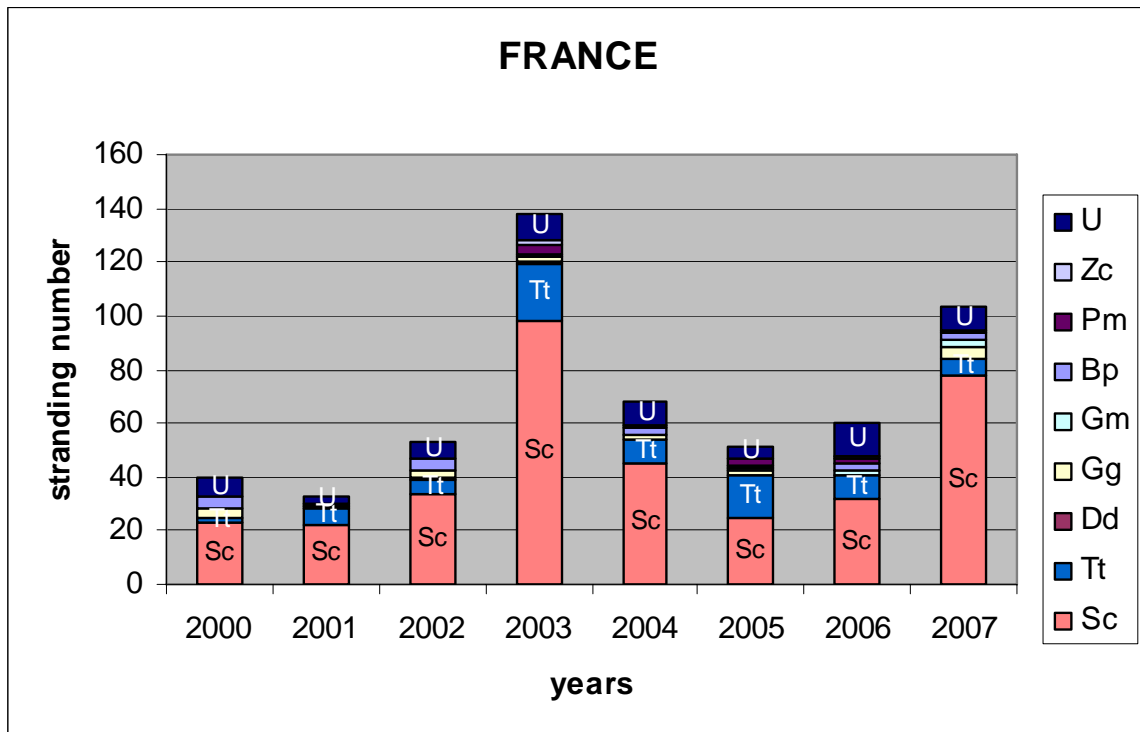
Comparing countries with more than ten stranding data submitted to MEDACES, it can be observed that Spain has the highest **species diversity** regarding strandings with 16 species (which is probably related to the influence of the Atlantic Ocean). Greece follows with 14 species, France 11, Israel 10, Tunisia 6 and Romania with 3 species (Figure 5 and Table 2).

