



RAC/SPA



ACCOBAMS

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



UNIVERSITAT DE VALÈNCIA

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

- Department of Biology-Chemistry, Faculty of Natural science, University of Shkodra (**Albania**)
- Institute of Fish Resources, Varna (**Bulgaria**)
- Faculty of Veterinary Medicine, University of Zagreb; Blue World Institute of Marine Research and Conservation; State Institute for Nature Protection (SINP) (**Croatia**)
- Centre de Recherche sur les Mammifères Marins de la Rochelle (CRMM) ; Groupe d'Etude des Cétacés de Méditerranée (**France**)
- ARION-Cetacean Rescue & Rehabilitation Research Centre (**Greece**)
- Israel Marine Mammals Research and Assistance Center (IMMRAC) (**Israel**)
- Marine Conservation, Nature Conservation Department, Environment General Authority (**Libya**)
- ACCOBAMS (**Monaco**)
- “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; General Establishment of Fisheries in Syria (**Syria**)
- Faculté des Sciences de Sfax; Institut National des Sciences et Technologie de la Mer - INSTM (**Tunisia**)
- Turkish Marine Research Foundation; Underwater Research Society (SAD)-Marine Mammal Research Group (DEMAG) (**Turkey**)

**July 2009**



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## 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, 2005; Peltier et al., 2009).

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**) (Spain), with the financial support of the Spanish

Ministry of the Environment and Rural and Marine Affairs (MARM) (<http://www.marm.es>). 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>) are both 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.

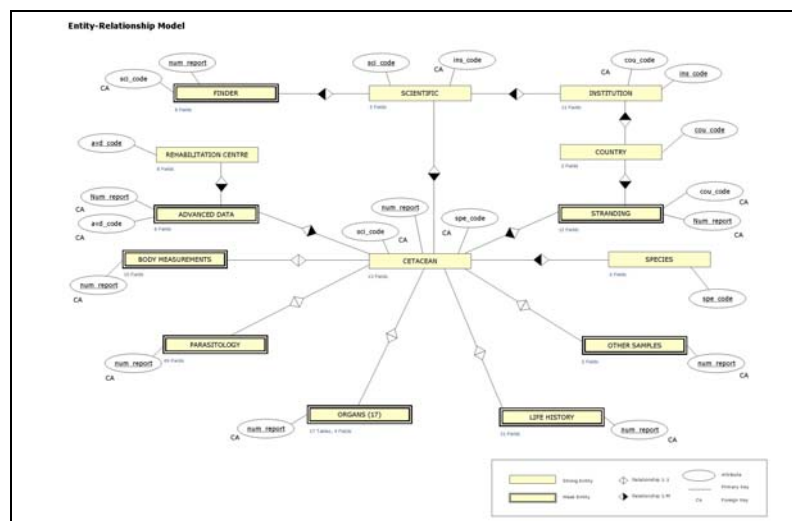


Figure 1. Structure and characteristics of the MEDACES database.



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 (Figure 2).
- The section ‘Collaborators’ (from ‘About MEDACES’) has been updated with the Organizations/Institutions collaborating and sending their data to MEDACES.
- A new section has been created in order to post MEDACES progress reports online.
- The database has been updated with the last records available.
- The section ‘Data-Dataset’, that show the stranding data on maps, has been updated with the available data and the collaborating countries (Figure 3).



MEDACES  
Mediterranean Database of Cetacean Strandings

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**News**

**Events**

VII European Seminar on Marine Mammals: Biology and conservation  
Universidad Internacional Menéndez Pelayo  
Valencia, Spain  
September 15th - 19th, 2008  
Info: [TRIPITICO Seminar Marine mammals 2008.pdf](#)

23rd Conference of the European Cetacean Society  
Turkish Marine Research Foundation  
Istanbul, Turkey  
2-4 March 2009  
Info: <http://www.tudav.org/ecs2009/>

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**News**

**Media**

[The Royal Navy has denied sonar noise from warships caused whales to strand themselves on beaches.](#)  
BBC News Online environment correspondent (Friday, 18 April 2008)

[Thousands of striped dolphins died from an epidemic in the Mediterranean](#)  
La Vanguardia.es (Monday, 1 October 2007) (in Spanish)

[The high number of dolphins deaths along the Valencian coast activates the emergency plan](#)  
Informacion.es (Monday, 1 October 2007) (in Spanish)

[Alert in the presence of a possible mortal epidemic among the Mediterranean dolphins](#)  
El mundo.es (Tuesday, 28 August 2007) (in Spanish)

[Twenty dolphins killed this summer by an infectious disease in the Valencian Community \(Spain\)](#)  
Lasprovincias.es (Saturday, 25 August 2007) (in Spanish)

[U.S. Navy Sonar May Harm Killer Whales, Expert Says](#)  
National Geographic News (Wednesday, 31 March 2004)

[Fishing ban call to save dolphins](#)  
BBC News Online environment correspondent (Friday, 30 January 2004)

[Towards a total prohibition of drift nets in the Mediterranean Sea](#)  
SECEM Groupe d'Etude des Cétacés En Méditerranée (Sunday, 14 December 2003)

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**Documents**

**Papers on strandings**

[Morbillivirus and Pilot Whale Deaths, Mediterranean Sea.](#)  
A. Fernández, F. Esperón, P. Herraéz, A. Espinoza de los Monteros, C. Clavel, A. Barnabé, J. M. Sánchez-Vizcaino, P. Verborgh, R. DeStephanis, F. Toledano, A. Bayón. *Emerging Infectious Diseases* • [www.cdc.gov/eid](http://www.cdc.gov/eid) • Vol. 14, No. 5, May 2008

[Genetic variation and population structure of western Mediterranean and northern Atlantic \*Stenella coeruleoalba\* populations inferred from microsatellite data](#)  
V.J.R. Bourret, M.R.J.M. Macé, B. Crouau-Roy *Journal of the Marine Biological Association of the United Kingdom*, Vol. 87, p. 265-269, 2007.

[Influence of environmental factors on small cetacean distribution in the Spanish Mediterranean.](#)  
A. Gómez de Sagura, P.S. Hammond, J.A. Raga *Journal of the Marine Biological Association of the United Kingdom*, p. 1-9, 2008 ;

[Seasonal variation of striped dolphins, fin- and sperm whales' abundance in the Ligurian Sea \(Mediterranean Sea\)](#)  
S. Laran, V. Drouot-Dulau *Journal of the Marine Biological Association of the United Kingdom*, Vol. 87, p. 345-352, 2007.

[Partitioning of the Pelagos Sanctuary \(north-western Mediterranean Sea\) into hotspots and coldspots of cetacean distributions.](#)  
Aurélie Moulins, Massimiliano Rosso, Marco Ballardini and Maurizio Würtz *Journal of the Marine Biological Association of the United Kingdom*, p. 1-9, 2008.

[Panel quits in row over sonar damage.](#)  
R. Dalton. *Nature*. Vol. 439, 376-377, 26 January 2006.

[Dolphin Morbillivirus Epizootic Resurgence, Mediterranean Sea.](#)  
J.A. Raga, A. Banyard, M. Domingo, M. Corteyn, M.F. Van Bresseem, M. Fernández, F.J. Aznar, T. Barrett. *Emerging Infectious Diseases* • [www.cdc.gov/eid](http://www.cdc.gov/eid) • Vol. 14, No. 3, March 2008.

[REAL DECRETO 1727/2007, de 21 de diciembre, por el que se establecen medidas de protección de los cetáceos.](#)

Figure 2. Update of the section 'News' ('Events' y 'Media') and 'Documents' from the MEDACES web-page.

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**Data**

MEDACES  
Mediterranean Database of Cetacean Strandings

**Dataset**

[All cetacean strandings](#)

[Balenoptera acutorostrata](#)

[Balenoptera borealis](#)

[Balenoptera physalus](#)

[Delphinus delphis](#)

[Eubalaena glacialis](#)

[Globicephala melas](#)

[Grampus oriseus](#)

[Kogia sima](#)

[Megaptera novaeangliae](#)

[Mesoplodon densirostris](#)

[Orcinus orca](#)

[Phocoena phocoena](#)

[Physeter macrocephalus](#)

[Pseudorca crassidens](#)

[Stenella coeruleoalba](#)

[Steno bredanensis](#)

[Tursiops truncatus](#)

[Undetermined whales](#)

[Ziphius cavirostris](#)

**Top**

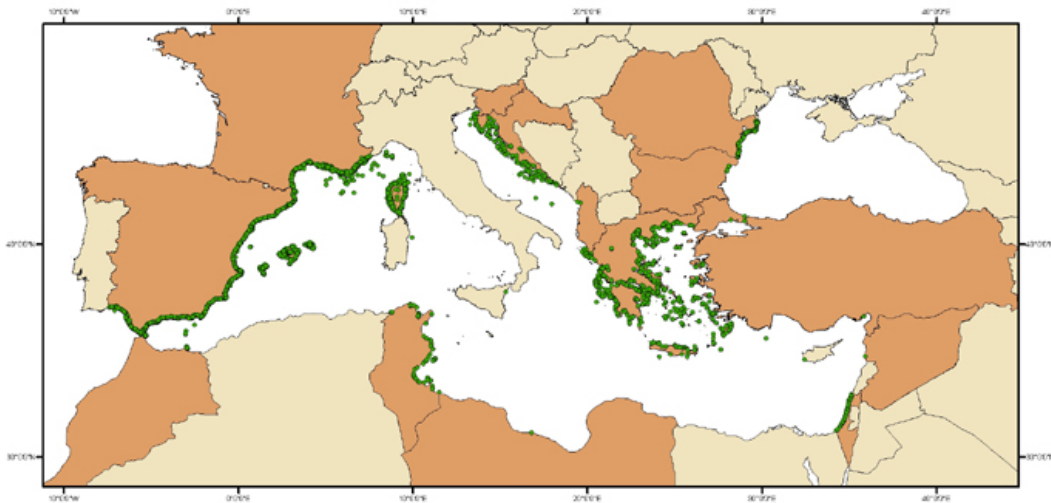


Figure 3. Update of the section 'Data set' ('Data') from MEDACES web-page where available cetacean stranding maps can be seen.



