Report of the

1st International Workshop

Conservation and research networking on short-beaked common dolphin (*Delphinus delphis*) in the Mediterranean Sea

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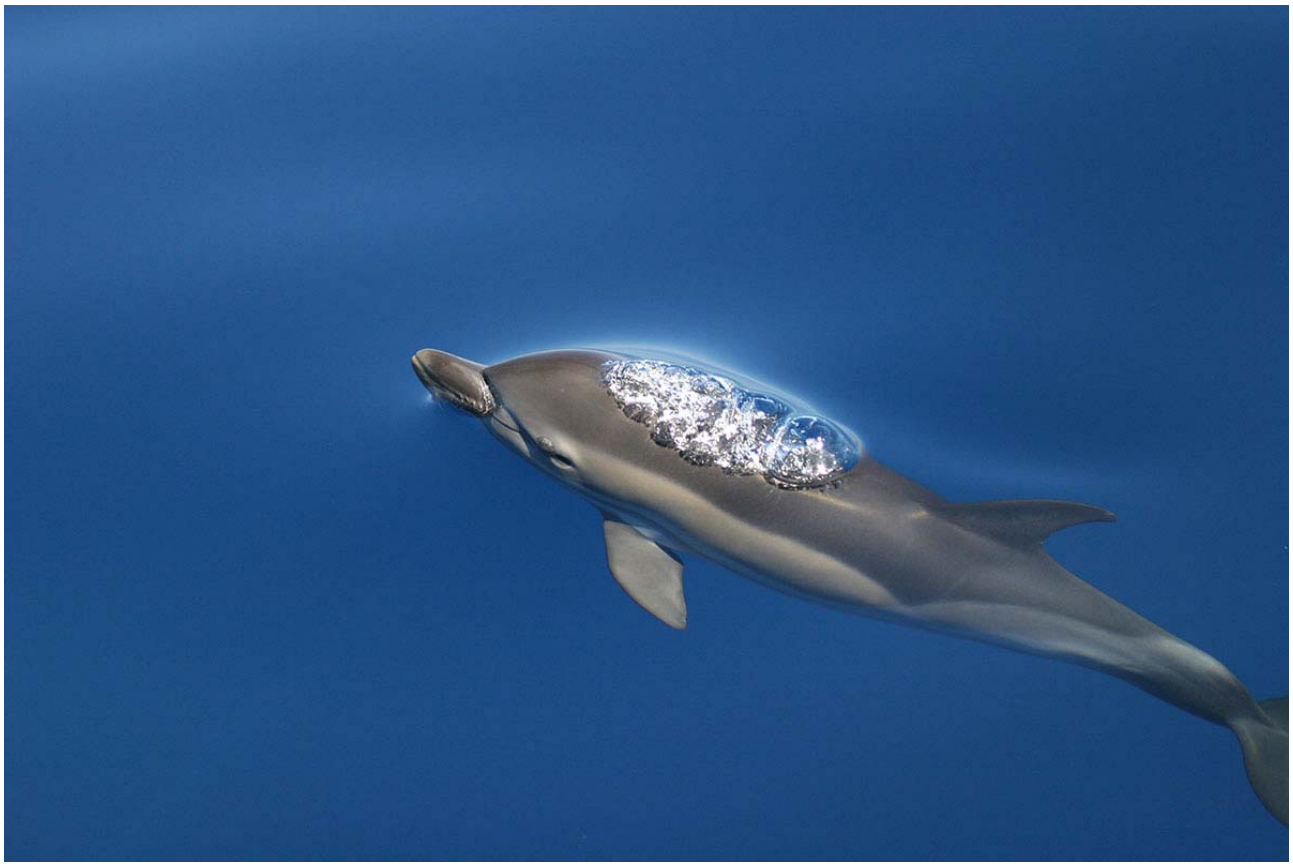

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Introduction

Oceanomare Delphis Onlus (Italy), BICREF (Malta) and OceanCare (Switzerland), jointly organized the 1st International Workshop on short-beaked common dolphin (*Delphinus delphis,* Linneaus 1758), which took place in Ischia, between the 13th and the 15th of April, in order to assess the status of the Mediterranean population, understand the major threats it faces and outline conservation action plans. Furthermore, the process for the IUCN red List re-assessment of the Mediterranean population was started.

The workshop brought together representatives of leading academic institutions, NGOs and research groups of the Mediterranean and European countries, with contributions from Algeria, France, Greece, Ireland, Israel, Italy, Libya, Malta, United Kingdom, Slovenia, Spain, Switzerland, Tunisia and Turkey.

Background

The short-beaked common dolphin is widely distributed throughout warm-temperate and tropical waters, from nearshore to offshore habitats (Perrin, 2002).