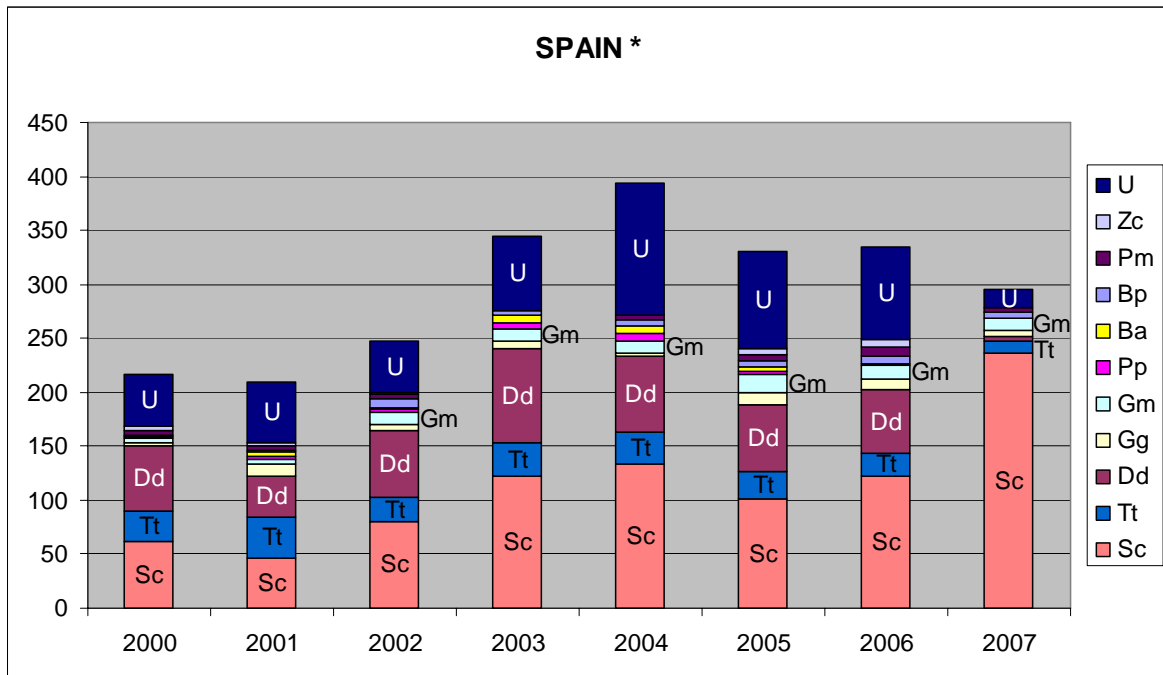


2.2.4. Stranding rate

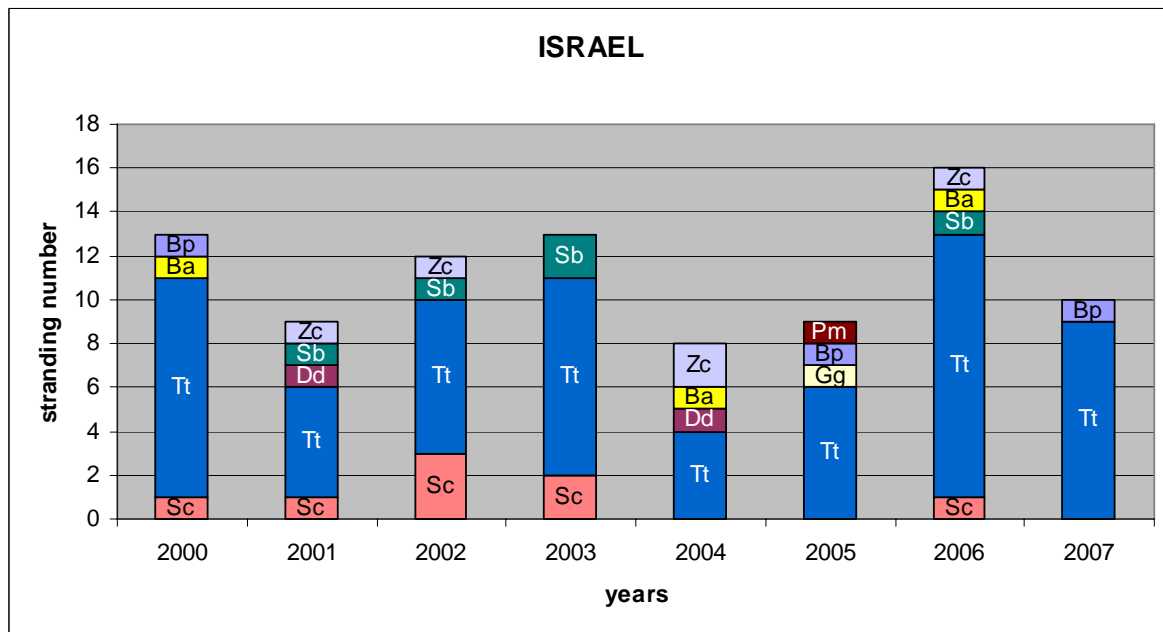
MEDACES has an important role in detecting anomalies in the **rate** of **cetacean strandings** at the Mediterranean and Black Seas, taking into consideration the direct implications that such events may have for these endangered species. Figure 6 shows the trend in the stranding numbers in selected countries. Only countries with more than ten stranding submissions to MEDACES and with submissions in the period 2000-2007 were selected. This time period has been selected because it may be expected that a well working stranding network was present in the countries, an assumption based on the long-time experience that they have with strandings (see Table 1). Only the most common cetacean species in each country has been used for the analysis.

