

FIRST DATA ON CETACEAN STRANDINGS AND IN SITU OBSERVATIONS ALONG THE ALGERIAN COAST

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Abstract. Data on cetaceans within the pelagic ecosystem remains scarce in the Algerian basin. This is linked to a lack of investigations stemming from the difficulty of quantitative population evaluation through oceanographic surveys and/or strandings statistics. In this context, we considered that it is appropriate to focus on data acquisition from offshore observations as well as setting up a network for monitoring strandings on sites scattered along the Algerian coast. During 10 oceanographic surveys conducted in two Algerian coasts sectors (eastern and central) we observed a total of 245 delphinids corresponding to 8 species that had an irregular distribution. We also identified 83 individuals belonging to five species that stranded between 2007 and 2017.

INTRODUCTION

Cetaceans constitute one of the least-known biological segments of marine biodiversity in Algeria. Very little research has been devoted to them due to the scarcity of systematists, the difficulty of observation and sampling, and considerable human and material resources to be implemented in order to be able to produce a reliable and steady stream of data. Some available data concerning this biological model come from old works (Loche 1840; Doumergue 1920; Lilly 1962, 1964; Lloze 1980) and those of Boutiba (1976, 1989, 1992, 1994a,b, 2003), Boutiba and Abdelghani (1995), Boutiba et al. (1996), and Taleb et al. (1994). This general state is observed throughout the Mediterranean basin. However, on the Algerian coast, the scarcity of data is more obvious. The difficulty is also partly linked to the wandering nature of these species, dispersing across vast distances, thus making statistical analyses rather difficult.

The synthesis done by Boutiba et al. in Grimes et al. (2004) takes stock of the state of knowledge regarding cetaceans on the Algerian coasts. This study makes it clear that most of the data cover the western part of the Algerian coast, with less attention being given to the central and east sectors.

The present study is a starting point for the establishment of an observation and monitoring network capable of providing new and regular data on previously unexplored or poorly studied sectors. It is in this context that we considered it appropriate to focus on acquiring data from offshore observations and setting up a network for monitoring strandings on sites scattered along the Algerian coast.

This strategy aims to: (i) widen the field of investigation, since most of the previous work concerned the western Algerian sector, (ii) improve knowledge of the status of cetaceans in the south-western Mediterranean, and (iii) identify interactions of cetaceans with fishing activities and their habitat.

MATERIALS AND METHODS

Presentation of the study area

Our study area covers all the coast of Algeria where three main sectors are delimited: west sector (A) from Telemcen to Ténès, central sector (B) from Ténès to Dellys, and east sector (C) from Dellys to El Taref (Figure 1).

Different ports in each sector have been selected to go out at sea and to conduct in situ cetacean observations. We chose:

Sector A: the Port of Beni-Saf, Ain-Temouchent and the Port of Mostaganem to represent the west sector (Figure 1);

Sector B: the Port of Tamenfoust and the Port of El Djamila in Algiers and the Port of Bouharoun in Tipaza to represent the central sector; and

Sector C: the Port of Boudisand the Port of Ziamamansouriah in Jijel and the Port of Stora in Skikda to represent the east sector.

Cetacean strandings were investigated only within sector B (Figure 1).