Although the taxonomy of the genus *Delphinus* is still subject of debate, currently there are two recognized species of *Delphinus*: the short-beaked common dolphin and the long-beaked common dolphin (*Delphinus capensis* Heyning and Perrin, 1994). Two endemic subspecies have been suggested, one of the short-beaked form (*Delphinus delphis ponticus* Barabash-Nikiforov, 1935) distributed in the Black Sea and one of the long-beaked form (*Delphinus capensis tropicalis* Van Bree, 1971) found in the Northern Indian Ocean and Red Sea.

In the Mediterranean Sea, the short-beaked common dolphin inhabits pelagic and neritic waters (Notarbartolo di Sciara & Birkun, 2010). In the past, this species was widely distributed throughout the Mediterranean basin and, until the 1960s, was considered the most abundant cetacean species. During the past decades, however, the species declined throughout the region (Bearzi et al., 2003) with notable strongholds remaining only in the Alboran Sea (Cañadas & Hammond, 2008) and around the Maltese Islands (Vella, 2005). Declined abundance raised conservation concerns, and in 2003 the Mediterranean short-beaked common dolphin was listed as Endangered in the IUCN Red List of Threatened Animals, based on criterion A2, which refers to a 50% decline in abundance over the last three generations, the causes of which 'may not have ceased or may not be understood or may not be reversible'.

Long-term monitoring has been carried out around the islands of Malta (Vella, 2005), Lampedusa, Italy (Habitat Directive Reporting, 2014; Pace et al., 2015), Ischia, Italy (Mussi & Miragliuolo, 2003; Pace et al., 2015), the Inner Ionian Sea Archipelago, Greece (Bearzi et al., 2003, 2008; Piroddi et al., 2011), and in the Alboran Sea (Cañadas & Hammond, 2008). However, information on occurrence, distribution and habitat use in the Mediterranean Sea remains fairly sparse, with little published data.

Objectives and main workshop topics

The workshop was organized in order to promote greater participation, international dialogue and scientific knowledge transfer (including presentation of recent and still unpublished studies). Such exchange of research experience was intended to strengthen the scientific and conservational efforts for the species.

The workshop participants contributed information regarding various aspects of the biology, current status and trends of common dolphins. Such contributions were relevant in order to:

1) *Share scientific information and methodologies* between different research groups. No large coordinated studies on short-beaked common dolphin have occurred across the Mediterranean and only a small number of teams have photo-identification catalogues of this species. The level of detail and effort dedicated to scientific research on common dolphins in the Mediterranean varies considerably. Relatively small research groups, often NGOs, carry out the majority of the studies.
2) *Set up the basis to update the assessment of the Mediterranean subpopulation of the species under the IUCN Red List criteria.* IUCN assessments are generally updated every 10 years. As the last assessment was carried out in 2003, and with new information available, a review on the status on the species in the Mediterranean is due.
3) *Enhance conservation efforts,* both locally and internationally. Provide a forum for scientists working on common dolphins in the Mediterranean Sea to discuss relevant topics, share experiences, and make recommendations.
4) *Define a platform for launching new partnerships*, activities or projects. The workshop has encouraged all the participants to collaborate in writing projects to sustain long-term research, monitoring and integrated management in the Mediterranean area.

Overall Workshop outcomes

- A declining trend in presence and abundance of this species was highlighted in some Mediterranean regions where long-term studies are ongoing. In the Ionian Islands, common dolphins formerly manifesting a strong site-fidelity towards the Inner Ionian Sea Archipelago (also referred to as Kalamos) appear to have expanded their home range quite significantly towards neighbouring areas where, until now, based on the limited data available, the species was not considered to be regularly present (Gonzalvo & Costa, this report). In the Gulf of Corinth, (Greece) a geographically distinct conservation unit, with likely little demographic and genetic exchange, faces a high risk of extinction due to its small population size (22 animals estimated in 2011–2015), limited extent of occurrence, and suspected hybridisation with a 60-fold larger unit of striped dolphins (Bearzi et al., in press; this report). In the Island of Ischia (Italy) yearly encounter rates had a significant steady decline between 2000 and 2013, and no common dolphin encounters were documented in 2014 and 2015 (Pace et al., submitted; Mussi et al., this report).
- Genetic differentiation between the Mediterranean and the Atlantic populations and further differentiation within the Mediterranean, between Eastern (Ionian) and Western

(Alboran) units was observed. This differentiation is likely to have evolved recently and to have been reinforced by a bottleneck event that recently affected the Ionian common dolphins.