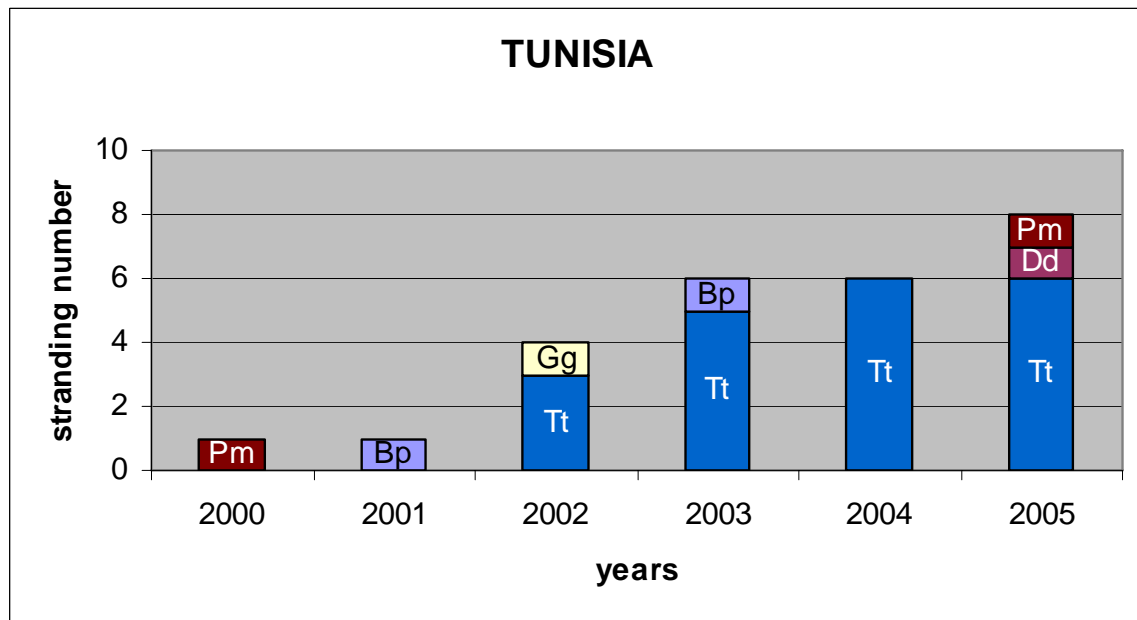
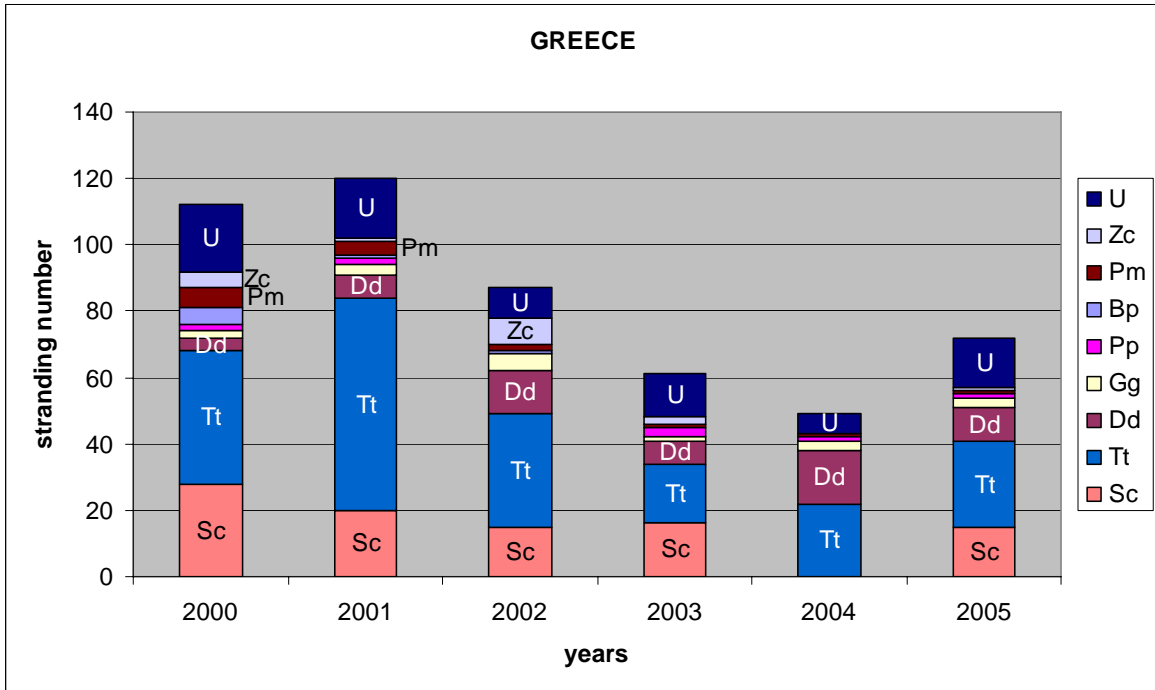
Figure 6. Cetacean stranding rate in six riparian countries during the period 2000-2007. Note that the order of the subdivisions on each bar of the histograms follows the order of the legend, i.e. from up to down. Abbreviations: U, unidentified species; Zc, *Ziphius cavirostris*; Pm, *Physeter macrocephalus*; Bp, *Balaenoptera physalus*; Ba, *Balaenoptera acutorostrata*; Pp, *Phocoena phocoena*; Gm, *Globicephala melas*; Gg, *Grampus griseus*; Dd, *Delphinus delphis*; Tt, *Tursiops truncatus*; Sc, *Stenella coeruleoalba*; Sb, *Steno bredanensis*.

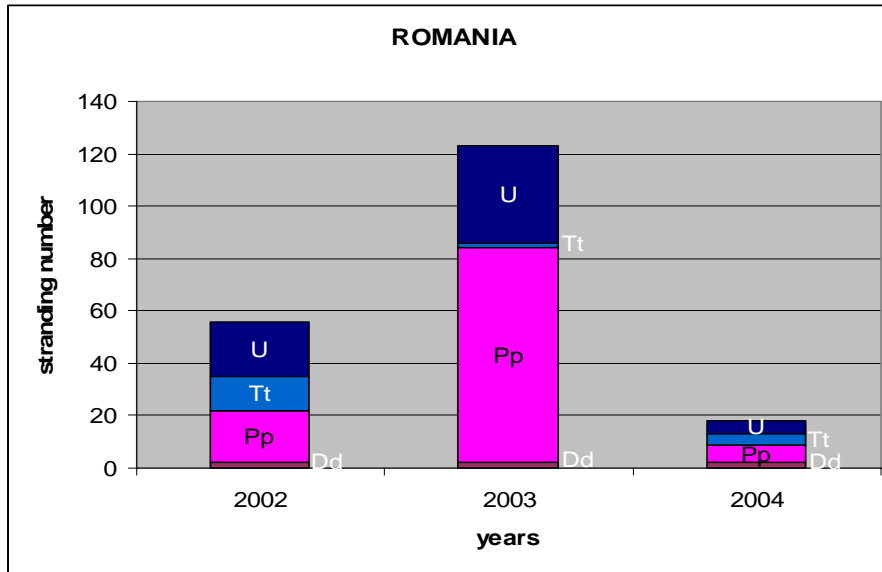




* Data from 2007 has not still been sent to MEDACES from some organizations/institutions working in Spanish Mediterranean