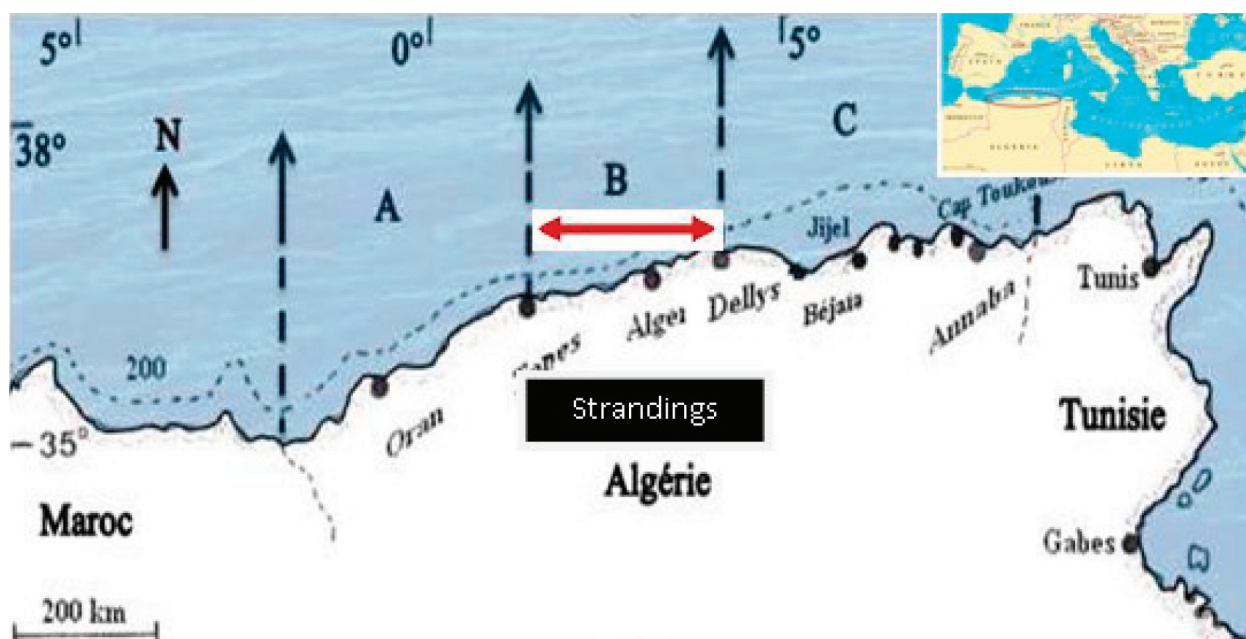


Figure 1. Coastal zone of Algeria and three sectors of cetacean observation.

Monitoring of cetacean strandings and in situ observations

The monitoring of strandings started in 2006 and was based on a network of observations that we had set up in coordination with a range of institutions (Urban Agency for the Protection and Promotion of the Coastline and Touristic Zones of Algiers (APPL), the National Centre for Research and Documentation for Fishing and Aquaculture, the National High School of Marine Sciences and Coastal Planning, the Coast Guards, Taza National Park in Jijel, the Conservation and Development Unit, and the National Park of Gouraya in Bejaia). This network also provided us data on strandings before 2000.

The methodological approach developed in this study is classical, and is based on: (1) observations from the mainland, (2) observations related to the economic activity of exploitation (fishing), and lastly (3) in situ observation of living individuals at sea (Gannier 1995):

(1) Observation from the mainland was used mainly for the common dolphin (*Delphinus delphis*) and bottlenose dolphin (*Tursiops truncatus*) which are most regularly observed in vivo along the Algerian coasts. These two species are known to be the most coastal (El Bouali 1987; Canadas 2006). This approach makes it possible to provide information on ecology (habitat, depth, frequency, abundance, etc.) and, in the case of strandings, mainly represent information on the mortalities causes that are sought in particular with regard to the quality of the environment (pollution, collisions, and accidental fishing).

(2) The second approach which is related to fishing activities often deals with indirect (accidental) catches which are quite frequent. Tissue and organ samples

taken from dead individuals most of the time (livers, muscles, skin, teeth, etc.) provide information on the biology of cetaceans, on their ecology and on population dynamics.

(3) The observation of live cetaceans at sea is based on surveys and/or missions at sea. The surveys are based on observations made by fishermen, recreational boaters, merchant navy vessels and Coast Guards as well as the civil defence. As for the strandings, we proceeded to the diffusion of standardized data sheets (400 copies during the summer period) in order to optimize the cetaceans census. At the same time, more than 20 sea trips along the continental zones were made possible thanks to logistical support from the Taza National Park, the National Navy (Coast Guards), the civil defence and some fishermen and recreational boaters. Our missions at sea took place in calm weather on paths in a straight line between two points of coordinates known preferably by daytime and when the wind was less than or equal to 3 on the Beaufort Wind Scale. The state of the sea had not to exceed stage 3 "slight sea". The wave height had to be less than 1.25 meters so that small species were not underestimated. The prospecting movement speed had to be equal to or greater than 4 knots, with a crew of 3 to 4 persons (Raga 2002; Gannier 1995).