#### **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, Bulgaria, Croatia, France, Greece, Israel, Libya, Monaco, Morocco, Romania, Slovenia, 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)

#### Bulgaria

- Institute of Fish Resources (Varna)

#### Croatia

- Blue World Institute of Marine Research and Conservation
- Faculty of Veterinary Medicine, University of Zagreb
- State Institute for Nature Protection (SINP)

#### France

- Groupe d'Etude des Cétacés de Méditerranée (Marseille)
- Centre de Recherche sur les Mammifères Marins de la Rochelle (CRMM)

#### Greece

- ARION-Cetacean Rescue & Rehabilitation Research Centre (Petroupolis)
- 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)

#### Libya

- Marine Conservation, Nature Conservation Department, Environment General Authority

#### Monaco

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



### 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)

### 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)
- General Establishment of Fisheries in Syria

### Tunisia

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

### Turkey

- Turkish Marine Research Foundation (Istanbul)
- Underwater Research Society (SAD)-Marine Mammal Research Group (DEMAG)



## 2.2. Stranding data

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

**Fifteen 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 **7,796** strandings are registered in the MEDACES database.

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

<b>COUNTRY</b>	<b>YEARS</b>	<b>NUMBER OF STRANDING DATA (%)</b>
Albania	2005	2 (0.03)
Bulgaria	2009	4 (0.05)
Croatia	1990-2008	191 (2.45)
France	1968-2008	1,876 (24.06)
Greece	1944-2006	1,175 (15.07)
Israel	1993-2008	147 (1.89)
Libya	2009	1 (0.01)
Monaco	1989-2008	7 (0.09)
Morocco	2005	1 (0.01)
Romania	2002-2008	375 (4.81)
Slovenia	2004-2008	4 (0.05)
Spain	1960-2008	3,897 (49.99)
Syria	2005	1 (0.01)
Tunisia	1941-2008	110 (1.41)
Turkey	2000-2002	5 (0.06)
	<b>TOTAL</b>	<b>7,796</b>

Figure 4 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 5 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.

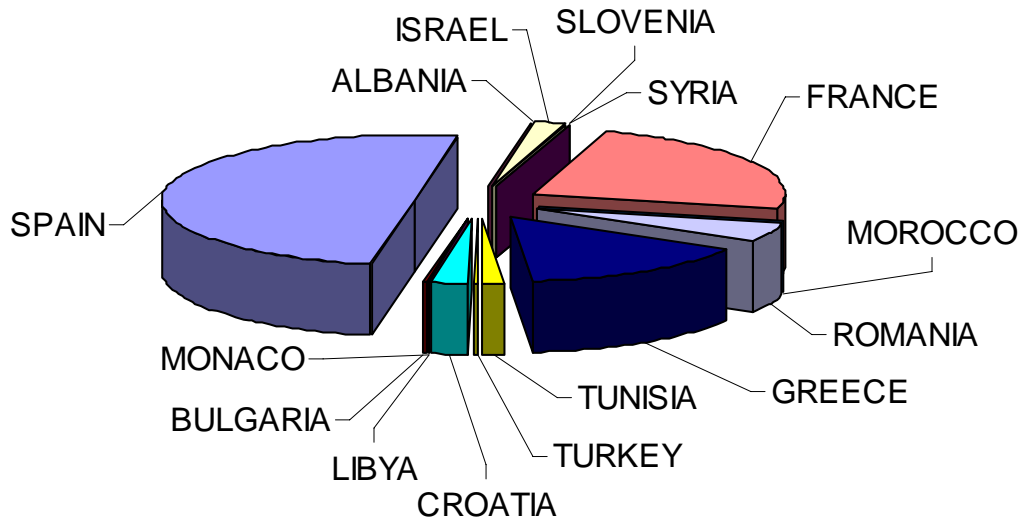


Figure 4. Contribution of each country to MEDACES.

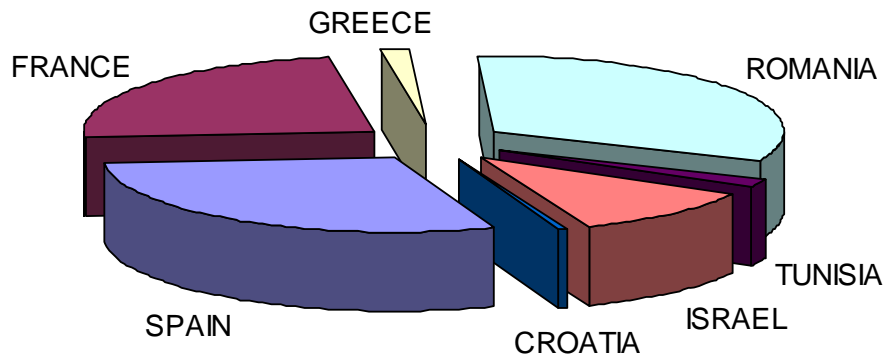


Figure 5. Contribution of several countries corrected for the length of coastline.

### 2.2.2. Distribution of strandings

Figure 6 shows the distribution of the strandings registered in MEDACES. The countries contributing with data to MEDACES are shown in darkened colour.

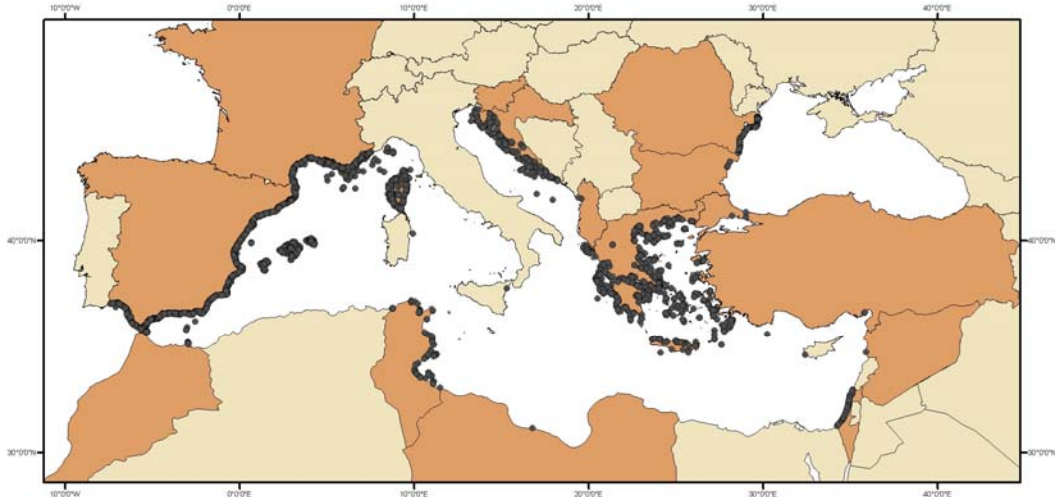


Figure 6. Location of the cetacean strandings along the Mediterranean and Black Sea coast of the collaborating countries, using the data collected so far.