A number of relevant observations can be made from the stranding rate data presented in Figure 6:

Western Mediterranean:

- Two stranding peaks appear in **FRANCE**, one in **2003** and another in **2007**. In these two years, the recorded stranding numbers were approximately the double of those observed in the other years. Strandings of **striped dolphins** contributed most significant to the observed increase. It should be mentioned that the peak of 2007 probably belongs to the epizootic episode, where striped dolphins suffered a morbillivirus infection (DMV) (see section 2.3.). However, as evident from the presented data, the number of striped dolphin strandings was even higher during 2003. It would be very interesting to follow up on this observation, primarily by analysis of tissue samples from some 2003-strandings in order to test for possible infection with DMV. The increase in the strandings of **bottlenose dolphins** during 2003 and 2005 is also noteworthy. As the striped dolphin, the bottlenose dolphin is also susceptible to DMV (Van Bressemer et al., 1999), and the increased strandings may indicate a DVM infection also of this species.
- Stranding rates in **SPAIN** show a considerable increase in 2003 with a peak in **2004**, followed by a slight decrease in 2005-2007. However, it should be noted that data from **2007** have still not been sent from some organizations/institutions working in Spanish Mediterranean. It is remarkable that the number of **striped dolphin** strandings in 2007 is approximately twice that of the other years, reflecting the **epizootic episode** due to DMV (see section 2.3.) (Raga et al., 2008). The number of unidentified cetaceans reported during 2004 was very high, being able to mask a possible increase of striped dolphin strandings similar to that which occurred in France during 2003. The number of strandings of



common dolphins during 2003 and 2004 was higher than that in the rest of the years, involving almost a hundred individuals per year. As this dolphin species also seems susceptible to DMV (Birkun et al., 1999; Van Bressem et al., 1999), the increased strandings may indicate a DVM infection. It is important to take this fact into account since common dolphins are endangered in the Mediterranean Sea (Bearzi et al., 2003, 2004). Again, it would be very interesting to analyse tissue samples from dolphins stranded in Spain during 2003-2004 in order to check for possible infection with DMV. Finally, the **stranding rate in the last five years is considerably higher** than in the period 2000-2002. Possible causes to this significant increase should be investigated in order to promote the conservation of these protected species (Notarbartolo di Sciara and Birkun, 2002; Prideaux, 2003; Reeves et al., 2003; Urquiola, 2004).

Central Mediterranean:

- In **TUNISIA**, the stranding number of **bottlenose dolphins** was increasing from 2002 to 2005. Although the number of implicated animals is low (six at maximum), it would be interesting to try to analyse the causes of the increase.

Eastern Mediterranean:

- In **GREECE**, the number of strandings of **bottlenose dolphins** was higher during 2000-2001 compared to those from 2002-2005. Stranding data from 2006 and 2007 should be analysed along with future data to help the conservation work regarding this dolphin species.
- No clear differences among years can be observed in the strandings numbers of **ISRAEL**.
- In contrast with what was occurring in the Western Mediterranean (data from France and Spain), the **striped dolphin** stranding rate in the Eastern Mediterranean (data from Israel and Greece) seems to have remained **stable**.

Black Sea:

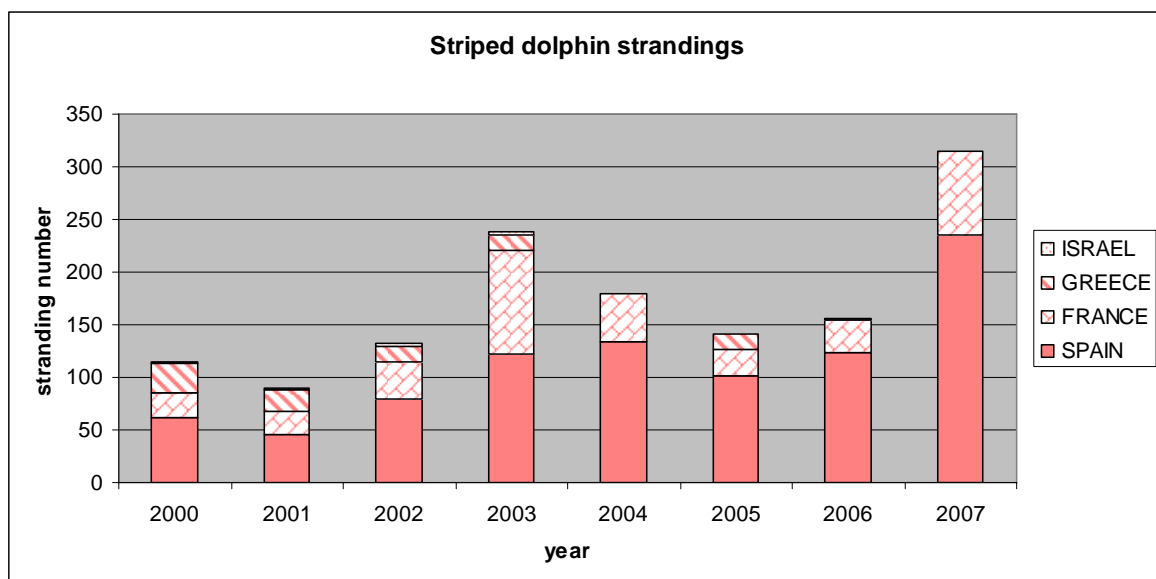
- Again in **2003**, a spectacular increase on strandings appears in **ROMANIA**, this time affecting **harbour porpoises**. It would be very interesting to check if a similar pattern also appears in other riparian countries of the Black Sea. The porpoise morbillivirus (PMV) likely caused the death of harbour porpoises of the northern Europe (Van Bressem et al., 1999). However, Müller et al. (2002) did not find clinical/immunohistological evidences for morbillivirus disease in harbour porpoises from the Black Sea, though serological data indicated the presence of antibodies against the virus.

In summary, an increase of the cetacean stranding number in the last years (2003-2007) have been detected in the **Western Mediterranean**, the high number of **striped dolphin** strandings being the main factor of this increase. A similar phenomenon has not been observed in Central or Eastern Mediterranean.

2.3. Special events

As shown in the previous section, an increase in the number of cetacean strandings has been detected in the last years in **Spanish Mediterranean coasts** and at the **coast of France and Corsica** (Western Mediterranean Sea). **Striped dolphins** were the most affected species. Figure 7 shows the trend of striped dolphin strandings in the last eight years along the Mediterranean basin. Two peaks can be observed, one in **2003** and other in **2007**, being the last year the highest. Moreover, the histogram clearly shows that the majority of the strandings occurred at the Western Mediterranean (France and Spain).

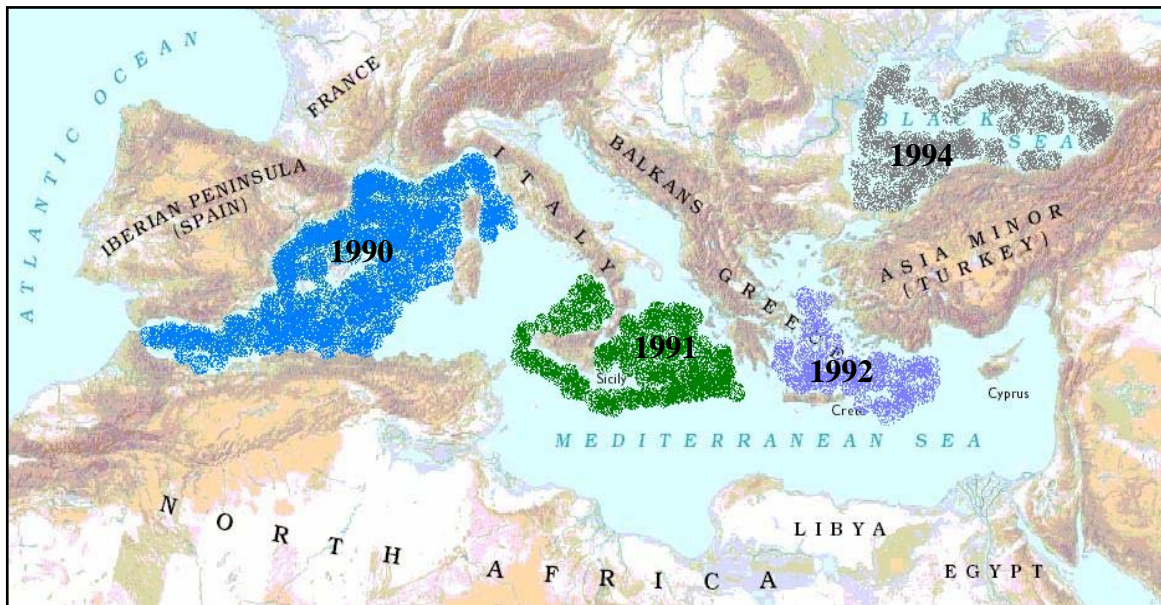
Figure 7. Striped dolphin stranding rate during the period 2000-2005/07. Note that the order of the subdivisions on each bar of the histograms follows in order in the legend, i.e. from up to down. Strandings from Greece for 2006-2007 are still not available.



Several diagnostic **analyses of tissues** from ten **striped dolphins** stranded along Spanish coast in **2007** were carried out in order to establish the cause of mortality. The associated pathologies and molecular evidence found in the majority of the animals were compatible with a **morbillivirus infection (DMV - Dolphin Morbillivirus)** (Raga et al., 2008). Some **pilot whales**, stranded at the Mediterranean coast of Spain during 2007, were also infected with this virus (Fernandez, 2008).