RESULTS

Stranding monitoring (central sector B, 2007–2017)

Data on strandings in the central Algerian region are presented in Table 1. These data show 83 stranded individuals and 8 cetacean species between 2007 and 2017.

Among others, we found *Ziphius cavirostris*, *Grampus griseus*, *Delphinus delphis* and *Stenella coeruleoalba* (Figure 2).

In the department of Tipaza, it appears that most strandings were concentrated on the coastal line Fouka-Bouharoun with a maximum of 9 specimens stranded in Bou-Ismaïl (30% of strandings). Concerning the species stranded along the Algerian coast, it appears that the majority of strandings were located in the eastern part of the department (49% of strandings) with a very high concentration in the municipality of Ain-Benian, more exactly, at the beach El Djamila (15 stranded individuals) (Figure 3). At Boumerdes, 21% of the strandings noted were concentrated in the beaches of Dellys.

We note that 50% of stranding occurred between February and April, the remaining strandings being concentrated during the months from August to November–December. *S. coeruleoalba* was the most commonly stranded species, followed by *D. delphis* and *Physeter macrocephalus* (Table 1).

Table 1. Identification of species and numbers of stranded cetaceans between 2007 and 2017.

Species	Number of stranded specimens
<i>Stenella coeruleoalba</i> (striped dolphin)	21
<i>Delphinus delphis</i> (common dolphin)	11
<i>Physeter macrocephalus</i> (sperm whale)	9
<i>Tursiops truncatus</i> (bottlenose dolphin)	9
<i>Globicephala melas</i> (long-finned pilot whale)	6
<i>Grampus griseus</i> (Risso's dolphin)	5
<i>Ziphius cavirostris</i> (Cuvier's beaked whale)	1
<i>Balaenoptera physalus</i> (fin whale)	2
Unidentified species	19
Total of stranded individuals	83

Causes of stranding

According to our interventions in the field, it turned out that the majority of beached cetaceans were in a state of decomposition (proof of a prolonged stay in the sea before being stranded on the mainland) (Figures 5

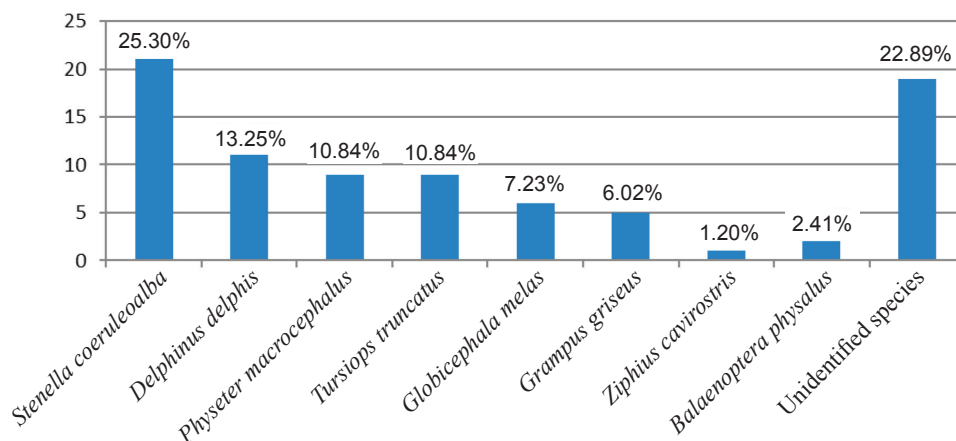


Figure 2. Representation of strandings between 2007 and 2017.