### 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 Figure 7): 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: 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*), pygmy sperm whale (*Kogia breviceps*) 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 and Portugal), strandings of several typically Atlantic species appear concentrated in this area, such as minke whale (*Balaenoptera acutorostrata*) and harbour porpoise (*Phocoena phocoena*). In the



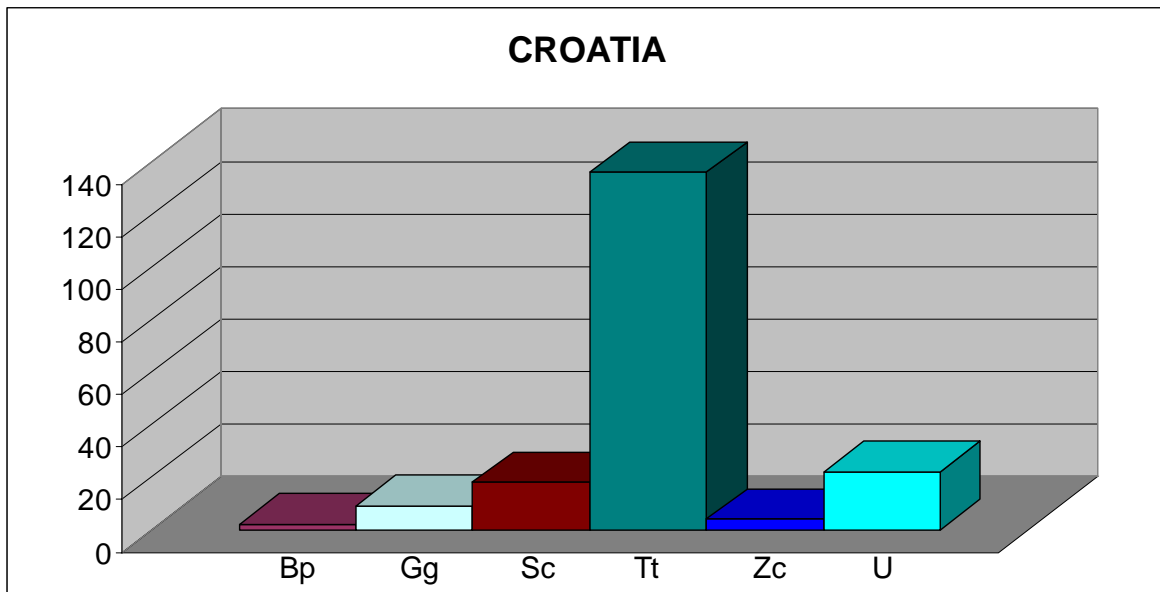
**Black Sea** (data from Bulgaria and Romania), three cetacean species appear in strandings (Figure 7): *D. delphis*, *T. truncatus* and *P. phocoena*. The latter species is the most commonly stranded in this region. Some strandings of this species occurs also in Mediterranean waters contiguous to the Black Sea (Northern Greek waters).

The following graphics (Figure 7) 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.

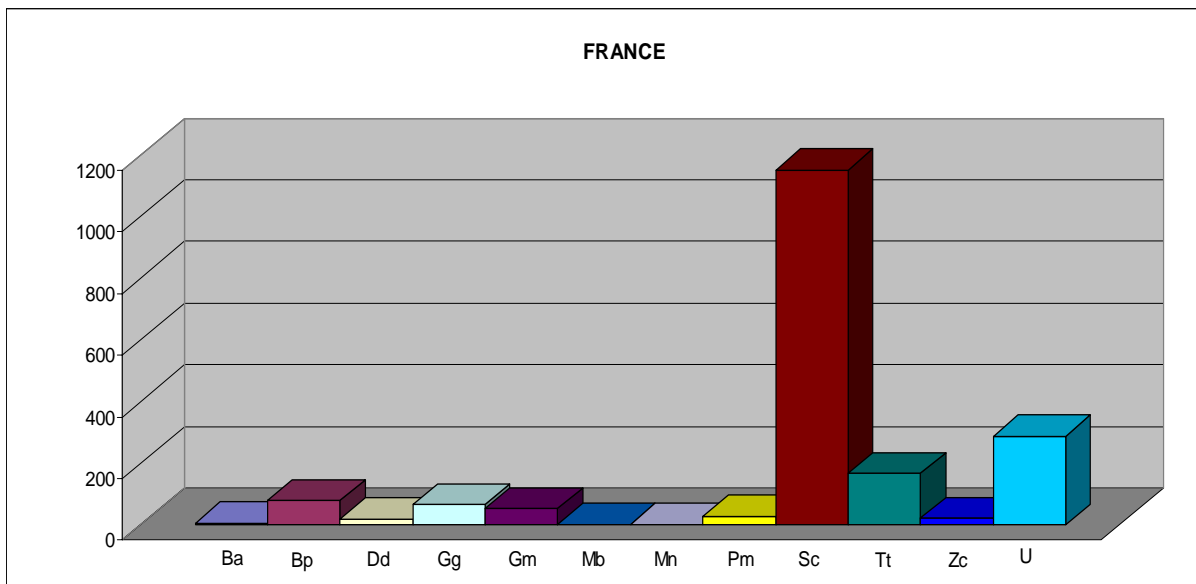
**ALBANIA:** 2 *Tursiops truncatus*.