This is not the only epizootic episode suffered by Mediterranean cetaceans in the last two decades. During 1990-1992 the DMV killed thousands of striped dolphins in the Mediterranean Sea (Bortolotto et al., 1992; Di Guardo et al., 1992; Van Bressemer et al., 1993; Cebrian D., 1995; Domingo et al., 1995; Van Bressemer et al., 1999). The first affected dolphins were detected in the Gulf of Valencia (Spanish Mediterranean) in July 1990, but the die-off extended to the Central Mediterranean in 1991 and to the Eastern Mediterranean in 1992 (Aguilar and Raga, 1993) (see Figure 8). Moreover, in 1994 the epizootic affected to the common dolphins inhabiting the Black Sea (Birkun et al., 1999).

Figure 8. Progression of the epizootic episode suffered by striped dolphins from 1990-1992 in the Mediterranean and by common dolphins during 1994 in the Black Sea. Modified from Aguilar and Raga (1993) and Birkun et al. (1999).



Considering this past disease history, it may be **expected** that the present epizootic that some cetacean species are suffering in the Mediterranean, will behave as the one occurring in 1990-1992 and 1994. Therefore, an increase on cetacean strandings can be expected in the **Central and Eastern Mediterranean in 2008 and 2009**, respectively, and **probably in 2010-2011 in the Black Sea**.



3. COMMENTS/RECOMMENDATIONS

3.1. Objectives/advantages of MEDACES:

MEDACES is the first database on cetacean strandings in Europe that works in an international context. The main objectives of the database are presented in the following, as are the advantages related to each objective:

Objective 1: To join the stranding information from all the collaborating countries in a unique database, making it easier to search for cetacean stranding information from the Mediterranean and Black Sea environment.

Objective 2: To help homogenize the stranding protocol, providing information about the type of data and samples that are recommended to collect in each cetacean stranding.

Objective 3: To facilitate the contact among people working on cetaceans at the Mediterranean and Black Seas. The database joins also information about the organizations/institutions collaborating with MEDACES, including data of contact-persons.

Objective 4: To monitor the cetacean stranding rate at the Mediterranean basin and Black Sea. Acquired data are analysed annually by managers of the database in order to detect changes in the stranding numbers, and the results are presented in the MEDACES reports. All cetacean species are protected to some degree, being some of them endangered, and knowledge about stranding rates is a very important tool for their conservation.

Objective 5: To provide access to the different information that has been collected from each stranded animal. Beneath is shown the data requested by MEDACES database:

- ‘Basic data’:
 - Data directly related to the animal (species, length, sex, state of conservation of the carcass).
 - Data related with the stranding (locality, date and time of stranding, geographical position).
 - Data of the scientists and institutions that have collected the data.
- ‘Advanced data’:
 - Additional data such as information regarding to the health condition of the animal or signs of possible interactions with humans.
 - The type of samples collected from each animal (life history studies, like age determination or genetic studies, and health studies, like bacteriology, virology or parasitology).



The **MEDACES webpage** play a very important role for the fulfillment of these objectives, since it makes the needed information available to everyone interested in cetaceans. However, it should be emphasized that submitted data are protected by a Deontological Code.

Comments on the objectives/advantages:

Objectives 1, 3, 5:

One of the important advantages of the MEDACES database is the readily available information about contact-persons working with cetaceans in other institutions and countries, including their scientific interests (species, sample types, etc.). If you, as an example, are interested in obtaining genetic samples of striped dolphins in the entire Mediterranean basin, you only have to make a search through the web page and latter make contact (by e-mail) with each scientific/Institution that are working on cetacean strandings. The recent request to the Marine Zoology Unit (University of Valencia, Spain) made by Dr. Kerem (IMMRAC, Israel) to ask for data on bottlenose dolphin stranded at the Valencian Community, may serve as an example.

Objectives 1, 4:

- Data analysis presented in this current report has identified the occurrence of **abnormal stranding rates** in the Western Mediterranean in recent years. In fact, the present MEDACES report is the first to inform about the high number of strandings detected in France and Spain during 2003 and 2004. If possible, it would be very interesting to follow up on these observations, primarily by analysis of tissue samples from relevant strandings in order to test for possible infection with DMV. The 2007 die-off was reported on the MEDACES webpage (section 'News'-'Alert call', and 'Documents'-'Papers on strandings') already September 2007, and MEDACES will have a very important role in the follow-up of this current die-off.
- The fact that this kind of events can be reflected through **MEDACES web page** is an opportunity for scientists as well as competent staff of the different governments of the riparian countries, to set up an **emergency protocol to anticipate a possible die-off**. In addition, standardized methods for necropsies and tissue sampling, as well as coordination procedures can be prepared. Again, MEDACES is providing contact-information about relevant scientists and institutions, allowing fast and easy exchange of experience and advices.
- Finally, MEDACES offers the opportunity to **coordinate actions and efforts internationally** on cetacean strandings at the Mediterranean and Black Seas.



3.2. Weaknesses of MEDACES:

Weakness 1: A number of countries, with well established stranding networks and data collected during many years, unfortunately have not been collaborating with the MEDACES to this date.