- New data on presence and distribution were presented for both Italian (around Sardinia and in Messina Strait) and Greek waters (North Aegean Sea).
- New information on strandings in Algeria was delivered, as well as for Southern Israel, where common dolphin stomach contents revealed the dominance of an unusual prey item (*Ariosoma balearicum*).
- Results on the diet of common dolphin in the Alboran and North Aegean Sea, and in Southern Israel supported previous knowledge that the species is mainly piscivorous, cephalopods being found in low quantities.
- Photo-identification was confirmed as a powerful method for estimating abundance and movement patterns.
- Aerial surveys were used to study the large home range and movements of the species year-round and to report the number, composition and size of groups encountered at different times of the year.
- Knowledge gaps were identified in several Mediterranean areas including the waters off Morocco, Algeria, Libya, Egypt, Lebanon, and Syria.
- To re-assess the status of the species under the IUCN Red List, the combination of different criteria (which requires full understanding of the IUCN Red List categories and criteria and guidelines for using them) should be considered.

Recommendations for conservation and management

Factors thought to be the cause of continuing decline include incidental mortality in fishing gear, contaminants, prey depletion, and climate change. Enforcing existing regulations and conservation measures may reduce some of the pressures faced by common dolphins in the Mediterranean.

1) *Bycatch*

Within the Mediterranean Sea under Regulation 812/2004, European Union Member States have to monitor and report on pelagic/midwater trawl fisheries operating east of line 5°36'W. Monitoring of static gear is not required within the basin. In European waters, fixed net gears generally pose a much higher incidental capture risk to cetaceans compared to towed gear. As outlined by the International Council for the Exploration of the Sea (ICES Working Group on Bycatch of Protected Species) in 2015 "The lack of mandatory monitoring of static gears in the Mediterranean and Black Seas represents a significant loophole in Reg. 812 reporting requirements." We recommend the inclusion of static gear fisheries in the Mediterranean Sea within the proposal revising the Data Collection Framework that may supersede the 812/2004 Regulation.

We also support the recommendations of the executive secretariat of ASCOBANS transmitted on 30 October 2015 to the European Commission relating to

the "Requirements of Legislation to Address Monitoring and Mitigation of Small Cetacean Bycatch" and including recommending overarching legislation for cetaceans in European waters to ensure the effective protection of cetaceans from all threats.

2) *Contaminants*

As high trophic level predators, marine mammals are more vulnerable than other marine organism lower down in the food chain to the accumulation of high concentrations of anthropogenic contaminants and thus more exposed to their toxic effects (WHO/UNEP, 2015). The toxic effects of Persistent Organic Pollutants (POPs) include immunosuppression and reproductive impairment; in particular, the high concentrations of DDT metabolites and PCB congeners (known as endocrine disrupting chemicals, EDCs) found in Mediterranean common dolphins are thought to be an important stress factor for the species (Fossi et al., 2003). The EU has implemented a number of legislative measures that are related to POPs (see The Union Implementation Plan, 2014). As sentinels of marine ecosystems, monitoring POPs concentrations in cetaceans should be considered for inclusion as an indicator under descriptor 8 within the European Marine Strategy Framework Directive (MSFD) (Directive 2008/56/EC).

3) *Prey depletion*

The exploitation of marine ecosystems and the depletion of food resources due to overfishing may represent major factors in the top predators' global decline (IUCN, 2015). Mediterranean fish stocks are largely overfished (FAO, 2016). Between 1950 and 2010 Mediterranean catches were 50% higher than reported by FAO and there is clear evidence of decline in catches,, with a stronger decline since the 1990s (Pauly & Zeller, 2016). In western Greece, the decline of common dolphins has been attributed to the depletion of small schooling fishes (Bearzi et al., 2008).

We recommend the establishment of no-take areas in common dolphin critical habitat, at least for fishing gears know to deplete common dolphin prey (*e.g.* purse seiners) and severely damage the coastal environment (*e.g.* bottom trawlers).

Furthermore, to better understand the biological and ecological processes which control prey depletion, we suggest the implementation of extensive stock assessments for fish and cephalopod species eaten by common dolphins, including non-commercial species and studies of diet (e.g. based on stomach contents analysis of stranded animals).

4) *Climate change*

In the last few years the natural evolution of the Mediterranean biome has been perturbed by the effects of climate change. In particular, shifts in temperature, circulation, stratification, nutrient input, oxygen content and ocean acidification are likely to have greatly modified the marine ecosystems (Doney et al., 2012; UNEP, 2009, 2010).

Long-term monitoring of the Mediterranean common dolphin critical habitat has revealed specific examples of climate change effects, such as reported by Cañadas and Vázquez (2016) for effects of sea surface temperature on availability of suitable habitat in the Alboran Sea. Since the evidence to date primarily comes from a single

region, the Alboran Sea, it is important to assess how representative this area is of other parts of the Mediterranean.

