



Distribution and Abundance of Cetaceans in the Romanian Marine Area (<i>Gheorghe Radu, Eugen Anton, Magda Nenciu, Alina Daiana Spînu</i>)	“Cercetări Marine” Issue no. 43 Pages 320-341	2013
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DISTRIBUTION AND ABUNDANCE OF CETACEANS IN THE ROMANIAN MARINE AREA

Gheorghe Radu, Eugen Anton, Magda Nenciu, Alina Daiana Spînu

*NIRDEP - National Institute for Marine Research and Development
“Grigore Antipa”, 300 Mamaia Blvd., 900581 Constanța, Romania,
E-mail: gradu@alpha.rmri.ro*

ABSTRACT

This paper is mainly a summary of data on the distribution and abundance of the three species of cetaceans during 2001 - 2004, particularly in the form of distribution maps. For each species are given data such as: Biological characterization of the species; Observations on the distribution and abundance; Occasional habitats of minor and major importance; Critical habitats; Disturbing factors; Population trends; Recommendations for their protection

KEYWORDS: Black Sea, *Phocoena phocoena*, *Tursiops truncatus*, *Delphinus delphis*, distribution, abundance, habitat

AIMS AND BACKGROUND

Being at the top of the food chain, Black Sea cetaceans play a major role in ecological equilibrium of the marine ecosystem. Due to this position, they are very sensitive to ecological conditions and in direct competition with some human activities. That is why many efforts must be concentrated on these environmental conditions with negative impact on the marine mammals.

The current precarious state of the Black Sea cetacean populations, represented by the three species: *Delphinus delphis ponticus*, *Tursiops truncatus ponticus* and *Phocoena phocoena relicta* has required research aiming at getting information on the populations existing in the coastal and offshore zone. The study on cetaceans needs a time continuity because of the complex and systematic research to be carried on in order to establish the species composition, distribution, occurrence frequency and abundance.

MATERIAL AND METHODS

The dolphin population distribution, frequency and structure were determined based on sightings both in the open sea and close to the shore.

The observations carried-out at sea, aboard vessels, crafts or marine drilling platforms, with the view to individual or group location of dolphins at the Romanian coast,

were performed starting with September 2001, in the area between Vama Veche and Sulina, on the 8-65 m isobaths [1, 27, 33, 35 and 39].

Dolphin monitoring at sea was made during calm sea, as it allows the location of individuals at great distances from the survey vessel [40, 41].

The aerial monitoring of dolphins in the Romanian marine area was made in two stages, one during the winter season and the other during the summer season, aboard a helicopter leased from "Petromar" Constanța. The sector overflown by the helicopter stretched between Tuzla and Gura Portiței and the round-trip movement of the aircraft was made on two routes, at 10 Nm and 30 Nm, respectively, off the coast [41, 44].

RESULTS AND DISCUSSION

1. Black Sea harbor porpoise (*Phocoena phocoena relicta*)

1.1. Common names and distribution map

Phocoena phocoena relicta (Abel, 1905)

Class: Mammalia

Order: Cetacea

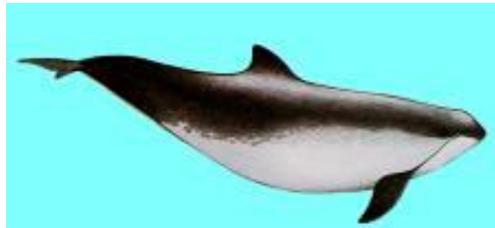
Suborder: Odontoceti

Family: Phocoenidae

Genus: *Phocoena*

Species: *Phocoena phocoena*

Romanian common name: marsuin, porc de mare, focenă



The harbor porpoise is the smallest cetacean in the Black Sea and the only representative of the Phocoenidae Family encountered in the Pontic Basin.

Description. The harbour porpoise has a small and sturdy body, narrowing towards the caudal fin; the skin is neat. The species does not have a distinct rostrum; each half jaw hosts 19-28 paddle-shaped teeth. The pectoral fins are small, dark colored and slightly rounded. The dorsal fin is triangular, with a wide base, and is located close to the middle section of the body, while the caudal fin is also wide, with an indentation in the middle [51].

Color. The dorsal side is black or dark gray, with lighter shades on the lateral sides. The ventral part is white, with a dark stripe from the mouth commissure to the pectoral fin.

Sizes. The maximum size of Black Sea harbor porpoises is 150 cm for females and 160 cm for males. The average weight of the Pontic porpoise is 43 kg, while the maximum weight reaches 65 kg [51, 21].

Sexual maturity is reached at 3-4 years of age, 133 cm (males) and 145 cm (females), the intercourse occurring in summer. The gestation lasts for 9-11 months and weaning occurs after four months or later. The length of the calf at birth ranges between 68-86 cm/3-8 kg and it is nursed by the mother for approximately 4-6 months. The longevity of the species *Phocoena phocoena relicta* is estimated at less than 16 years [51, 21].

1.2. Geographic range

Phocoena phocoena relicta is encountered in the Black Sea and contiguous areas (Azov Sea, Kerchi Strait, Turkish Straits System). In November and December, they are sometimes encountered off the Danube Delta outflow [31, 44].

Scarce *Phocoena phocoena relicta* herds were noticed south of Constanța down to Costinești, in shallow waters, in the close vicinity of the Romanian coast. They sometimes follow their prey inside the Constanța, Mangalia and Midia harbors [36, 39].

The research carried-out at sea, during September 2001-September 2002, for individual or group location of dolphins, resulted in the sighting of groups comprising 1-8 *Phocoena phocoena relicta* dolphins, 72% of them being sighted in the northern part and 28% in the southern sector (Fig. 1.2.2) [40, 41].

According to the field data interpretation, it resulted that in September 2001 and May 2002, dolphins were sighted solely in the northern part of the coast, while in April, June and July, the share was 20-50% in the south and 50-80% in the north (Fig. 1.2.2).