Weakness 2: The main bulk of data received at MEDACES have belonged to the category 'Basic data'. Several organizations/institutions working in stranding networks at the Mediterranean and Black Seas, have reported that the task of fitting gathered stranding information, in particular 'Advanced data', into the MEDACES format is a huge work. This is especially relevant when several dozens or even hundreds of strandings occur in some regions.

3.3. Recommendations to improve MEDACES and participation levels:

Recommendation 1:

In every riparian country wishing to collaborate, the different National Focal Points should increase the support to the national organizations and institutions working in stranding networks. This should be conducted through the RAC/SPA or/and ACCOBAMS. As said above, to prepare data for sending to MEDACES, especially those related with the type of samples collected from each animal, means an extra work that most organizations /institutions probably can not assume by their own. This support could be in the way of a temporary contract for a person that during (e.g.) the first month of each year could prepare and send the complete data from the previous year. This recommendation will probably improve the participation level as well as the amount/type of data sent to MEDACES.

Recommendation 2:

To strengthen the monitoring of cetacean stranding rates at the Mediterranean and Black Seas by international support and promotion of different national stranding networks, as well as the collaboration with the MEDACES project. This is especially important in light of the probable current incipient epizootic episode. In the *Western Mediterranean*, it would be very interesting to improve participation of Morocco and Algeria in the MEDACES collaboration; in *Central Mediterranean*, only data from Tunisia are available in MEDACES, making it highly interesting to incorporate data from Italy, the Adriatic countries and Libya; in *Eastern Mediterranean*, more complete data from Turkey, Cyprus and Syria, and data from Egypt or Lebanon, would be very



welcome; at the *Black Sea*, data from more countries are necessary to estimate the stranding rates since only Romania are presently participating.

Recommendation 3:

In order to facilitate the access to MEDACES utilities, links to MEDACES from web-sites related to cetaceans or marine life could be established.

Recommendation 4:

The creation of a suggestion box in the MEDACES web-page would also improve the working of the database. With the aid of this tool, problems related with the function of the database or the web-page can be detected faster. Also it would be easier to receive more general questions/suggestions about MEDACES, its philosophy and objectives. It could be also a way to better know the real problems that each country/organization/institution are facing when sending data or joining MEDACES. The suggestion box tool could be included in the MEDACES web-page as a tool/function separate from 'Help & contacts' – hopefully making it more attractive and less serious to people, and in this way inviting to a smooth communication. Incoming suggestions could be included in a special section of the general MEDACES reports.

Recommendation 5:

In case that a specific country/organization/institution is aware of MEDACES but is not (yet) collaborating, an official meeting between this party and officers from ACCOBAMS and/or RAC/SPA, with the technical support of the MEDACES staff, is suggested. Such personal meetings would be very useful to determine the kind of difficulties country/organization/institutions have for joining MEDACES. The above mentioned 'suggestion box' could also be helpful in this way.

Recommendation 6:

In order to stimulate the participation of countries, both collaborating and non-collaborating, it could be useful to distribute e-mails from MEDACES at regular intervals, containing information about activities, news and special events occurring at the MEDACES context. Reminders for submission of data could also be issued.

Recommendation 7:

To improve the efficiency and dynamics of MEDACES and to disseminate the results obtained from the database, several actions are proposed:



- 7.1. **Data processing and dissemination.** Data analysis reported in the MEDACES reports may be added to the MEDACES webpage, such as the stranding trends and their interpretation, or the histograms showing the different cetacean species and the number of individuals stranded in each collaborating country. Other data analysis can be performed and presented at the webpage by the MEDACES staff, such as to calculate the male/female ratio, the percentage of pregnant females (if necropsy is done), the percentage/number of strandings per month/season, the number of dead cetaceans with signs of human interactions and the type of such interaction, etc. These analyses should be updated once a year or as often as necessary.
- 7.2. **Courses and conferences.** The MEDACES staff can offer technical support and collaboration in different courses/conferences organised by RAC/SPA and/or ACCOBAMS.
- 7.3. **International meetings.** To present the most important and significant activities of MEDACES, including the analysis of stranding data, at international meetings (European Cetacean Society Annual Conference, Biennial Conferences of the Society for Marine Mammalogy, etc.). This kind of contributions must be authored by all MEDACES contributors.

3.4. Additional comments/suggestions:

Comment 1: It has been proposed by some collaborators to include the **total length of stranded cetaceans** as an additional useful data in the MEDACES database. This data type is already being reported in some cases. If this addition will be approved by all collaborating organizations/institutions, it will add useful information about unidentified specimens. Also, for each species, it will be possible to establish the size range of the stranded specimens. For example, Raga et al. (2008) reported that juvenile striped dolphins have been more severely affected by the DMV infection in Valencian Community. Therefore, a monitoring of this phenomenon could be done through MEDACES in other localities.

Comment 2: Moreover, an **easier access and use of MEDACES data** for scientific works have also been proposed. In this case, a revision of the Deontological Code by ACCOBAMS-RAC/SPA would be necessary.