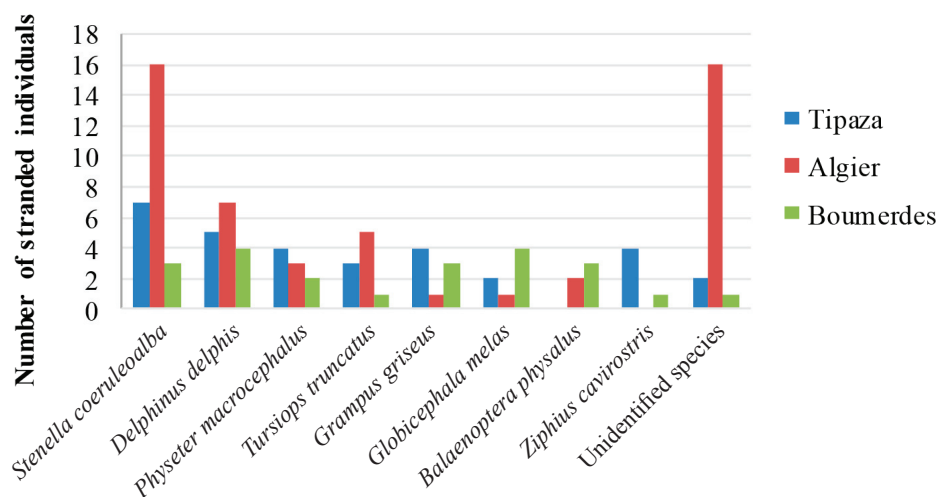


Figure 3. Representation of stranding in central sector between 2007 and 2017.

and 8). Therefore, the identification of the exact cause of stranding remains unknown. However, 22% of individuals had severed fins probably related to fishing activity (Figure 9). This interaction is well established, since 13% of the stranded species presented nets around their body, particularly on the caudal fins. Especially, *D. delphis* (36%), *P. macrocephalus*, *T. truncatus* (18%) and *G. griseus* (18%) presented severed fins (Figure 6). However, 20% of the stranded delphinids did not present either wounds or traces of nets on the body, especially young individuals (Figure 4).

Unfortunately, we did not carry out an autopsy on the stranded cetaceans corpses because the stranding surveillance network in the central region is not yet established and we often arrive too late to intervene properly in the field. We also do not have infrastructure for autopsies with qualified veterinarians. It is precisely this work that we wish to do in the near future to establish the exact causes of strandings in the Algerian central sector.

Cetacean observations in situ

From March to August 2015, ten offshore explorations were conducted which resulted in a census of a total of 245 delphinids off the Algerian coast: 59 individuals were observed off the western coast (sector A, 22.86%), 88 individuals on the central coast (sector B, 35.92%) and 98 individuals on the eastern coast (sector C, 40%). On the eastern coast, the majority of the species encountered were found in the region of Jijel, mainly in Cavallo (Figure 9).

A total of 155 *D. delphis* were observed, representing 63% of appearance frequencies. In view of our observations, it should be noted that there is no preferred observation zone for this species. Nevertheless, in terms of abundance, it is necessary to emphasize preponderance in the western sector, especially between Ain Tagourait and Cherchell. Next to *D. delphis*, we counted 52 individuals of *T. truncatus* (21% of the encountered delphinids) (Figure 10).

S. coeruleoalba was also present and very often mixed with *D. delphis*, but its population was much smaller, a total of 11 appearances (8%). Moreover, we have

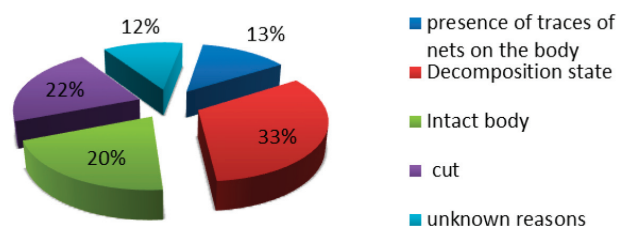


Figure 4. Representation of the physical state of the corpses of cetaceans stranded between 2007 and 2017.



Figure 5. Stranding of a delphinid in a state of decomposition in April 2008 in Bou Ismail (west Algiers).



Figure 6. Intervention during the stranding of a young *Stenella coeruleoalba* in August 2009 at the beach broken boat in Bordj el Kiffan (east Algiers).



Figure 7. Stranding of a *Physeter macrocephalus* at the Franco beach of Raïs Hamidou in May 2017 (Algiers).

noted the presence of *Physeteridae* off the Algerian basin coast. Three sperm whale individuals were listed during the study period, which represents 2% of all encounters (Figure 10).

Note also that no cetacean sightings have been made off the bay of Algiers. However, all observations made in this area begin either east of the bay from Cape Matifou or west from Cape Acrata.



Figure 8. Grounding of a *Grampus griseus* on Sidi El Djilali (Tipaza) beach in September 2017.