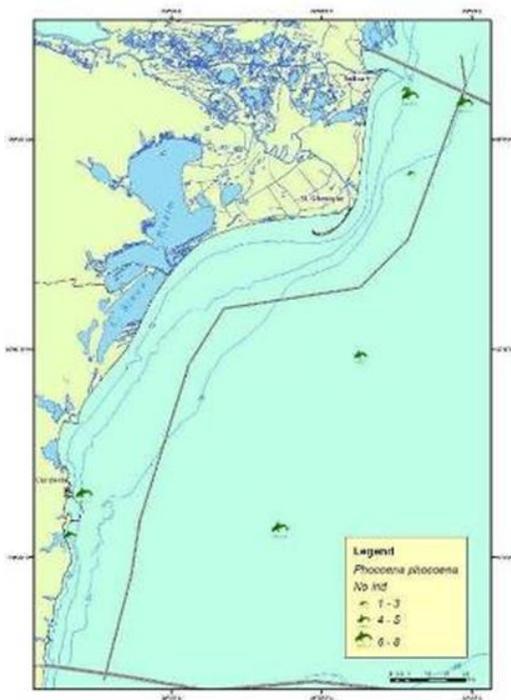


Fig. 1.2.1. - Distribution map of *Phocoena phocoena relicta* individuals sighted at sea, during May-July 2002

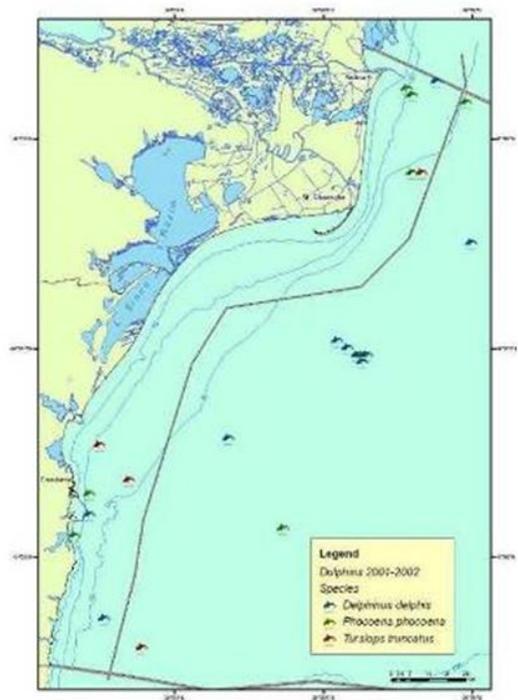


Fig.1.2.2. - Distribution map of dolphins sighted at sea, during September 2001 - September 2002

The aerial monitoring of dolphins in the summer of 2002 was performed aboard a helicopter leased from “Petromar” Constanța. The sector overflowed by the helicopter stretched between Tuzla and Gura Portiței and the round-trip movement of the aircraft was made on two routes, at 10 Nm and 30 Nm, respectively, off the coast (Fig. 1.2.3) [41, 44].

The monitoring performed aboard the helicopter in August 2002 resulted in recording 59 dolphins belonging to the three species encountered at the Romanian coast, 6 individuals of the *Phocoena phocoena relicta* species (Fig.1.2.3) [41, 44].

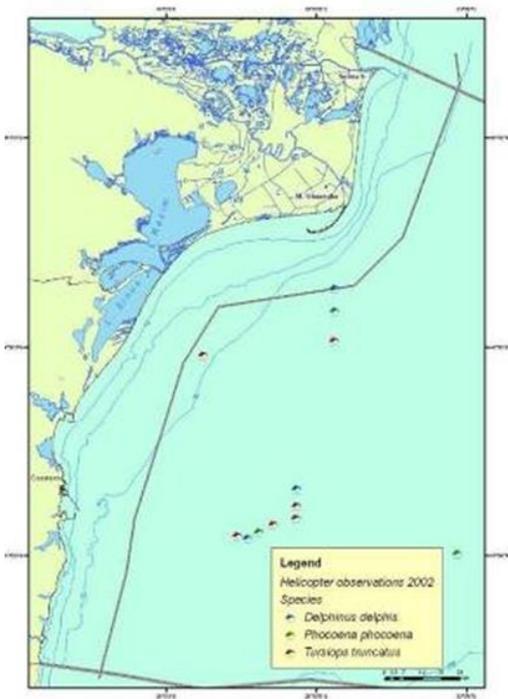


Fig. 1.2.3 Distribution map of dolphins sighted at sea, aboard the helicopter, in 2002

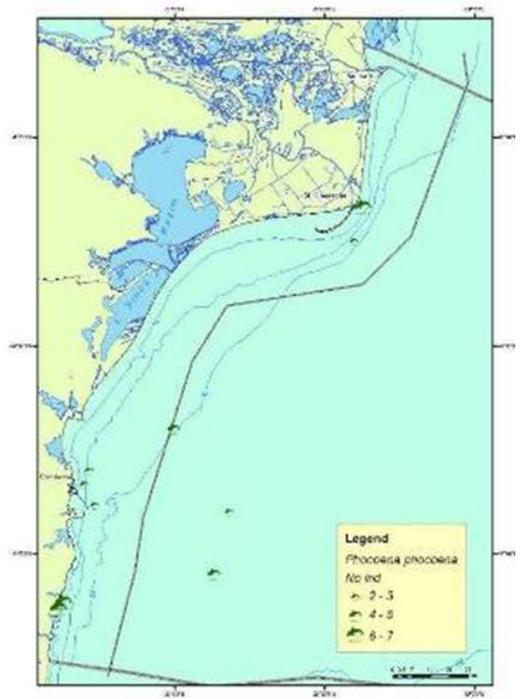


Fig. 1.2.4 Distribution map of *Phocoena phocoena relicta* individuals sighted at sea, during April-September 2003

Overall, it can be concluded that the distribution of dolphins sighted at sea, aboard vessels, during April-September 2003, in percentages, was 26% in the south and 76% in the north, while the species composition in percentages was the following: 7% *Phocoena phocoena*, 26% *Delphinus delphis*, 30% *Tursiops truncatus* and 37% unidentified species (Fig. 1.2.5) [41, 44].

In 2003, the aerial monitoring of dolphins in the Romanian marine area was made in two stages, one during the winter season (28.02.2003) and the other during the summer season (03.07 and 18.08.2003), aboard a helicopter leased from "Petromar" Constanța [44].

During the aerial monitoring in the winter season, no dolphins were sighted. We assume that, due to the harsh weather conditions in the winter of 2003, dolphins moved towards areas where water temperature was higher and food more abundant.

The monitoring aboard the helicopter during the summer season resulted in the sighting of 19 dolphins. Concerning the dolphin distribution in the two sectors of the Romanian coast, during the summer season (July-August 2003), the situation was the following: 16 individuals (84%) in the northern area and 3 individuals (16%) in the southern area; 4 individuals belonged to the species *Phocoena phocoena relicta* (Fig.1.2.6) [44].