**BULGARIA:** 4 *Tursiops truncatus*

**CROATIA:**

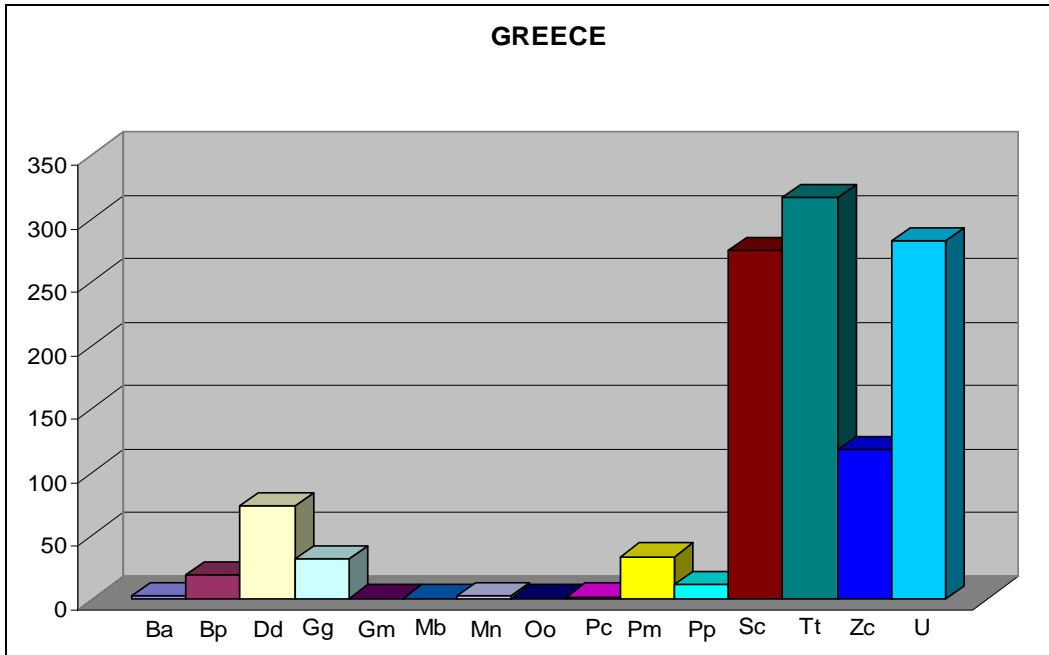


**FRANCE:**

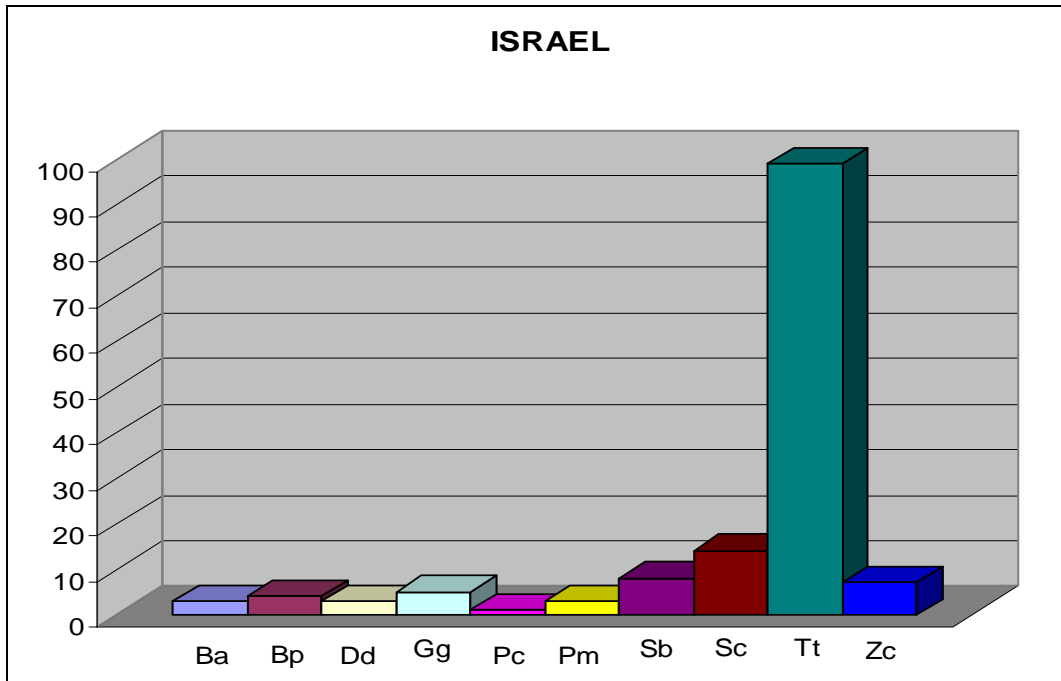




**GREECE:**



**ISRAEL:**



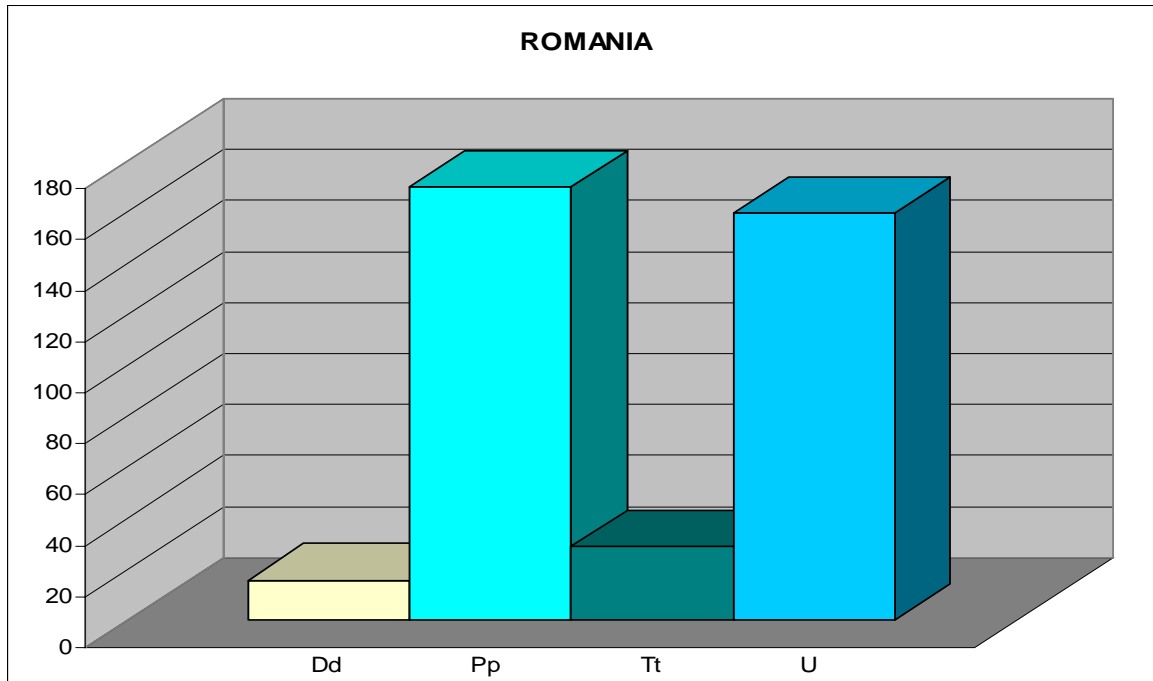
**LIBYA:** 1 *Balaenoptera physalus*

**MONACO:** 6 *Stenella coeruleoalba* and 1 unidentified cetacean

**MOROCCO:** 1 *Balaenoptera* spp.

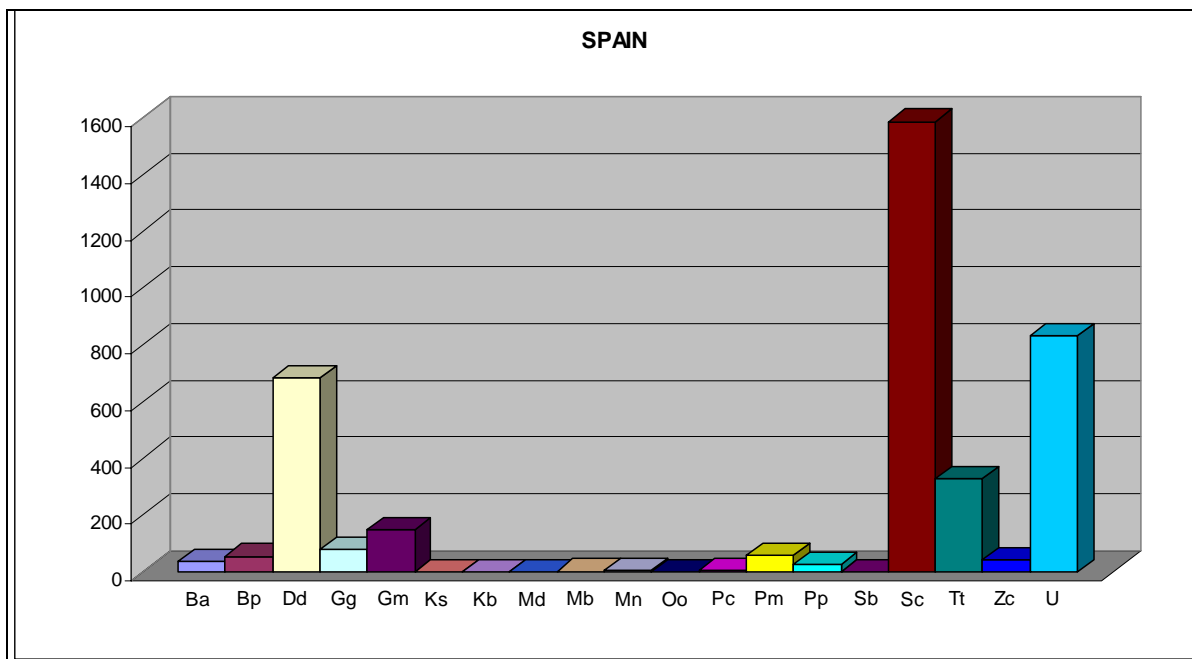


**ROMANIA:**



**SLOVENIA:** 4 *Tursiops truncatus*

**SPAIN:**



**SYRIA:** 1 unidentified cetacean.



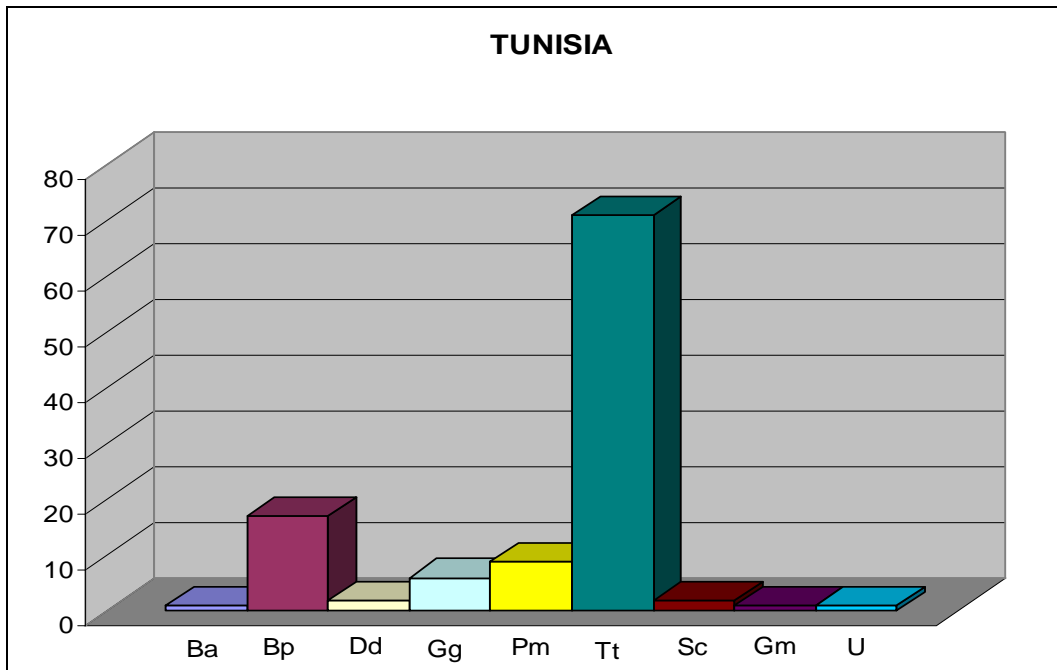
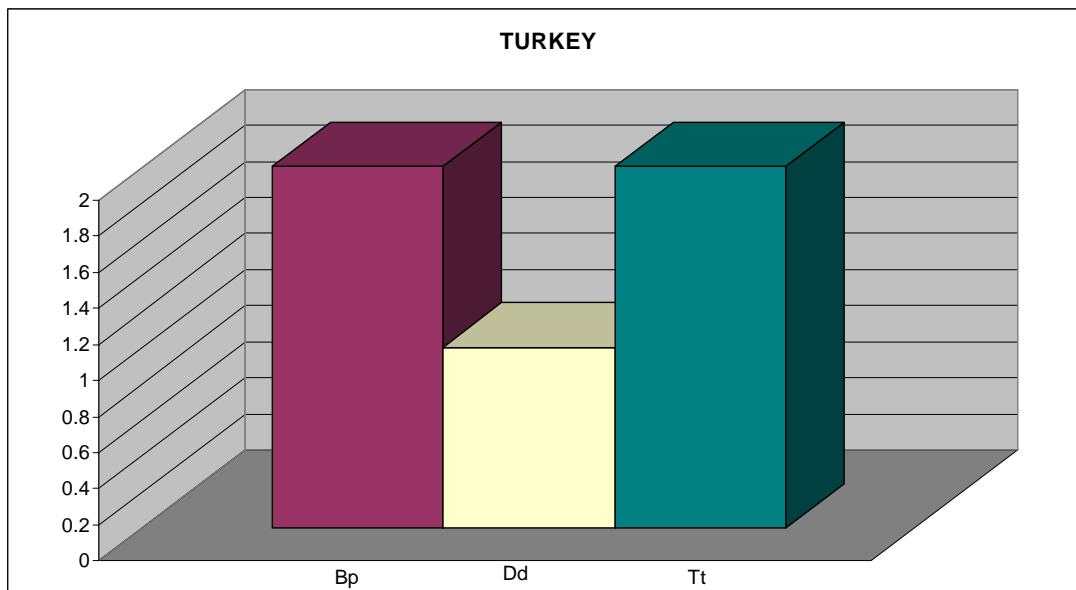
**TUNISIA:****TURKEY:**

Figure 7. 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*; Kb, *Kogia breviceps*; Ks, *Kogia sima*; Mb, *Mesoplodon bidens*; 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.