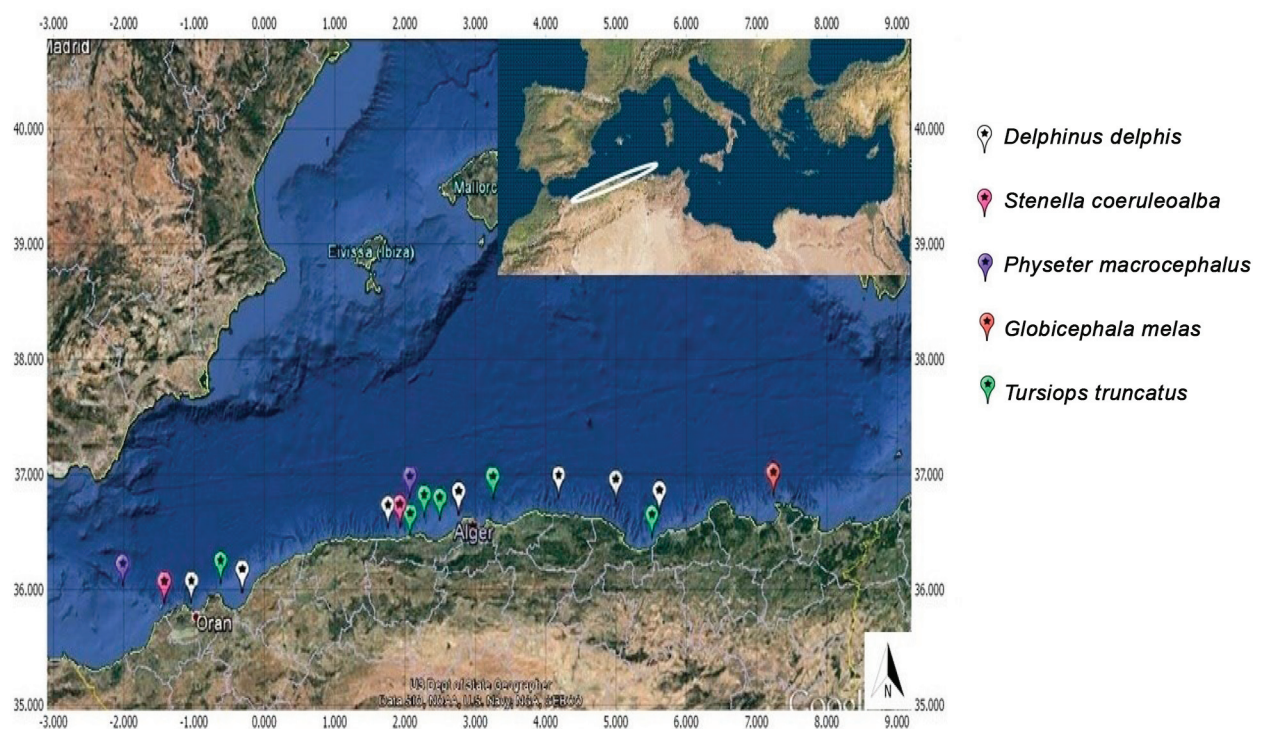


Figure 9. Geographic distribution of cetaceans along the Algerian coast during the summer season 2015.

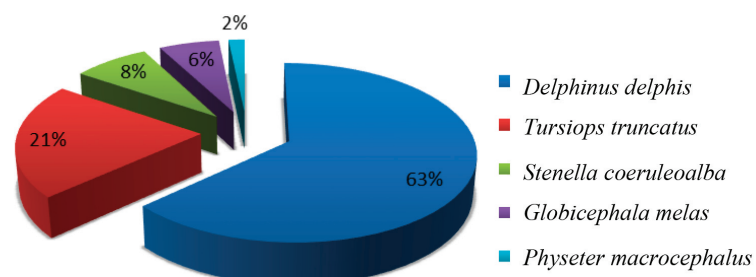


Figure 10. Frequency of species observed in situ along the Algerian coast in 2015.