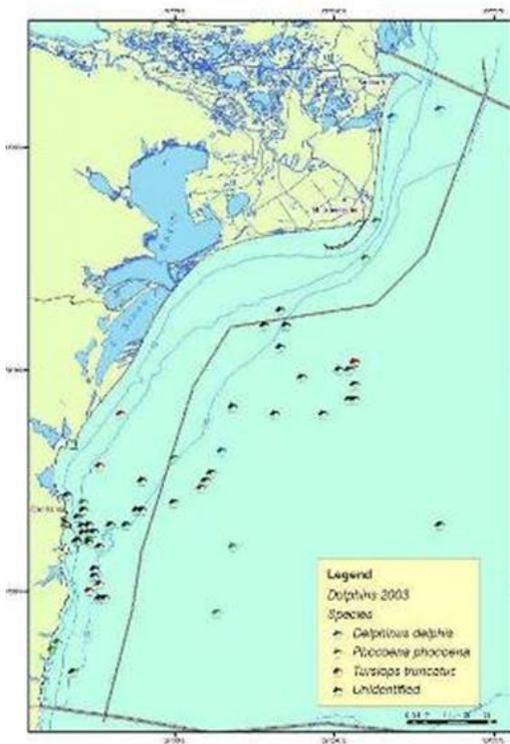


Fig.1.2.5 Distribution map of dolphins sighted at sea, during April-September 2003

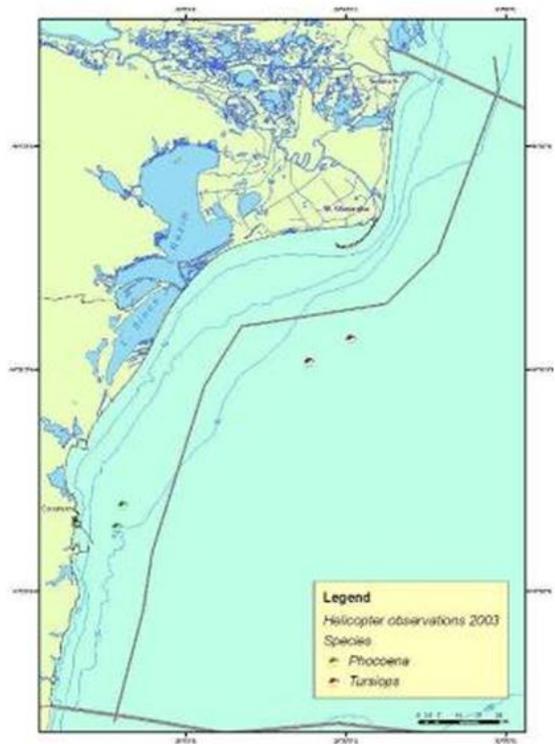


Fig. 1.2.6 Distribution map of dolphins sighted at sea aboard the helicopter, in 2003

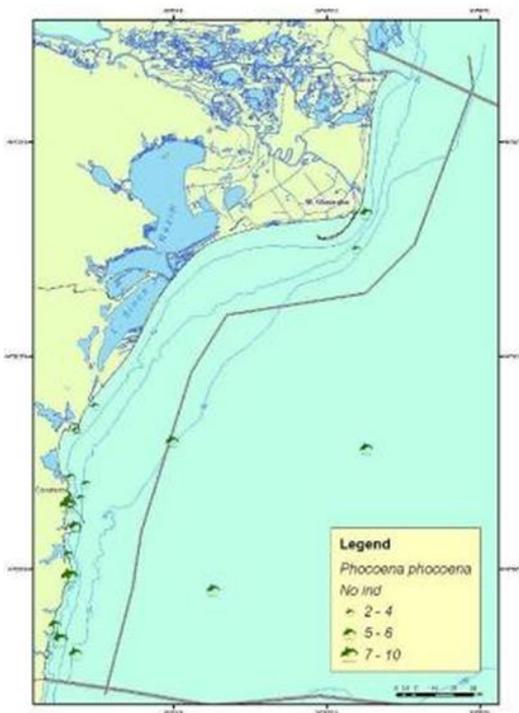


Fig. 1.2.7 Distribution map of *Phocoena phocoena relicta* individuals sighted at sea, during April-July 2004

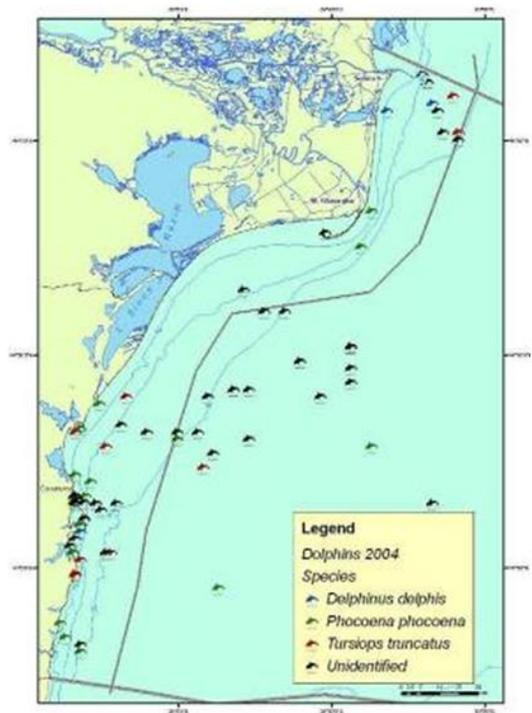


Fig. 1.2.8 Distribution map of dolphins sighted at sea, during April-September 2004

During April-August 2004, in the marine area between Vama Veche and Sulina, dolphins were sighted divided on percentages as follows: 10% *Delphinus delphis*, 11% *Phocoena phocoena*, 37% *Tursiops truncatus* and 42% unidentified species (Fig. 1.2.7) [44].

The percentual composition on species of the dolphins sighted at sea aboard vessels during April-September 2004 was the following: 10% *Phocoena phocoena*, dolphins sighted both in the northern and southern part of the littoral; 11% *Delphinus delphis*, most individuals were sighted in the northern part of the coast; 37% *Tursiops truncatus*, with an almost uniform distribution on the 2 sectors (north and south) and 42% unidentified species, reported mostly in the northern sector (Fig.1.2.8) [44].

The aerial monitoring of dolphins was performed during the summer season 2004 aboard a helicopter, the sector overflowed by the helicopter stretched between Tuzla - Gura Portiței - Mangalia and the round-trip movement of the aircraft was made on two routes, at 10 Nm and 30 Nm, respectively, off the coast.