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 7.

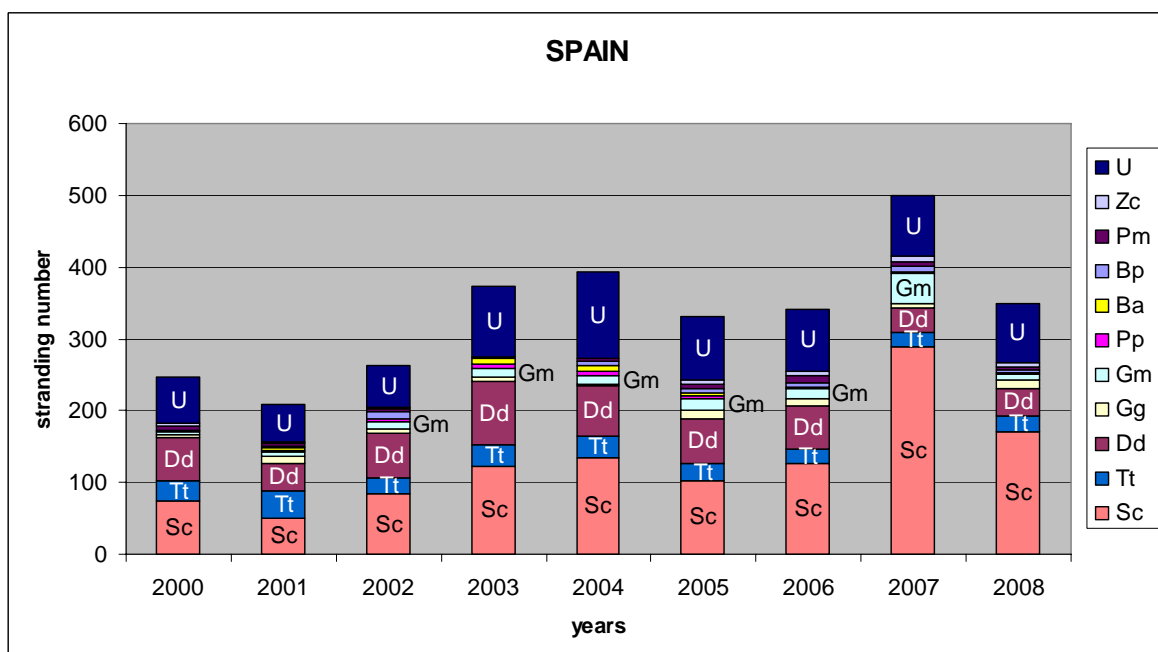
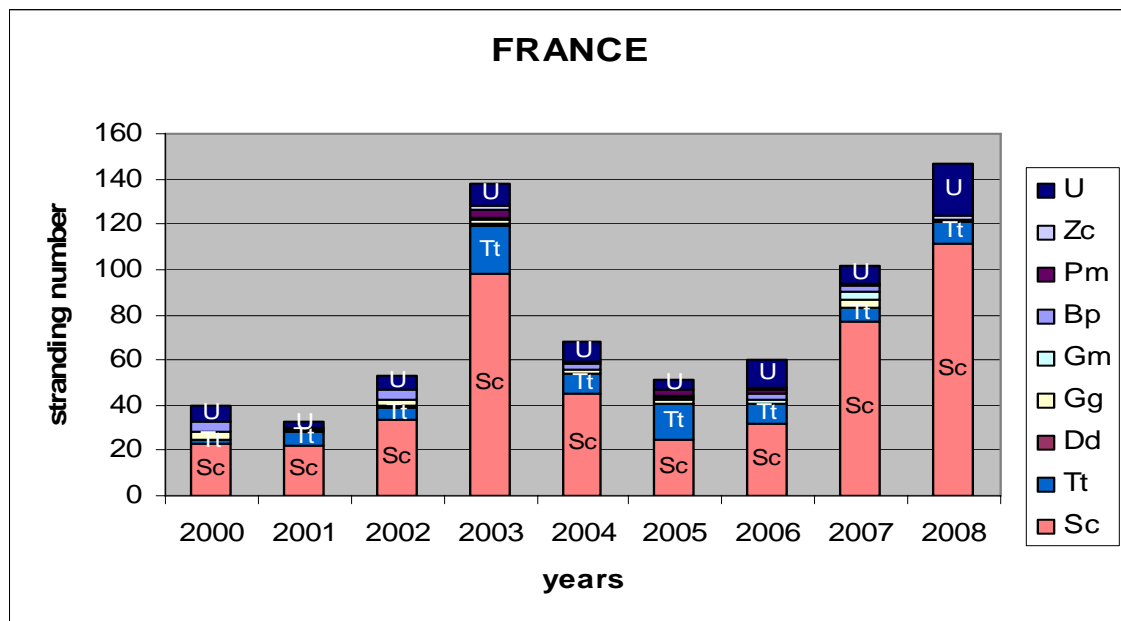
<b>CETACEAN SPECIES</b>	<b>ALBANIA</b>	<b>BULGARIA</b>	<b>CROATIA</b>	<b>FRANCE</b>	<b>GREECE</b>	<b>ISRAEL</b>	<b>LIBYA</b>	<b>MONACO</b>	<b>MOROCCO</b>	<b>ROMANIA</b>	<b>SLOVENIA</b>	<b>SPAIN</b>	<b>SYRIA</b>	<b>TUNISIA</b>	<b>TURKEY</b>
<b>Ba</b>				6	3	3						38		1	
<b>Bp</b>			2	79	19	4	1					55		17	2
<b>Mn</b>				1	3							6			
<b>Pm</b>				27	34	3						59		9	
<b>Ks</b>												1			
<b>Kb</b>												1			
<b>Zc</b>			4	21	118	7						44			
<b>Mb</b>				2	1							2			
<b>Md</b>												1			
<b>Oo</b>					1							1			
<b>Pc</b>					2	1						5			
<b>Gm</b>				52	1							147		1	
<b>Gg</b>			9	64	32	5						80		6	
<b>Dd</b>				19	74	3				16		682		2	1
<b>Sc</b>			18	1151	275	14		6				1587		2	
<b>Tt</b>	2	4	136	166	317	99				29	4	327		71	2
<b>Sb</b>						8						1			
<b>Pp</b>					12					170		26			
<b>U</b>			22	288	283			1	1	160		834	1	1	
<b>TOTAL</b>	<b>2</b>	<b>4</b>	<b>191</b>	<b>1876</b>	<b>1175</b>	<b>147</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>375</b>	<b>4</b>	<b>3897</b>	<b>1</b>	<b>110</b>	<b>5</b>