DISCUSSION

Regarding the previous observations made along the central and eastern Algerian coast, Mechenene (2007) affirms that the common dolphin is the most frequently observed, that is to say it makes 77.77% of the total of encounters on the western part of the golf of Bejaia. Henda and Boutiba (2007) found that *S. coeruleoalba* is also present and is often found in a mixed group with *D. delphis* (20.37% in the Bejaia region and 12% on the Algiers coasts). They also counted 36 *T. truncatus* (23% of the total population) during the same period, with a preferential distribution for the eastern coast near the Algiers basin (Jijel and Skikda).

If we compare with studies of Boutiba (1994), he confirms that from 1975 to 1990 *D. delphis* was the most common species on the western coast with a high density (103 *D. delphis* listed individuals and 46 *S. coeruleoalba*), especially on Oran coasts (frequency of 74.2% for *D. delphis*). The same emerges from our study, because *D. delphis* is observed with a frequency of 63%. However, Terkmani (2011) after six months of exploration found that it is rather *T. truncatus* that is most frequently observed with 94.63% of observation frequency.

With regard to our observations, *T. truncatus* is the second most frequent species. Larbi Doukara (2015) who conducted a 14 days summer survey off the Oran region noted the presence of a mixed group of 10 *D. delphis* and blue and white dolphin, two *T. truncatus* and some individuals of *G. griseus* and *G. melas*. Henda and Boutiba (2007) noted a unique sighting of this species off eastern waters, particularly in the Cap de Fer region.

Off the coast of Tunisia, *T. truncatus* and *S. coeruleoalba* were the most common species followed in decrease of occurrence by *B. physalus*, *Z. cavirostris* and *P. macrocephalus* (Aïssi et al. 2015). In Morocco, common and striped dolphins were seen together on 18 occasions. Pilot whales were seen together with sperm whales on five occasions and with bottlenose dolphins on 14 occasions (De Stephanis 2008).

In our study, it would be difficult, if not premature, to draw definitive conclusions from the data presented for in situ observations. With regard to strandings, it is possible to consider that more than 90% of strandings have not escaped the report, especially since the establishment of our observation network. The essential reasons that justify our cautiousness with respect to the results of in situ observations are as follows:

- (i) duration of observation, which is still limited and does not cover all seasons;
- (ii) weather conditions: bad weather sometimes cancels

for weeks the missions at sea and the follow-up of observations is compromised;

- (iii) the fact that the covered area can be enlarged substantially if appropriate and required means are used, making it possible to multiply the chances of encountering cetaceans at sea.

Nevertheless, with regard to the data presented above it is possible to affirm the following. There are no preferred stranding areas in the sectors of study or preferential species in terms of frequency. This is especially true in the central sector, because in the region of Bejaia it is almost exclusively *D. delphis* that stranded. On the other hand, in terms of abundance it is obvious that the common dolphin is most exposed to strandings. A comparison can be made with a study in Tunisia in 2018 where it was rather *T. truncatus* that stranded most frequently, followed by *B. physalus* (Attia Elhili et al. 2018). According to Masski and De Stephanis (2015), in Morocco it is Delphinidae that stranded the most (42%) along the Moroccan coasts between 1980 and 2009, with *S. coeruleoalba* in the first position followed by *D. delphis*.

It is also interesting to note that 50% of strandings in the Algiers sector were between the months of February and April; the rest were concentrated during the months of August and November–December. In the east, most of the strandings occurred during spring.

It should be noted that almost all individuals of stranded cetaceans have traces (mutilations) of fishing nets. These injuries are apparent either on the belly, on the head, on the caudal fin or the pectoral fin. Sometimes one of these fins is severed. In any case, more than 90% of strandings in which we personally assisted concern individuals in the state of more or less advanced putrefaction.

With regard to in situ observations, it can be said that privileged areas are highlighted both in the centre and in the east. In addition, between 75% and 90% of frequencies and abundances are attributable to *D. delphis*. Mixed groups are often observed, mainly among *S. coeruleoalba* and common dolphins. The cetaceans observed during the study period are most often in small groups (2 to 4 individuals). Sometimes, they are observed in groups of more than 10 individuals in relatively limited perimeters.

Finally, it should be noted that among the major handicaps when observations are pursued at sea and when a consistent database is established, human and material resources are the most important element. The densification of our observation network depends in part on awareness with respect to the cetaceans issue as a whole not only among the fishing community but also among the recreational community and at the university level.

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