The monitoring made aboard the helicopter during the summer season 2004 resulted in the sighting of 61 dolphins, of which 18 individuals of the species *Phocoena phocoena* (Fig. 1.2.9) [44].

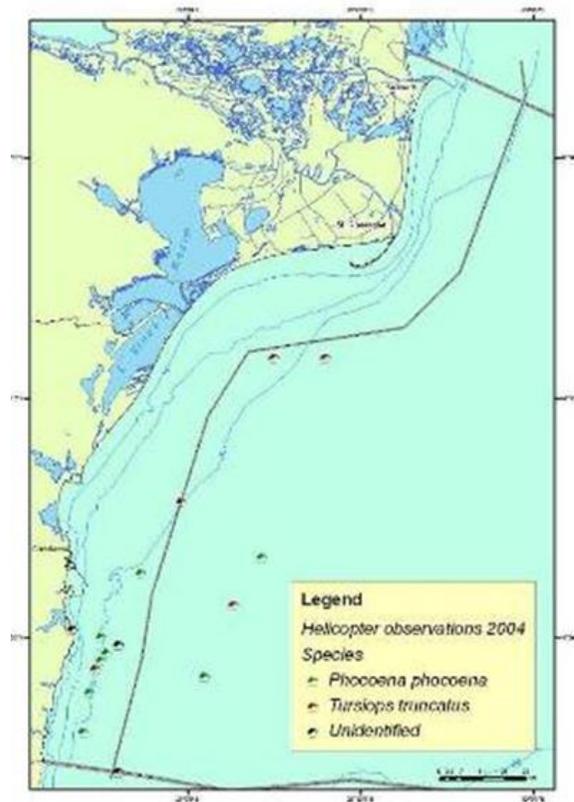


Fig.1.2.9 Distribution map of dolphins sighted at sea aboard the helicopter, in 2004

1.3 Major, minor and occasional habitats

Phocoena phocoena usually inhabits shallow waters on the continental shelf, around the Black Sea [26]. During the warm season, they also enter the Azov Sea through the Kerch Strait [24] and the Marmara Sea through the Bosphorus [32]. They winter in the south-east of the Black Sea [12], including southern Georgia and likely eastern Turkey. During the warm season, this species may occur in low salinity and high turbidity waters.

Phocoena phocoena relicta is solitary or lives in groups comprising 2-10 individuals, sometimes in larger concentrations, displaying an obvious segregation on sexes. These dolphins swim along the coast and they are difficult to approach; they never play at the vessel bowline. They generally make short leaps every 3-6 minutes. Porpoises are ichthyobenthophagous species, feeding on fish (flounder, turbot and gobies) and invertebrates (gasteropods) [34].

Dolphin monitoring at sea pointed-out the fact they prefer clean water areas, with rich and diverse food sources [7, 8]. This aspect was reported in the central and northern area, where porpoises are attracted by feeding and spawning fish agglomerations [38, 41].

Thus, there were several cases in which it was noted that dolphins crowd in clean water sectors (8-10 m transparency, blueish water colour), east of the separation line of varying salinity waters (brackish/marine), from where they make short trips towards the shore, for feeding purposes [39, 41].

The global temperature increase determines changes in the distribution of fish species cetaceans feed on and, consequently, changes in their distribution and abundance. Thus, behavioural changes were reported in fish, by the movement of fishing agglomerations away from the coast during high seawater temperatures (24°C) and a more pronounced dynamism of the establishment and dispersion of such agglomerations, causing changes in dolphin distribution as well [53, 28, 37, 45 and 47].

1.4 Critical habitats

Cetaceans, an integral part of the marine ecosystem, are vertebrates with a long life cycle, on top of the food chain and with a low breeding rate. This is why they are the most vulnerable to a complex of threats caused by various human activities, among which accidental catch during fishery activities, habitat loss and degradation, contaminant substances and disturbances caused by maritime traffic [8, 9, 10, 16, 30, 41 and 42].

Habitat loss and degradation is major wherever the marine ecosystem is strongly influenced by various human activities. Among the factors causing habitat degradation, the following can be included [3, 17, 18, 20 and 46]:

- a) pollution, of various types and sources (waste waters, air pollution, heavy metals, persisting organic pollutants, marine litter, nutrients, oil and oil residues, radioactive contaminants, genetic and biologic pollution);
- b) climate changes;
- c) land-based changes, mainly caused by agriculture, industry and forestry activities;
- d) coastal development, including urban sprawl, industry, tourism and hydrotechnical works;
- e) direct use of the marine environment and its resources, by maritime traffic, fisheries and aquaculture.

In marine areas where maritime traffic or other activities are intense, the disturbance of dolphins is of great concern for the survival of their populations. A potential negative impact could be represented by maritime traffic, collision with boats, noise generated by various sources (navigation, coastal industrial constructions, dredging, mineral resources identification prospectations, military activities etc.), as well as the enhancement of sports and leisure activities at sea, including commercial dolphin sighting. While marine prospectations for natural gas and oil deposits may affect the dolphins' orientation system, massive waste discharges into seawater cause irreversible damages to the marine ecosystem, dolphins included [23, 35, 38 and 43].

It is, thus, clear that humans are responsible for the extinction of hundreds of thousand dolphins around the world by the increasing pollution of seas and oceans, as well as uncontrolled overfishing [17, 18 and 20].

1.5 Population trend

By 1983, unregulated hunting was the main threat which caused a dramatic drop of the *Phocoena phocoena relicta* population. Currently, it is forbidden by law to hunt or kill for any reasons these marine mammals [42, 43]. However, in spite of these prohibitions, the number of harbor porpoises keeps dropping.

2. Black Sea common dolphin (*Delphinus delphis ponticus*)

2.1 Common names and distribution map

Delphinus delphis ponticus (Barabasch-Nikiforov, 1935)

Class: Mammalia

Order: Cetacea

Suborder: Odontoceti

Family: Delphinidae

Genus: *Delphinus*

Species: *Delphinus delphis*

Romanian common name: delfin comun



Description. The common dolphin has a long rostrum (10-20 cm), the mandible is longer than the upper-jaw; 40-45 small, cone-shaped teeth are located on each half jaw; the forehead is slightly flattened to the rear. The dorsal fin is high, sickle-shaped and sharp. It is located halfway of the body and coloured black to light-gray, with black edges. The pectoral fins are long and lean, slightly curved or sharp. The caudal fin is sharp at the top, with a well-marked middle indentation. The dorsal, pectoral and caudal fins are coloured black to brown-gray [51, 21].