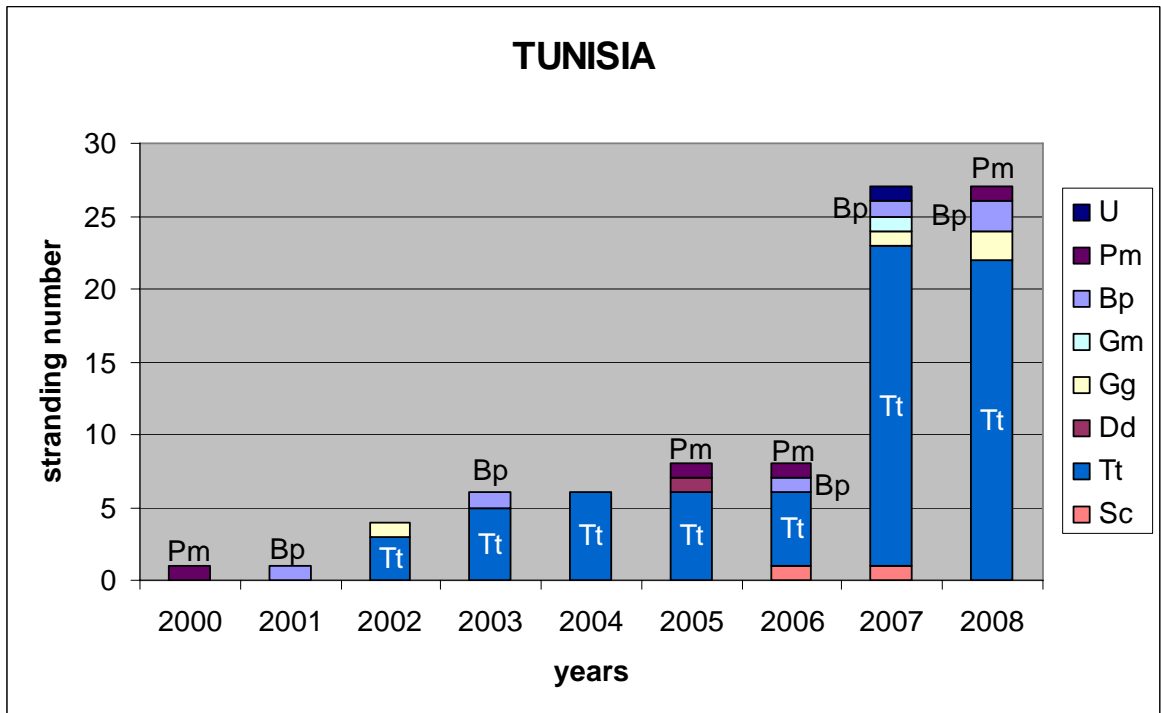
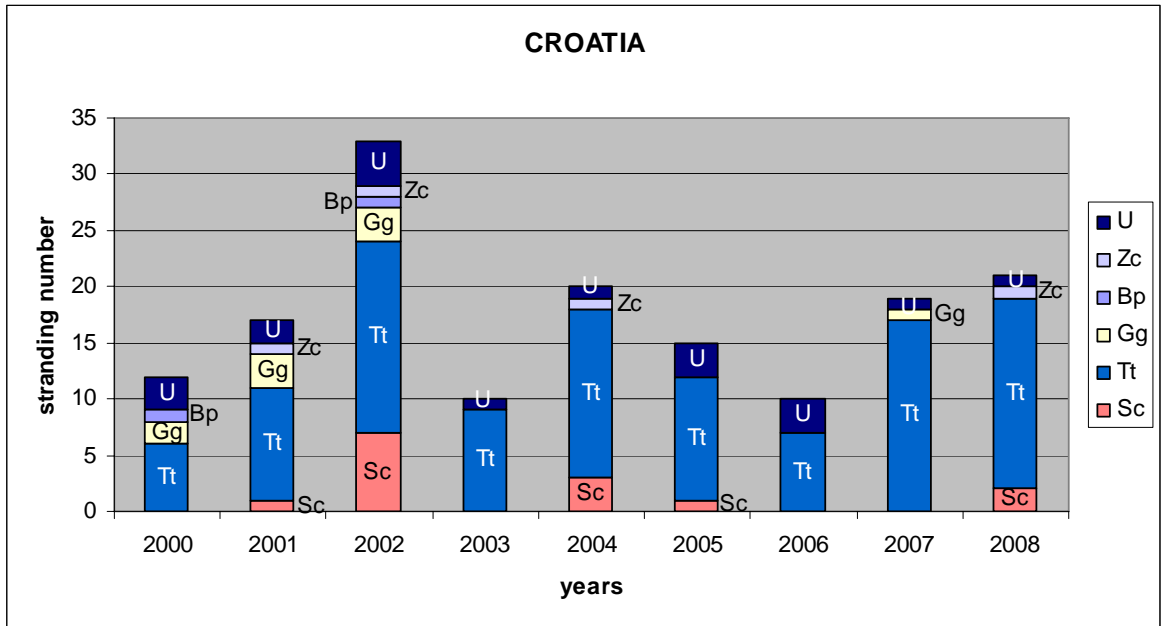
Comparing countries with more than ten stranding data submitted to MEDACES, it can be observed that Spain has the highest **species diversity** regarding strandings with 18 species (which is probably related to the influence of the Atlantic Ocean). Greece follows with 14 species, France 11, Israel 10, Tunisia 8, Croatia 6 and Romania with 3 species (Figure 7 and Table 2).

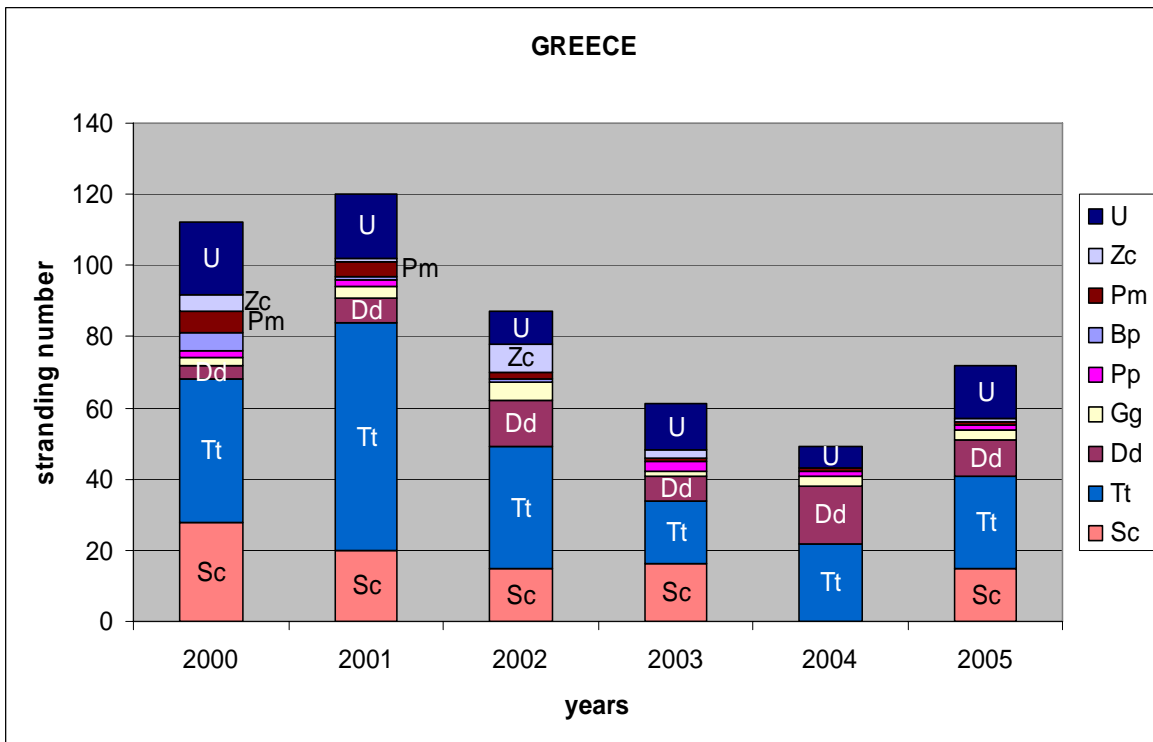
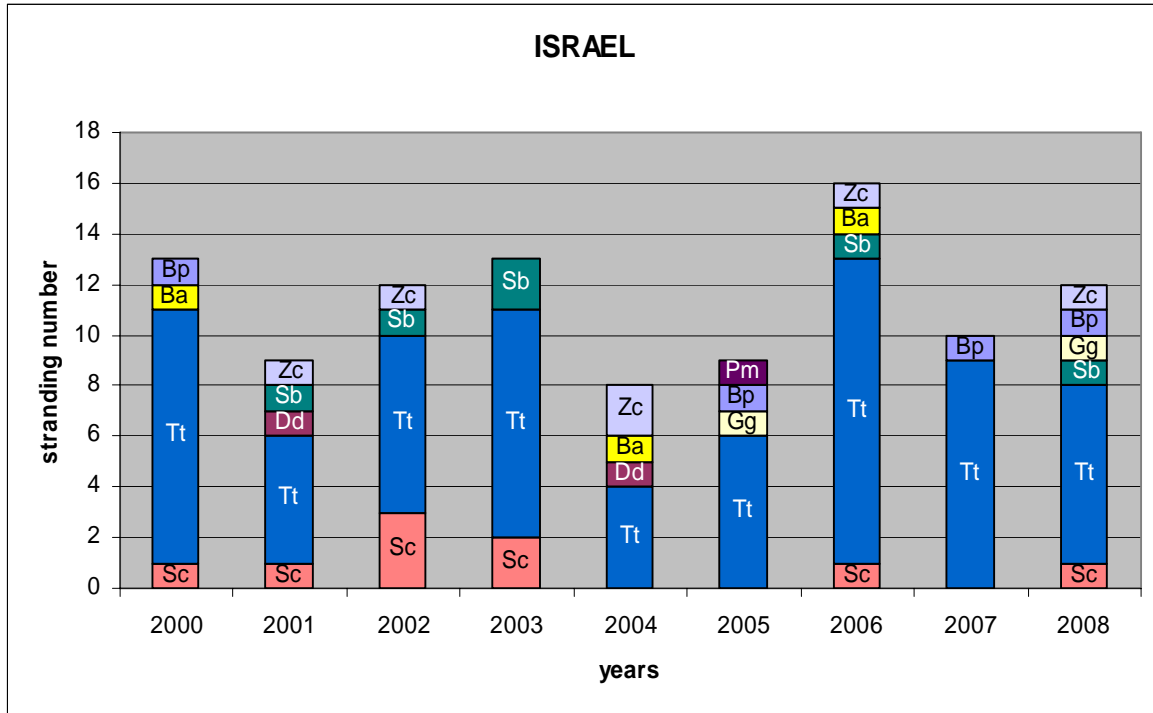
The number of strandings and the diversity of cetacean species stranded along the coast of Tunisia have increased during the last 3 years (2006-2008) (Figure 8). During 2007-2008 the increase in stranding numbers is related with a considerable increase in bottlenose dolphin strandings (more than 3 folds than previous years). Regarding the increase in diversity, in 2006-2007 striped dolphin and long-finned pilot whale strandings have been reported for the first time along Tunisian coast according to MEDACES data. These dates and species correspond with the epizootic episode suffered by these two species in 2007 (see section 2.3).