LIST OF REFERENCES

- Aguilar A., Raga J.A. (1993)** The striped dolphin epizootic in the Mediterranean Sea. *Ambio* 22(8):524-528.
- Bearzi G., Reeves R., Notarbartolo-Di-Sciara G., Politi E., Canadas A., Frantzis A., Mussi B. (2003)** Ecology, status and conservation of short-beaked common dolphins *Delphinus delphis* in the Mediterranean Sea. *Mammal Review*, 33(3): 224-252.
- Bearzi G., Notarbartolo di Sciara G., Reeves R.R., Cañadas A., Frantzis A. (2004)** Conservation Plan for short-beaked common dolphins in the Mediterranean Sea. ACCOBAMS, Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area. 90 pp.
- Birkun Jr., A., Kuiken, T., Krivokhizhin, S., Haines, D.M., Osterhaus, A.D.M.E., Van De Bildt, M.W.G., Joiris, C.R., Siebert, U. (1999)** Epizootic of morbilliviral disease in common dolphins (*Delphinus delphis ponticus*) from the Black Sea. *Veterinary Record*, 144 (4): 85-92.
- Bortolotto A., Casini L., Stanzani A.L. (1992)**. Dolphin mortality along the Southern Italian coast (June-September 1991). *Aquatic Mammals*, 18:56-60.
- Cebrian D. (1995)** The striped dolphin *Stenella coeruleoalba* epizootic in Greece, 1991-1992. *Biological Conservation*, 74 (2): 143-145.
- Di Guardo, G., Agrimi, U., Amaddeo, D., McAliskey, M., Kennedy, S. (1992)** Morbillivirus infection on a striped dolphin (*Stenella coeruleoalba*) from the coast of Italy. *Veterinary Record*, 130: 579-580.
- Domingo M., Vilafranca M., Visa J., Prats N., Trudgett A., Visser I. (1995)** Evidence for chronic morbillivirus infection in the mediterranean striped dolphin (*Stenella coeruleoalba*). *Veterinary Microbiology* 44:229-239.
- Fernandez, A., Esperon, F., Herraez, P., Espinosa, A., Clavel, C., Bernabe, A., Sanchez-Vizcaino, J., Verborgh, P., De Stephanis, R., Toledano, F., Bayon, A. (2008)** Pilot whales (*Globicephala melas*) mortality due to Morbillivirus in the Mediterranean Sea. *Emerging Infectious Diseases*. In press.
- Geraci, J.R. and Lounsbury, V.J. (1993)** *Marine Mammals Ashore: a field guide for strandings*. Texas A&M Sea Grant Publication, 305 pp. (electronic version in CD Rom, NOAA and National Aquarium in Baltimore).
- Müller, G., A. Wünschmann, W. Baumgärtner, A. Birkun, A. Komakhidze, T. Stanev, C.R. Joiris (2002)** Immunohistological and serological investigations of morbillivirus infection in Black Sea harbour porpoises (*Phocoena phocoena*). *Veterinary Microbiology*, 87: 183–190.
- Notarbartolo di Sciara, G. (2002)** Cetacean species occurring in the Mediterranean and Black Seas. In: G. Notarbartolo di Sciara (Ed.), *Cetaceans of the Mediterranean and Black Seas: state of knowledge and conservation strategies*. A report to the ACCOBAMS Secretariat, Monaco, February 2002. Section 3, 17p.
- Notarbartolo di Sciara, G., Birkun, A. (2002)** Conservation needs and strategies. In: G. Notarbartolo di Sciara (Ed.), *Cetaceans of the Mediterranean and Black Seas: state of knowledge and conservation strategies*. A report to the ACCOBAMS Secretariat, Monaco, February 2002. Section 18, 21p.
- Prideaux M. (2003)** *Conserving cetaceans: the Convention on Migratory Species and its relevant Agreements for cetacean conservation*. WDCS, Munich, Germany. 24 pp.
- Raga, J.A., A. Banyard, M. Domingo, M. Corteyn, M.F. Van Bresseem, M. Fernández, F.J. Aznar, T. Barrett (2008)** Dolphin Morbillivirus Epizootic Resurgence, Mediterranean Sea. *Emerging Infectious Diseases*, 14 (3): 471-473.



- Reeves R.R., Smith B.D., Crespo E.A., Notarbartolo di Sciara G. (2003)** Dolphins, Whales and Porpoises: 2002-2010 Conservation Action Plan for the World's Cetaceans. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. 139 pp.
- Urquiola, E. (2004)** 1. Introducción. In: Proyecto Mediterráneo. Zonas de especial interés para la conservación de los cetáceos en el Mediterráneo español. J. A. Raga y J. Pantoja (Eds.), Naturaleza y Parques Nacionales Serie técnica. Ministerio de Medio Ambiente. pp: 7-14.
- Van Bresse, M.F., I. K. G. Visser, R. L. De Swart, C. Örvell, L. Stanzani, E. Androukaki, K. Siakavara and A. D. M. E. Osterhaus (1993)** Dolphin morbillivirus infection in different parts of the Mediterranean Sea. Archives of Virology, 129: 235-242.
- Van Bresse, M.F., K. Van Waerebeek, J.A. Raga (1999)** A review of virus infections of cetaceans and the potential impact of morbilliviruses, poxviruses and papillomaviruses on host population dynamics. Diseases of Aquatic Organisms, 38: 53-65.