Color. The back is gray with blueish-greenish shades to black, from the top of the head towards the tail, closing-up in a “V” on both sides, under the dorsal fin. The sides are light gray behind the dorsal fin and white-bronze in front of the dorsal fin. The belly is white. Around the eyes, dark coloured circles are located, connected by a black line crossing the head behind the rostrum and another coloured strip, more or less dark, unites the lower jaw with the jointing of the pectoral fins [51].

Sizes. The average length of individuals of this species is 175 cm for males and 160 cm for females. They can reach 135 kg. In the Black Sea, the common dolphin seldom exceeds 2 m in length (male - 177 cm, female - 159 cm) and 80 kg in weight.

The breeding period covers 5-6 months (July-December) and they reach sexual maturity at 2-4 years of age. The gestation period ranges between 10 and 11 months, weaning occurs at 4 months and the calf is between 80 and 95 cm long at birth. Highly developed maternal instinct. The longevity of the species *Delphinus delphis ponticus* was estimated around 25-30 years [22 years (males) and 20 years (females)] [51].

2.2 Geographic range

The common dolphin is widely spread, being encountered in temperate and tropical waters around the world, tending to concentrate in open seas. *Delphinus delphis ponticus* is a species representative for the Black Sea, being widely spread in this area [15, 31].

In order to obtain the information on the dolphin distribution and occurrence frequency at the Romanian coast, complex and systematic research has been carried-out, based on specific methods for this type of studies [39].

The dolphin monitoring activities at sea carried-out during September 2001-September 2002 resulted in the sighting of groups comprising 2-12 *Delphinus delphis ponticus* individuals, reported in the northern sector in 86% of the cases. The dolphin monitoring at sea was performed in the area between Vama Veche and Sulina on the 10-55 m isobaths (Fig. 1.2.2) [41, 44].

The aerial dolphin monitoring in August 2002 resulted in the sighting of 9 dolphin individuals (of which: 7 adults and 2 calves) of the species *Delphinus delphis ponticus*. With reference to the dolphin distribution in the two sectors of the Romanian coast, the situation was the following: in the northern area, 6 *Delphinus delphis ponticus* individuals (5 adults and 1 calf) and 3 *Delphinus delphis ponticus* individuals (2 adults and 1 calf) in the southern area (Fig.1.2.3) [44].

The dolphin monitoring at sea during April-September 2003 resulted in the sighting of herds comprising up to 20 dolphins of the species *Delphinus delphis ponticus*, all located in the northern sector of the Romanian coast (Fig. 1.2.5) [44].

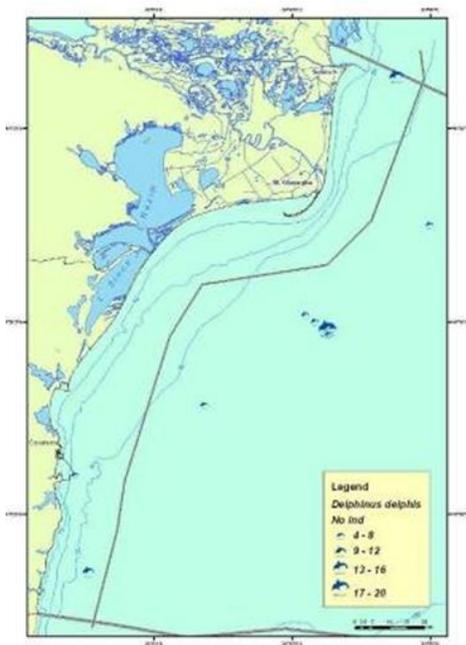


Fig. 2.2.1 Distribution map of the *Delphinus delphis ponticus* dolphins sighted at sea, during September 2001-September 2002

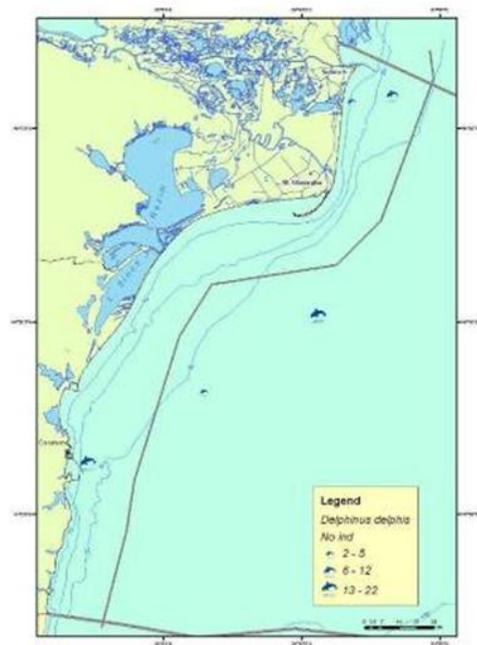


Fig. 2.2.2 Distribution map of the *Delphinus delphis ponticus* dolphins sighted at sea in September 2003

Compared to the period 2002-2003, in 2004 the dolphin occurrence frequency was higher and, from the distribution point of view, most dolphins (63%) were sighted in the northern area for all species analyzed. The presence of dolphins in various shares in the two sectors of the Romanian Black Sea can be correlated with the food sources - fish - forming agglomerations in relation to hydro-climate and biological factors [41, 44].

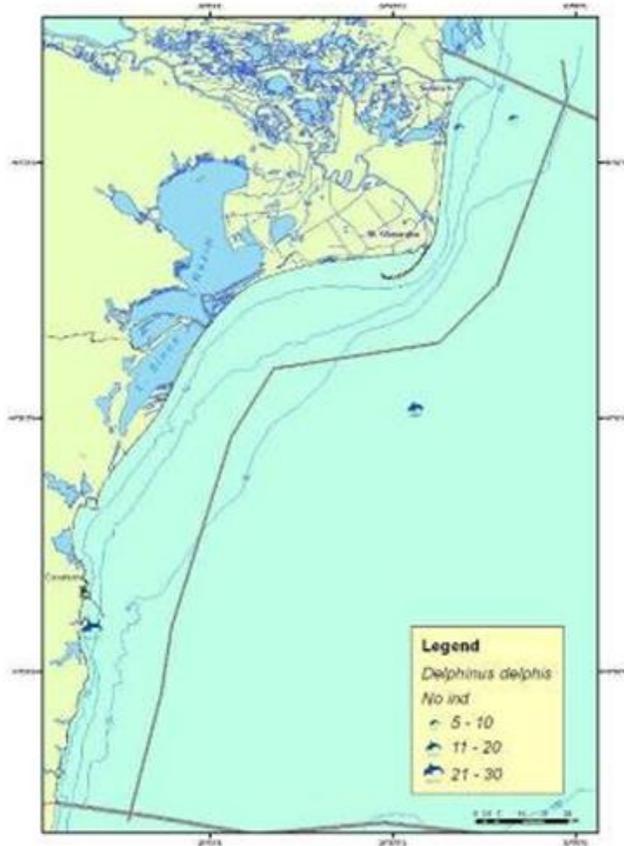


Fig. 2.2.3 Distribution map of the *Delphinus delphis ponticus* dolphins sighted at sea, during April-June 2004