There is also the need to evaluate whether such relationships are direct, *e.g.* due to the limits of a species thermal neutral zone, or whether they are indirect, *e.g.* due to an effect on preferred prey species (MacLeod, 2009).

We suggest to investigate whether the ranges of common dolphins are, in fact, driven by water temperature rather than by other factors which currently co-vary with temperature.

5) Other threats

To mitigate a number of threats such as underwater noise, recreational vessel traffic and whale watching disturbance, the designation of protected areas should be considered where short-beaked common dolphin critical habitats are known to occur. The ACCOBAMS resolution 4.15 (2010) lists the following areas of special importance for the common dolphin: Kalamos (Greece); The Alborán Sea; waters surrounding the island of Ischia (south-eastern Tyrrhenian Sea, Italy); waters surrounding the island of Malta and south-eastern Sicily, Italy; the eastern Ionian Sea and the Gulf of Corinth (Greece); the Sazani Island – Karaburuni Peninsula (Adriatic and Ionian Sea, Albania); the Gulf of Saronikos and adjacent waters (Argo-Saronikos and southern Evvoikos Gulf, Greece); waters surrounding the northern Sporades (Greece); the northern Aegean Sea (Greece); and waters surrounding the Dodecanese (Greece). Currently, the only established Mediterranean Marine Protected Area specifically designated to protect short-beaked common dolphin critical habitat is the Italian MPA "Neptune Kingdom" of the Island of Ischia Procida and Vivara, which until now has not implemented practical measures to preserve the species.

We recommend undertaking surveys in poorly-known areas (particularly off the coasts of North Africa), increased efforts to identify and establish other protected areas encompassing common dolphin critical habitat, and working to ensure that specific protection measures are implemented within designated protected areas.

Goold (1996) found that common dolphins were temporarily disturbed by seismic surveys, and Stone & Tasker (2005) confirm this first observation, describing the animals' avoidance reaction to airguns.

To limit the impact of anthropogenic noise on common dolphin habitat, it would be beneficial to implement the recommendations from the CMS Resolution 10.24 on Further Steps to Abate Underwater Noise Pollution for the Protection of Cetaceans and Other Migratory Species, which are consistent with resolutions and papers on this topic adopted under other international fora during the last years.

Vessel presence has been shown to increase travelling and avoidance behaviour in common dolphins at the expenses of foraging and resting (Neumann & Orams, 2006; Stockin et al., 2008). In particular, common dolphin foraging behaviour has been demonstrated to be altered and reduced by boat interactions (Meissner et al., 2015), with possible consequences for individual health and ultimately reproduction (pregnancy and nursing; Young & Cockcroft, 1995).

In the Mediterranean, disturbance by whale watching vessels currently occurs in the Bay of Algeciras (a recognized feeding and breeding ground for common dolphins; Giménez et al., 2011) mainly by Gibraltar (UK) companies. We recommend the application of the guidelines for commercial whale watching activities included in the ACCOBAMS resolutions 4.7 (2010) and 5.10 (2013).

Recommendations for further research

Based on the evidence presented and discussed, the following requirements were identified:

1) *Abundance*
   - conduct well-designed surveys in areas known to include important habitat, as well as large-scale surveys in areas where no information is available;
   - compile and compare status and abundance trends in different areas, where necessary accounting for differences in research approaches;
   - develop and apply innovative techniques for abundance estimation, such as integrating photo-identification and acoustic records.

2) *Distribution and habitat use*
   - develop and implement predictive models of presence and distribution using sighting and survey effort data, *inter alia* to identify potential common dolphin habitats where new surveys should be conducted, while revealing sites that should be suitable for the species but which are not utilised due to anthropogenic or other changing conditions. The latter need to be investigated in order to facilitate future management improvements to reduce distribution fragmentation and increase accessibility of suitable habitats for the species.

3) *Stock assessment and genetics*
   - define spatial (population, subpopulation, management unit) and temporal scales for management through genetics, ecological tracers, pollutant profiles, morphometrics as well as through monitoring of individual movements (site fidelity, home range);
   - collect samples from different regions of the Mediterranean for genetic analysis to clarify population structure.

4) *Threats and causes of death*
   - increase studies on interactions with human activities to assess possible impacts on common dolphins and determine, whenever possible, the causes of death of stranded individuals;
   - analyse data and samples from stranding networks (MEDACES) in a systematic and coordinated way; extend and enhance strandings monitoring to cover all Mediterranean coasts;
   - use the data collected to monitor threats and to help construct population and ecosystem models.