### 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 8 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 2000-2008 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.







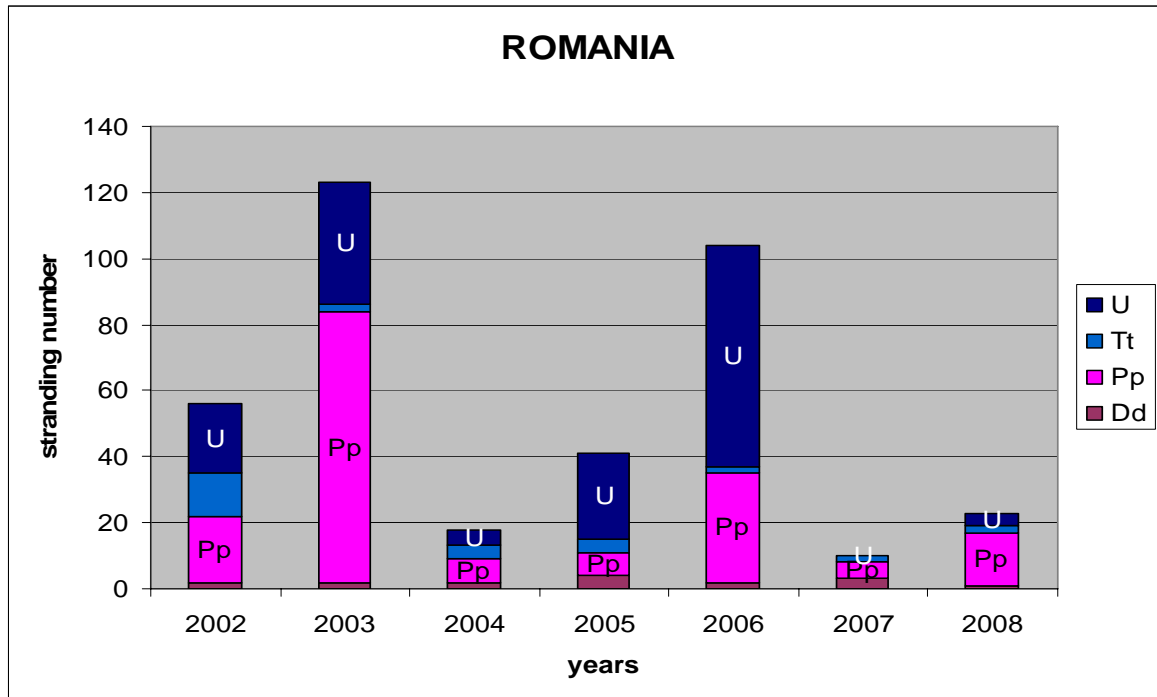


Figure 8. Cetacean stranding rate in seven riparian countries during the period 2000-2008. Note that the order of the subdivisions on each bar of the histograms follows the order of the legend, i.e. from up to down. Abbreviations: U, unidentified species; Zc, *Ziphius cavirostris*; Pm, *Physeter macrocephalus*; 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*.

A number of relevant observations can be made from the stranding rate data presented in Figure 8:

#### Western Mediterranean:

- Two stranding peaks appear in **FRANCE**, one in **2003** and another in **2008**, with a smaller peak in **2007**. In 2003 and 2008, 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 2007-2008 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 very similar 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 Bressem et al., 1999), and the increased strandings may indicate a DVM infection also of this species.
- Stranding rate in **SPAIN** shows marked fluctuations during the last years, varying from about 200 strandings in 2001 to more than twice in 2007. The striped dolphin stranding rate follows these fluctuations probably because it is the most abundant species in the area. A considerable increase in the total stranding numbers can be noticed as of 2003, with a peak in **2004** and a higher one in **2007**. 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). During 2007, an increase in the **long-finned pilot whale** stranding number was also detected, being about twice that of the other years. As shown in section 2.3, some of these animals were infected with the same virus affecting striped dolphins (Fernández 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. Stranding cetacean numbers in 2008 seem to be similar to 2005-2006, decreasing substantially from 2007, probably showing a recovery of the 'normal' stranding rate, although the striped dolphin stranding number appears still slightly higher. Finally, the **stranding rate in the last six 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:

- Stranding data from **CROATIA** registered in MEDACES are the only available data from Adriatic Sea so far. The stranding rate fluctuates among years, but a peak can be seen in 2002. During this year the stranding numbers of several species increased, especially for striped and bottlenose dolphin. However, due to the relative few number of involved animals none conclusion can be done. Bottlenose dolphin is the species with more strandings reported for the period 2000-2008, probably showing its abundance in the area.





- In **TUNISIA**, the number of cetacean strandings has increased sharply in the last 2 years (2007-2008), being bottlenose dolphin strandings the main reason of this increase (more than 3 folds than previous years). This increase could be due to an improvement in the stranding network of the country, but it is worth to investigate the possible causes of these strandings in order to check possibles hazards and threats affecting to this protected species. The diversity of species stranded has also risen in 2006-2007: striped dolphin and long-finned pilot whale strandings have been repoted for the first time along Tunisian coast according to MEDACES data during these 2 years. This event coincides with the epizootic episode suffered by these 2 species in 2007.

#### 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 2008 should be analysed along with future data to help the conservation work regarding this dolphin species. Moreover, stranding data of striped dolphins during these years would help to follow the development of the current epizootic episode.
- No clear differences among years can be observed in the strandings numbers of **ISRAEL**. Bottlenose dolphin is the more common stranded species, probably because it is the most abundant cetacean in the area.

#### Black Sea:

- Again in **2003**, a spectacular increase on cetacean strandings appears in **ROMANIA**, this time affecting **harbour porpoises**. During **2006**, another peak appears affecting to more than one hundred cetaceans, however, there are a very high percentage of unidentified specimens, although an increase in harbour porpoise strandings can be observed. 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 Bressemer et al., 1999). However, Müller et al. (2002) did not found clinical/immunohistological evidences for morbillivirus disease in harbour porpoises from the Black Sea, though serological data indicated the presence of antibodies against the virus.

### 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 9 shows the trend of striped dolphin strandings in the last nine years along the Mediterranean basin. Two peaks can be observed, one in **2003** and other in **2007-2008**, being the latter the highest. Moreover, the histogram clearly shows that the majority of the strandings occurred at the Western Mediterranean (France and Spain).

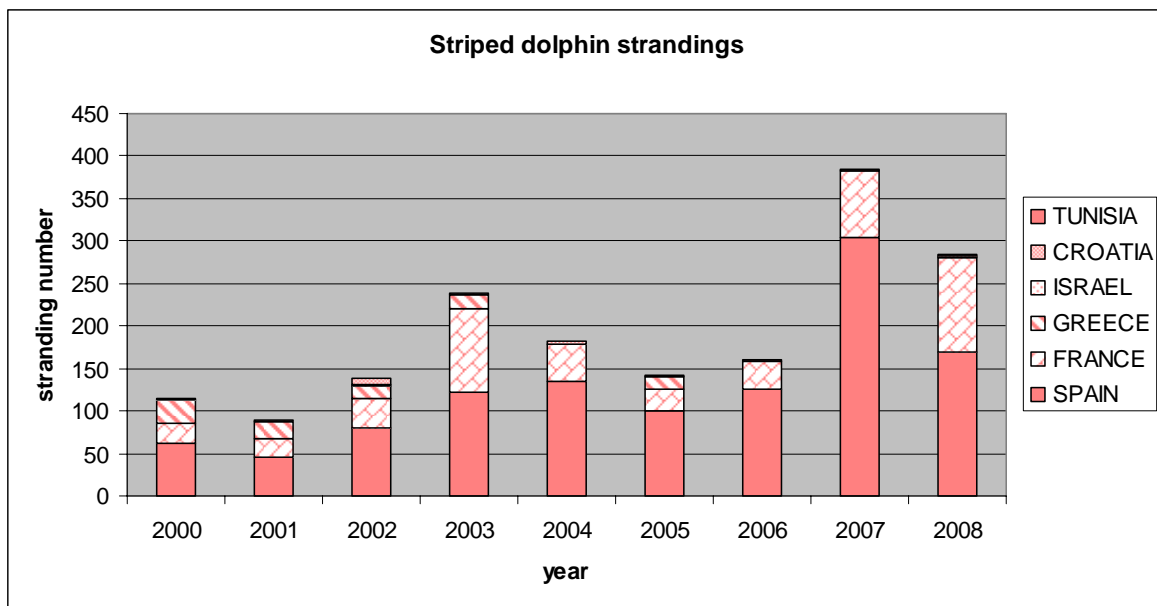


Figure 9. Striped dolphin stranding rate during the period 2000-2008. Note that the order of the subdivisions on each bar of the histograms follows in order in the legend, i.e. from up to down. Strandings from Greece for 2006-2008 are still not available.