2.3 Major, minor and occasional habitats

The common dolphin is widely spread, being encountered throughout the entire Black Sea Basin. *Delphinus delphis ponticus* inhabits maximum depths up to 70 m. It performs regular migrations, connected to the seasonal shifts in food availability [15]. In winter, dolphins stay near the Georgian coast and south-west of the Crimean coast, in the wintering grounds of anchovy, while in summer it moves to the north-western part of the sea, where sprat shoals crowd [12].



Nektonic, mainly benthophagous species, it approaches the coast mainly in spring and summer. It usually groups in 10-15 individual herds, also in couples or as isolated individuals, but it can also form large herds, crowding in fish concentration areas.

Delphinus delphis ponticus is extremely sensitive to chemical and noise pollution. It swims very fast, reaching top speeds of approximately 50 km/hour. Common dolphins can be often sighted playing around vessels. They perform brief dives and breathe frequently at the surface, every 1/3 seconds.

Delphinus delphis ponticus dolphins are fish eating mammals, the main food is represented by small pelagic fish species (sprat, anchovy, Black Sea sprat) and crustaceans, yet often other fish species were also found in their stomach content - horse mackerel, whiting, bluefish, gray mullet, Danube shad, red mullet, shrimps and molluscs [34]. Common dolphins hunt in herds.

2.4 Critical habitats

The main threats of Black Sea common dolphins are overfishing anchovy and sprat, which are the main food of the species *Delphinus delphis ponticus*, as well as the increasing pollution also causing the drop in dolphins' resistance to diseases.

Diseases, parasites, toxic algae outbursts are natural factors affecting cetacean mortality. However, all these factors may be caused by habitat degradation as a follow-up of human activities, which makes the integrated approach of such causes extremely important. This implies the management of all human activities which may impact on the state of cetacean populations, the protection of cetacean habitation areas, the establishment of monitoring and research, training, education and public awareness programmes.

The consequences of all these factors on the survival of dolphins in the region are considered significant, however the impact mechanisms, their complex interactions and actual effects on cetacean populations and their critical habitats are little known.

2.5 Population

The number of dolphins decreased 13-16 times in the past 40 years, this issue becoming critical ever since the 1950s-1960s. *Delphinus delphis ponticus* has been and still is the most representative species from the Black Sea, however numerically the population dropped significantly [4, 15].

It is estimated that approximately 440,000 *Delphinus delphis* individuals were killed during 1958 and 1966 and approximately 365,000 in the past 12 years. In the mid 1960s, along with the drop of fisheries, dolphin population recorded a dramatic decrease, up to extinction.

During 1983 and 1984, by means of vessels and planes, the dolphin population in the Black Sea was estimated around 60,000-100,000 individuals. The main species (59%) was the common dolphin (*Delphinus delphis ponticus*), 33% - *Tursiops truncatus ponticus* and 8% - *Phocoena phocoena relicta*. Dolphins may be more abundant in the southern area of the Black Sea compared to the north [52].

It is assumed that during 1983-2005, the *Delphinus delphis ponticus* population recorded a slight recovery, yet the depletion caused by commercial hunting, along with the mass mortality outbursts (1990, 1994) caused by epizooties could not be overcome [15, 8]. Despite the fact that it is extremely difficult to estimate the current size of the *Delphinus*

delphis ponticus population, it can be assumed that it reaches at least several hundreds of thousand individuals, possibly 100,000 or even more [15].

In the Romanian marine area, the number of dolphins was estimated to be less than 2,000 individuals, of which 600-800 belong to the species *Delphinus delphis ponticus* [50].

Delphinus delphis ponticus is listed in the IUCN Red Book and all Black Sea riparian countries have forbidden its hunting for commercial purposes. This species is protected by the Bern, Bonn conventions, CITES and ACCOBAMS.

IUCN Status: Subregion level: VU in Romania.

2.6 Population trend

The dolphin population size in the Black Sea is unknown, in spite of the efforts carried-out for its estimation. Certain research performed with the aim of assessing dolphin population abundance in the Black Sea [55, 19] proved to be little reliable, due to the methodology used.

3. Black Sea bottlenose dolphin (*Tursiops truncatus ponticus*)

3.1 Common names and distribution map

Tursiops truncatus ponticus (Barabasch - Nikiforov, 1940)

Class: Mammalia

Order: Cetacea

Suborder: Odontoceti

Family: Delphinidae

Genus: *Tursiops*

Species: *Tursiops truncatus*

Romanian common name: delfin mare, afaLin, delfin cu bot gros



Description. The bottlenose dolphin is a relatively sturdy dolphin, usually having a distinct rostrum (about 8 cm), flattened dorso-ventrally and stubby, hence the English name “bottlenose” (“dolphin with a bottle-like nose”). The jaws are approximately equal. This species has 18-20 cone-shaped sharp teeth on each half jaw. The bottlenose dolphin has high cervical mobility, as five of the seven neck vertebrae are not tied together, as in ocean dolphins. Surface breathing is very frequent (every 15 seconds), lasting 1 second. The dorsal fin has a characteristic shape, broad at the base, high and curved, being located close to the middle section of the body. The caudal fin lobes are wide and curved, with a well-marked middle indentation. The pectoral fins are mid-sized and sharp [51].

Color. The colour of this dolphin species varies greatly, but it is usually coloured from light gray to white on the ventral side, the sides even lighter, and dark gray on the dorsal side, the belly is white or rosy; the passage from the dark colour of the dorsal side to the lighter shade of the belly is progressive, with no clear borderline. A round, ashen spot is located above the eyes [51].

Sizes. The bottlenose dolphin’s length ranges between 250 - 350 cm in males and 230 - 320 cm in females, while the average weight usually varies around 180 kg.