5) *"Novel" information sources*

- use citizen science data to complement information on distribution and abundance, with data filtering protocols to avoid species misidentification;
- implement historical research, where available, to investigate long-term trends and set appropriate baselines, *e.g.* through the analysis of museum collections, historical literature, time series of fishery catches and long-term stranding databases.
- ask government officers permission to access the reports of cetacean surveys by oil and gas companies, bearing in mind the variable quality of such information.

6) *Knowledge gaps*

- strengthen the research effort off southern Mediterranean coasts and in offshore waters;
- review information and results from different studies in order to obtain a more comprehensive picture of the conservation needs of the Mediterranean population.

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ABSTRACTS

Common dolphins: ecology, threats, research and conservation

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The Mediterranean Sea is generally oligotrophic, although with some productivity hotspots, with relatively high biodiversity but also high levels of maritime traffic and tourism and a high human population living in "water-poor" countries. Environmental threats include habitat destruction, prey depletion, invasive species, microbial pathogens, pollution and climate change. The Mediterranean short-beaked common dolphin is listed as endangered in the IUCN Red List and its abundance is thought to have fallen by over 50% in the last 40 years, although causes of the decline are poorly understood. There are likely three genetic stocks (east and west and Black Sea) but Management Units have not been defined.

Previous high abundance is evident from historical records and specimens but there are no large-scale population estimates. An internationally coordinated visual survey covering the whole Mediterranean Sea is needed, plus coordination of small-scale surveys but the regular occurrence of mixed common and striped dolphin groups presents an important challenge.

Monitoring of strandings can give important insights into biology and ecology, also helping to construct population and ecosystem models. Some strandings schemes exist in the Mediterranean, more effort is needed to gather and analyse data and samples in a systematic and coordinated way. It is thought that common dolphins need a diet rich in fat fish and overexploitation of sardine and anchovy may have been a factor in their decline. Dietary data and ecosystem models are needed to understand effects of changing prey abundance.

Important threats include fishery bycatch, prey depletion, contaminants and underwater noise. Recent research suggests that Mediterranean fisheries have removed far more fish than indicated by FAO data. Significant common dolphin mortality has been recorded in drift net and gill net fisheries in the Mediterranean and systematic monitoring of by-catch is needed.

The Mediterranean has numerous coastal pollution hotspots. PCBs are known to cause reproductive failure and immune suppression in marine mammals and high concentrations have been recorded in Mediterranean marine mammals. PCB concentrations may be falling but other compounds with likely similar effects continue to be developed and released into the oceans, along with an estimated 8 million tons of plastic per year globally, to which Egypt is among the top 10 contributors. Phalates from microplastics have been detected in fin whales from the Mediterranean and may have significant adverse effects. The role of disease in the decline of common dolphins remains unknown but striped dolphins have suffered two major morbillivirus epizootics in the Mediterranean. Other possible threats include non-

indigenous species, noise and other disturbance from shipping and climate change. Climate projections for the Mediterranean region point to reduced rainfall and higher temperatures.

Mediterranean common dolphins are protected by national laws and international agreements, including the Barcelona Convention Protocol on Specially Protected Areas and Mediterranean Biodiversity. However, lack of implementation and compliance remain major obstacles to achieving conservation objectives, as is the lack of monitoring. In Europe, the MSFD is probably the major focus of current marine conservation efforts. Issues include the difficulty of detecting changes in cetacean abundance and a difficulty in identifying suitable management measures. Implementing fishery by-catch mitigation is one key measure. Given the lack of monitoring, a precautionary approach is needed, with action taken on gears with known high bycatch rates (e.g. gillnets, purse seines, drift nets). The USA Marine Mammal Protection Act provides a possible model for future legislation. Controls on overfishing and pollution are important but even less tractable priorities.

Common dolphins, common in neritic waters off southern Israel, demonstrate uncommon dietary habits

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During the last decade, the common dolphin (CD) has become the second most sighted dolphin in Israeli coastal waters, after the common bottlenose dolphin (CBD).

Sightings, delimited within a 10 km strip, are almost exclusively confined to the southern half of the coast and are comprised of rather large groups (mean±SD: 21.5±13.3), often with young calves. They are sighted year round, less often in the cold season. Seasonality however may be biased by observation effort, as documentation almost totally relies on opportunistic, photo and/or video-backed, second party reports.

Figure 1: Common dolphins in Israeli water

Strandings are relatively scarce (CBD/CD=8/1), usually one per year, but due to a cluster in 2012, 4 stomach contents were available for diet analysis.

Cephalopod beaks comprised <3% of the combined prey items. Surprisingly, by far the most abundant and prevalent prey item found (56% of combined content; present and dominant in 3 out of 4 stomachs) was the Balearic eel (*Ariosoma balearicum*), a sand burrower which is also a major dietary component of the CBD.