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 et al., 2008).

This is not the only epizootic episode suffered by Mediterranean cetaceans in the last two decades (Figure 10). 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 11). Moreover, in 1994 the epizootic affected to the common dolphins inhabiting the Black Sea (Birkun et al., 1999).

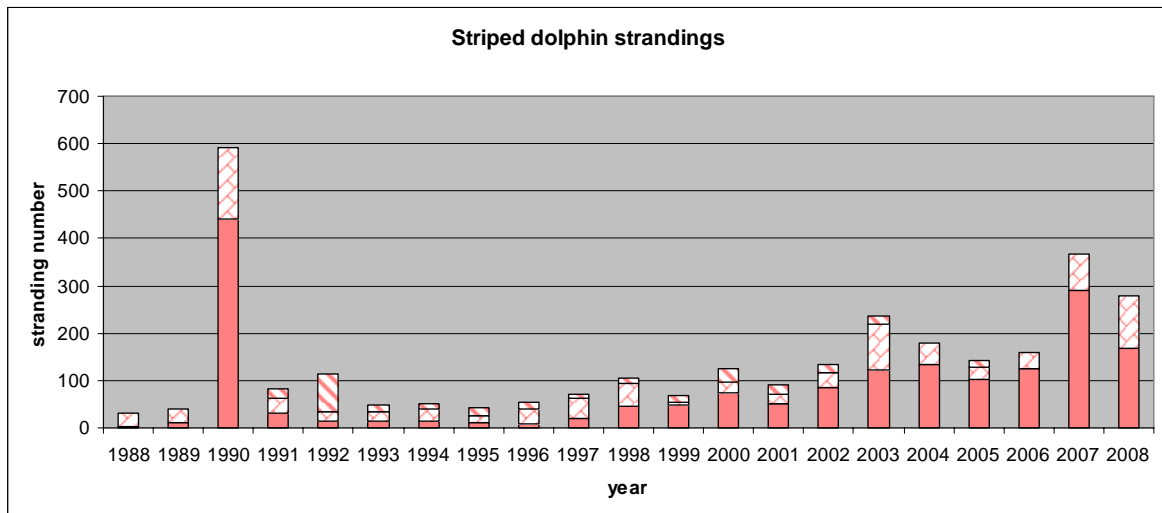


Figure 10. Striped dolphin stranding rate during the period 1988-2008 for France, Greece and Spain. Legend as in Figure 9.

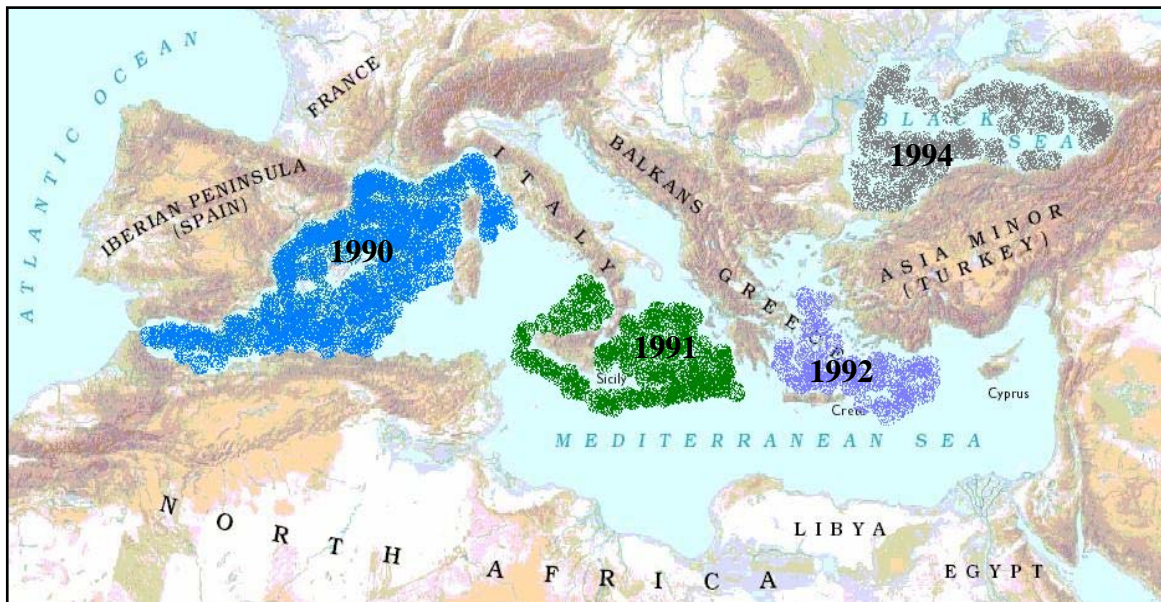


Figure 11. Progression of the epizootic episode suffered by striped dolphins from 1990-1992 in the Mediterranean and by common dolphins during 1994 in the Black Sea. Modified from Aguilar and Raga (1993) and Birkun et al. (1999).

Considering this past disease history, it would 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. However, with data available so far, some differences can be observed: First, a much lower peak than in 1990 appeared in 2007; second, another peak appeared in 2008, but this time with more contribution of animals stranded along the French coast; third, if the number of animals stranded in 2007 is added to the numbers in 2008, the total amount (646) is some larger than those in 1990 (591). Moreover, it is also remarkable that the number of strandings from 2003 is higher than in previous years, except for 1990. Therefore, information on number and distribution of striped dolphin strandings during the following years at the Mediterranean basin is extremely necessary in order to follow the development and behaviour of the current die-off.

### 3. COMMENTS/RECOMMENDATIONS

- The **MEDACES web-page** plays a very important role for the fulfillment the following **objectives**: To join the stranding information from all the collaborating countries in a unique database; to provide access to the different information that has been collected from each stranded animal; 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. Thus, MEDACES makes the cetacean stranding information available to everyone interested in cetaceans (although submitted data are protected by a Deontological Code). In this context, during 2009, Dr. Gannier (Groupe de Recherche sur les Cétacés, France) has requested to the Marine Zoology Unit (University of Valencia, Spain) for information about strandings of Ziphiidae at the Valencian Community.
- During 2008 and 2009, the number of **collaborating countries** with MEDACES has increased: Croatia has sent its complete database (from 1990 to 2008) and data have been obtained from Bulgaria, Libya, Monaco and Slovenia. Updated data has been sent by France, Israel, Spain, Romania and Tunisia. Libya and Turkey have shown their intention to continue collaborating with MEDACES and to send their updated database. A first contact has been established with Italy, Portugal and Ukraine. They have shown their intention of joining the project, although data have not still sent.
- From MEDACES, ACCOBAMS and RAC/SPA **regular contacts** have been and are established regularly to encourage the different countries to collaborate with the database. But still, 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.

- Data analysis presented in this report has identified the occurrence of **abnormal stranding** rates in the Mediterranean in recent years. Several species has been affected: striped dolphins and pilot whales in Western Mediterranean, bottlenose dolphins in Central Mediterranean (Tunisia) and harbour porpoises in the Black Sea. If possible, it would be very interesting to follow up on these observations in order to test for possible infection with DMV or an increase in human interactions. Moreover, complete data from 2008 would help to follow the development of the current die-off. In this context, MEDACES will have a very important role in its follow-up.
- **MEDACES reports** are posted online in MEDACES webpage during the present year. **The analysis of MEDACES data**, 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, are now available through these reports.
- 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. MEDACES is also providing contact-information about relevant scientists and institutions, allowing fast and easy exchange of experience and advices.



#### 4. 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. (2005)** *Marine Mammals Ashore: A Field Guide for Strandings*, Second Edition. National Aquarium in Baltimore, Baltimore, MD.
- 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.
- Peltier, H., Certain, G., Van Canneyt, O., Daniel, P., Ridoux, V. (2009)** How stranding records can inform on cetacean at sea: an attempt to model and validate drift and discovery rates. *Book of Abstracts of the 23<sup>rd</sup> Annual Conference of the European Cetacean Society*. 2-4 March 2009, Istanbul, Turkey. Pp. 17.
- 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 Bresse, 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)** 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.