Breeding occurs in July-October. Males reach sexual maturity at the age of 10 and females at 5-7 years old. The gestation covers 10-12 months. At birth, the bottlenose



dolphin calf measures between 90 and 120 cm. The calves are nurtured by the age of one and remain along with their mother until the age of three. The longevity of the species *Tursiops truncatus ponticus* is estimated around 25-30 years of age [51].

3.2 Geographic range

The bottlenose dolphin is a species encountered in the Mediterranean and Black Sea [14]. At the Romanian coast, it is most often encountered in the Gura Portiței area, at 35-45 m depths, and in the littoral area off the Techirghiol Lake, at depths ranging between 30 and 40 m. In spring, this dolphin comes very close to the shore, sometimes entering for food the enclosure of the Midia Harbor [35, 39 and 44].

The activities carried-out at sea for the monitoring of dolphins at the Romanian coast, during September 2001-September 2002, resulted in the sighting of groups comprising 1-20 *Tursiops truncatus ponticus* individuals, sometimes together with calves, located in 69% of the cases in the northern sector and in 31% of the cases in the southern sector (Fig.1.2.2) [40, 41].

The monitoring made aboard the helicopter, in August 2002, resulted in the sighting of 59 dolphin individuals, the species dominating from the number of individuals sighted during the flight point of view being *Tursiops truncatus ponticus* - 44 individuals (Fig.1.2.3) [40, 41].

The research carried-out aboard vessels for the monitoring of dolphins at the Romanian coast, during April-September 2003, resulted in the sighting of groups comprising 1-12 *Tursiops truncatus ponticus* individuals or large herds comprising 40-50 *Tursiops truncatus ponticus* dolphins, most of them (75%) being located in the northern part of the Romanian marine area (Fig. 1.2.5) [41, 44].

The presence of dolphins in various shares in the two sectors of the Romanian Black Sea can be correlated with the food sources - fish - forming agglomerations in relation to hydro-climate and biological factors.

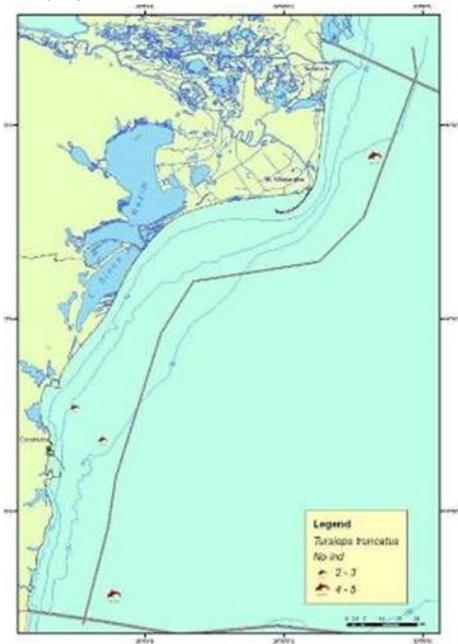


Fig. 3.2.1 Distribution map of *Tursiops truncatus ponticus* dolphins sighted at sea, during April-July 2002

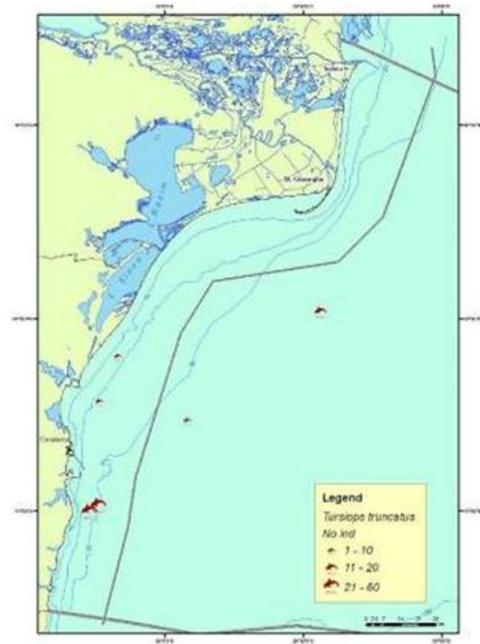


Fig. 3.2.2 Distribution map of *Tursiops truncatus ponticus* dolphins sighted at sea, during April-September 2003

The observations made aboard the helicopter, during July-August 2002, for the aerial monitoring of dolphins, resulted in the sighting of 15 *Tursiops truncatus ponticus* dolphin individuals (10 adults and 5 calves) (Fig. 1.2.6).

The dolphin monitoring activities aboard vessels carried-out in August 2004 resulted in the sighting of groups comprising 1-7 *Tursiops truncatus ponticus* individuals (Fig. 3.2.3) [44].

The research carried-out at sea, aboard vessels, in order to monitor dolphins during April-August 2004 resulted in the sighting of groups comprising 1-12 dolphins or larger herds comprising 60-80 *Tursiops truncatus ponticus* individuals; 84% of these dolphins were located in the northern part of the Romanian coast (Fig. 1.2.8)[41, 44].

The observations made aboard the helicopter, during the summer season 2004, resulted in the sighting of 61 dolphin individuals, of which 10 *Tursiops truncatus ponticus*, while more than 50% could not be identified (Fig. 1.2.9).

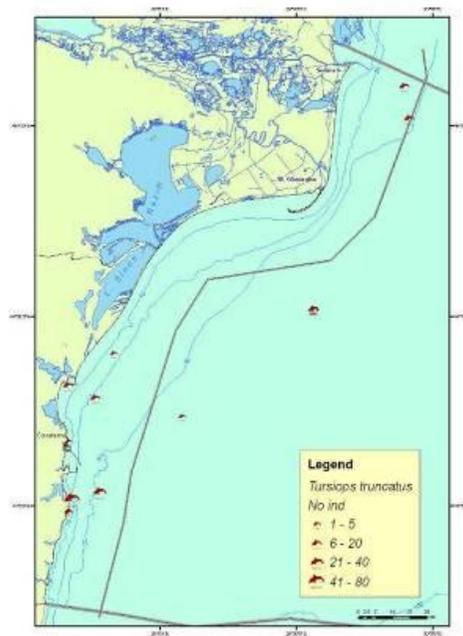


Fig. 3.2.3 Distribution map of *Tursiops truncatus ponticus* dolphins sighted at sea, during April-August 2004

3.3 Major, minor and occasional habitats

Tursiops truncatus ponticus is widely spread in the Black Sea. It may swim at depths up to 90-100 m. This species is encountered in small groups, comprising 4-10 individuals, above the continental shelf and herds larger than 25 individuals are common in the open sea areas. The bottlenose dolphin swims with approximately 33 km/hour [31].