The latter cetacean is locally known to forage and feed behind bottom trawlers, which makes us believe that (some?) CDs also make common use of this foraging mode. Indeed, in addition to their association with purse seiners, they have several times been documented accompanying bottom trawlers.

Interestingly, while CBD is quite often a victim of trawl-net bycatch, there was not a single incident involving CD. CBD, when following trawlers feeds at the mouth of the net, where it has the opportunity to enter it and get entrapped. CD is seen to swim and dive at the cod-end of the net, where the small and slender eels may be escaping through the net's eyes.

Information gaps include range extension to the south/southwest, abundance estimation and genetic flow/isolation. While we could not identify specific threats, considering the state of the Mediterranean sub-population, we are of the opinion that the southeastern Levantine sub-sub-population should be considered a conservational management unit in need of protection and its area of occupancy, an Area of Special Importance for Mediterranean CD.

Trophic ecology of common dolphins in the Alboran Sea (Mediterranean Sea)

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The Mediterranean subpopulation of common dolphin (*Delphinus delphis*) is classified as "endangered" by the IUCN as it is estimated that abundance has declined by 50 percent in recent decades. Information about the diet of this species in the Mediterranean Sea is scarce. Common dolphin has been described as an opportunistic feeder, although epipelagic and mesopelagic fish have been found more often in the stomachs of stranded animals. In this study, stomach contents of 37 common dolphins stranded in the Alboran Sea and Strait of Gibraltar, two of the areas with the greatest abundance of this species in the Mediterranean, are analyzed. A total of 13,603 individual prey of 28 taxa were identified using fish otoliths and jaw bones and cephalopod mandibles. The average diversity of prey in the stomachs was 4 (range 1-11). The family Myctophidae (86.82% N, 59.46% O, 55.63% W, 8469.74 IRI) was the most important group, especially *Ceratoscopelus maderensis* (60% N, 45.95% O, 29.96% W, 4133.45 IRI) and *Notoscopelus* sp. (20.43% N; 32.43% O, 24.33% W, 1451.68 IRI), followed by the family Sparidae (0.78% N, 35.14% O, 16.55% W, 608.84 IRI) especially bogue *Boops boops* (0.76% N, 35.14% O, 15.97% W, 587.49 IRI). Results indicate that the diet of common dolphins in this area is piscivorous, with predominance of myctophids. Cephalopods were found in low quantities (0.23% N, 27.03% O, 0.27% W, 13.47 IRI). These studies are needed to determine the role that common dolphins are playing as top predators in the Mediterranean and to evaluate the possible competition with local fisheries to implement proper management action to conserve the endangered subpopulation of common dolphins of the Mediterranean Sea.

The common dolphin's presence in Libya, state of knowledge and gaps

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Information about cetaceans in the southeast Mediterranean coast is considered limited and fragmented due to lack of studies and research. Basic information about cetacean species' presence and occurrence is either absent or not clear, such is the case with the Libyan sea (which encompass 40% of the north African coast).

Two studies were conducted in relation to the presence of *Delphinus delphis* in Libya. The first was conducted in 2013-2014 as a review to gather and compile historic data on small cetaceans and other megafauna in the country. Along with few publications, the study approached fishermen, sailing and diving clubs, museums and privet collectors to look for anecdotal evidence for any cetaceans' sightings or strands.

The other study was mainly a socio-economic survey that was conducted in 2013 to assess anthropogenic impacts on the marine environment of Al-kouf National Park (northeast Libya). Part of the questionnaire adopted in the survey was to assess the degree of interaction between the local artisanal fisheries and the small cetaceans present there.

Results from both studies suggest that there was hardly any strandings recorded for the common dolphin in Libya (2 proven cases) while there were several sightings (pods of 3 -16 individuals) on several locations (figure 1). The common dolphin was also identified by the fishermen in the latter study as the second most recognised/common species encountered after the bottlenose dolphin.

However little, these few indications suggest that the species might be present in high abundance in the Libyan waters. Hence, it is highly recommended that research should be conducted and promoted in selected parts of the country to know more about the species.

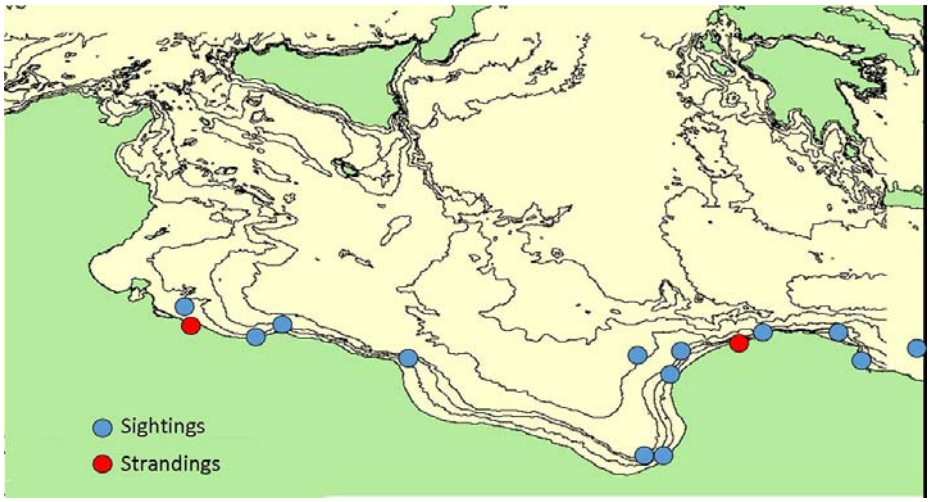

Figure 1: sighting and stranding records along the Libyan coast.

Comparison of habitat use of bottlenose dolphin (*Tursiops truncatus*) and short-beaked common dolphin (*Delphinus delphis*) in Tunisian northeastern coasts

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The occurrence of two species of Delphinidae in the same geographical area is frequent and has been reported for the common bottlenose dolphins (*Tursiops truncatus*) and the short-beaked common dolphins (*Delphinus delphis*) in the Mediterranean basin.

Between January 2012 and January 2013, a total of 45 boat-based surveys were conducted with a total of 360 hours of survey effort. We studied the occurrence and distribution of bottlenose and short-beaked common dolphins and analyzed differences between group dynamic (group size and composition) and spatial distribution (depth and distance to coast).

From a total of 67 independent sightings of Delphinidae, 57 were of bottlenose dolphins and 10 were of short-beaked common dolphins. Both species were observed generally in small groups (<5 ind.). Groups of bottlenose dolphins included both adults and calves, contrary to the short-beaked common dolphins which groups are predominantly composed by adults (n=6).

Analysis of spatial distribution showed a difference. We recorded in several sightings, in the same area, the overlapping of groups of both species. Results show that *T. truncatus,* in contrast to *D. delphis,* are more closely related to the inshore than to the offshore ecotype. Bottlenose dolphins are more encountered in shallower waters (<70m) near shore (<15NM). In contrary, short-beaked common dolphins are occurring preferentially in deeper waters (>150m) and more distant to coast (>15NM). These differences suggest that habitat preference is due to differences in these species ecological niches and preys abundance.

Due to the lack of data, further researches must be carried out to ameliorate our knowledge on feeding ecology of these two species.

Occurrence of short-beaked common dolphins in the Gulf of Trieste (northern Adriatic Sea)

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This contribution reviews the past and recent occurrence of short-beaked common dolphins (*Delphinus delphis*) in the wider area of the Gulf of Trieste and the Northern Adriatic Sea, based on published and unpublished accounts as well as new original data. Historical evidence suggests that short-beaked common dolphins used to be a regular occurrence in the Gulf of Trieste and the rest of the Adriatic Sea during most of the 20th century. However, by the end of 1970s, they virtually disappeared from the northern Adriatic Sea and probably most other parts of the basin, likely due to systematic culling and habitat degradation. Systematic boat surveys in the wider area of the Gulf of Trieste between 2002 and 2015 confirmed that the common bottlenose dolphin (*Tursiops truncatus*) is the only regularly occurring cetacean there. Despite this, several sightings of short-beaked common dolphins were recorded in the area between 2009 and 2012. Dorsal fin markings allowed the photo-identification of some of these individuals. Most of the sightings involved single individuals, but some included a mother-calf pair. This pair involved a female that was temporarily resident in the area for 16 months, and remained in a port for almost a year, a behaviour atypical for this species. Photo-identification showed that this individual was previously sighted in the Inner Ionian Sea Archipelago in Greece, over 1000 km from the Gulf of Trieste. This is currently the longest documented movement for any individual of this species, worldwide. Nevertheless, at present times, the short-beaked common dolphin can be considered extremely rare in the wider area of the Gulf of Trieste and in the northern Adriatic Sea.

Abundance, distribution and diet of short-beaked common dolphins (*Delphinus delphis*, Linnaeus, 1758) in the North Aegean Sea, Greece.

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The abundance, distribution and diet of short beaked common dolphin were investigated as part of a first detailed study on cetacean populations in the Greek North Aegean Sea. This area, in particular the Thracian Sea where the research took place, is extremely productive and largely exploited by both coastal and mid-water fisheries. It is also considered important for cetaceans and it has been proposed as a potential cetacean conservation area by ACCOBAMS and other entities.