Usually a ichthyobenthophagous species, it approaches the shore mainly in spring. Adults feed on benthic and pelagic fish, shrimps, crabs and molluscs. It may also feed on large fish (gray mullet) [34].

The monitoring of dolphins in the area close to the shore pointed-out that they prefer areas where fish form feeding agglomerations and their migration routes, respectively. In addition, it must be emphasized that bottlenose dolphins come very close to the protection moles of the Midia, Mangalia and Constanța harbors, often entering the harbor enclosure, due to the fact that they can find here small shoals of their favourite fish (gray mullet, horse mackerel, bluefish etc.) [41, 44].

3.4 Critical habitats

From the fishery point of view, there is a reciprocal impact between humans and marine mammals, due to the fact they have similar vital interests, namely fish consumption, most of the times in the same areas and during the same times [3, 46].

There is little information on the influence of cetaceans on commercial fisheries in the Black Sea. No special estimates have been made, except for certain erroneous estimations of the annual amount of fish consumed by dolphins, hence the conclusion that



dolphins are the main threat for fisheries, being responsible for the depletion of fishery resources.

Fisheries may cause a series of effects on cetaceans, among which the following:

- modification (reduction or enhancement) of feeding possibilities;
- behavioral changes;
- alteration of distribution, migration and breeding capacity.

Pelagic and coastal fishing may affect cetacean populations by the overfishing of the fish species which are food sources for the dolphins [2, 3 and 29].

The fishery activity may alter dolphins' behaviour and fishing strategy, cetaceans being often sighted close to fishing vessels, active trawl, near or inside passive fishing gear (trap nets, gillnets, longlines) [3].

The deterioration of dolphin habitats by fisheries can occur in several ways:

- the large number of fixed tools - trap nets, gillnets etc. - significantly reduces the living area of dolphins, increasing highly the possibility of entanglement herein;
- bottom trawling, aside from being a direct hazard for cetaceans, also destroys benthic fauna, eliminating important links in the food chain;
- pelagic trawling is also a direct hazard, as there is the likelihood of dolphins being trapped in the net, however it mainly influences food resources, as they are little selective, affecting both adults and spawn [3, 37 and 48].

However, according to field observations, the greatest hazard for the Black Sea dolphins is represented by turbot gillnets, with one net wall and especially three wall gillnets, as they have a high catchment capacity and increased tear resistance, which results in the reduction of dolphins' escape chances after entanglement [2, 3 and 29].

3.5 Population

Entanglement in fishing gear, collision with boats, habitat degradation, certain persisting human influences and loss of food sources are only part of the causes still leading to the drop of this species' population. In addition, in the past years, there have been some mass mortality outbreaks, which resulted in the death of thousands of bottlenose dolphins [6].

The breeding peculiarities of this species are the main natural factor limiting the population increase of *Tursiops truncatus ponticus*. In addition, by the early 1980's, the *Tursiops truncatus ponticus* populations suffered greatly because of the industrial fishing of this species, activity highly developed in certain Black Sea riparian countries. With the view to protecting and preserving dolphin populations in the Black Sea, in 1966, the industrial fishing of dolphins was forbidden in Bulgaria, Romania, the Russian Federation, Ukraine, and, in 1983, in Turkey, as well [50, 35, 45 and 49].

In the 1980's, *Tursiops truncatus ponticus* dolphins were listed in the National Red Books of Georgia, Russia, Bulgaria and Ukraine. At international level, this species is protected by the Bern, Bonn and Washington conventions, it is listed in the IUCN Red Book, and, since November 1996, it is protected by the Agreement on the Conservation of Cetaceans in the Black Sea Mediterranean Sea and Contiguous Atlantic Area.

IUCN Status: Subregion level: EN in Romania.

3.6 Population trend

Currently, the actual size of the total cetacean population in the Black Sea is unknown, however the research carried-out suggested that the size of the current *Tursiops truncatus ponticus* population could range around several thousand individuals, no more than 15,000 [14]. It is known that, among the three cetacean species in the Black Sea, *Tursiops truncatus ponticus* has had the lowest abundance [11, 14].

As previously suggested, the cetacean population size in the Black Sea suffered greatly due to direct killing and, in spite of the assumption that during the following stage a slight recovery trend was noticed, the significant losses of the 1980s have not been recovered yet [13].

CONCLUSIONS

The observations carried-out at sea, aboard vessels, crafts or marine drilling platforms, with the view to individual or group location of dolphins at the Romanian coast, were performed starting with September 2001, in the area between Vama Veche and Sulina, on the 8-65 m isobaths.

The dolphin population distribution, frequency and structure were determined based on sightings both in the open sea and close to the shore.

Dolphin monitoring at sea was made during calm sea, as it allows the location of individuals at great distances from the survey vessel.

The research performed on cetaceans at the Romanian Black Sea coast resulted in obtaining data concerning their occurrence frequency and distribution in Romanian waters (open sea and shallow coastal waters, respectively). In addition, the analysis and processing of the field data resulted in obtaining information on the social structure of dolphins, preferred habitats, as well as the effects of fishing gear operation on cetaceans.

The higher frequency of dolphins in the central and northern area may be accounted for by the larger fish agglomerations present here for feeding and breeding.

Dolphin monitoring at sea also pointed-out another issue, namely the fact that they prefer clean water areas, with rich and diverse food sources. This aspect was found in the central and northern area, where dolphins are attracted by fish agglomerations for feeding and breeding.

There were several cases in which it was noted that dolphins crowd in clean water sectors (8-10 m transparency, blueish water colour), east of the separation line of varying salinity waters (brackish/marine), from where they make short trips towards the shore, for feeding purposes.

The occurrence of dolphins in different percentages in the two sectors of the Romanian coast may be correlated with the food sources - fish - forming agglomerations in relation to hydro-climate and biological factors.

In conclusion, a non-uniform distribution of dolphins in the Romanian marine sector resulted, mainly determined by the seasonal evolution of environmental conditions and the presence of fish agglomerations, which are the main food for dolphins.

Aerial monitoring is considered an efficient method, given the fact that it provides the coverage of a large area during a brief time interval and dolphins can be easily identified and counted, however it has a drawback as well, namely it is extremely expensive.



The dominant species from the number of individuals point of view, sighted during flight, was *Tursiops truncatus ponticus*. The only calves sighted belong to the species *Delphinus delphis* and the number of dolphins in one group ranged between 2 to 30.

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