Abundance and distribution were investigated between 2005 and 2013 through dedicated scientific marine surveys. Data were collected during a total boat survey effort covering 14,701 km in sea conditions ≤ Beaufort 3; the study area of about 2000km^2 included the Gulf of Kavala and the sea around the island of Thassos. The survey used the line-transect sampling method to estimate relative abundance, calculated using Distance software 6.0. Dolphin sightings were successively correlated to eight environmental variables using GAM and PCA.

Cetacean strandings were recorded since 1998 in the entire Thracian Sea, and stomach sampling started in 2002 for diet analysis. Stomach-content analysis was performed on a total of 26 suitable specimen samples, among them 8 belonged to common dolphins. Trophic level of the species was calculated.

Six cetacean species were recorded in the study area; the common dolphin was the second most abundant species after the bottlenose dolphin. Common dolphins presented an encounter rate of 0.24 groups/100km (1.5 dolphin/100km) and a mean group size of 6.88 (SE=1.90). The relative abundance of common dolphins in the Gulf of Kavala and Thassos was obtained with Distance analysis after post-stratification. The yearly relative abundance in the area was estimated at 185 individuals (95% C.I. = 118 – 284; CV = 22.55).

The correlation with environmental parameters showed that common dolphin sightings correlated with depth ($p = 0.035$), temperature ($p = 0.022$ for median temperature and $p = 0.001$ for temperature gradient) and salinity ($p = 0.001$ for median salinity and $p = 0.024$ for salinity gradient). These parameters affect the distribution of common dolphins' prey, in particular of pelagic fish.

Results from the stomach-content analyses showed that common dolphins ($N = 8$) fed mainly on species from the Clupeidae, Myctophidae and Centracanthidae families which composed 59% of stomach-content. Cephalopods in the stomachs analysed were very rare. Although

important commercial fisheries species were found during diet analysis, in none of the stomachs investigated their presence was considered dominant on other species. Results of the trophic level calculated from the diet indicated the common dolphin as a top predator in the food web of the region.

This research, providing the first abundance, distribution and diet data of common dolphins in the northernmost part of the North Aegean Sea, confirm and corroborate the ACCOBAMS proposal of the need of a conservation area for common dolphins and other cetacean species in the Thracian Sea. In fact, as already presented, the area is widely used both by humans and dolphins and risk of interaction is very high.

Distribution and habitat of *Delphinus delphis* in the Mediterranean Sea as obtained from small boat dedicated surveys

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The common dolphin is often described as a generally uncommon species in the Mediterranean Sea, with the exception of the Alboran Sea and a few restricted regions. Historical elements suggest that *Delphinus delphis* was more frequent one century ago, at least in regions with a favourable habitat. But off French Riviera at least, there are obvious examples of mis-identifications that may have affected the perception of the species past status. The present-time relative abundance of common dolphin in the Mediterranean Sea and its habitats have been investigated by processing data obtained by Groupe de Recherche sur les Cétacés during summer surveys from 1988 to 2015, between the Straits of Gibraltar and Rhodes Island (Greece). A total of 60 *D. delphis* sightings was obtained (out of a total of 4,123) with an effective effort of 33,500 NM (Figure 1). Survey data were analysed for 10 regions, ranging from the Alboran Sea to the Levantine basin. In the Alboran Sea, *D. delphis* accounted for 39% of the delphinid sightings contrasting with the rest of the Mediterranean (1.1% as a global average), and sighting frequencies close or equal to 0 in the following regions: Gulf of Lion-Provence, Ligurian Sea-W Corsica, Levantine region. Interestingly, we obtained high common dolphin sighting frequencies in two more regions: western-southern Sardinia (23%) and southern Sicily (33%). In four other regions, common dolphin sighting frequencies were low but not negligible: SW basin-Balearic Islands (4%), northern and southern Tyrrhenian Sea (about 3%) and northern-central Ionian Sea (5%). The relative abundance index (RAI) was high in the Alboran Sea (0.33 dolphin/km) or in Sicily channel (0.25 dolphin/km) but quasi-null in the NW Mediterranean and Levantine basins. Common dolphin preferred habitat was upper slope (depth < 1000 m) or shelf: a mean sighting depth of 514 m and an average distance to 200 m isobath of 6.8 km were observed (compared to respectively 1,837 m and 30 km for the striped dolphin). The average RAI was 0.07 for the neritic habitat and 0.02 for the slope habitat. Off French continental shores, common dolphins were rarely sighted (less than 0.1% of sightings), in spite of an intense survey effort including the four seasons. In the Gulf of Lions, its quasi-absence is enigmatic, since a relatively high primary productivity and the extension of shelf and slope habitats would support its significant presence. As it is demonstrated that anthropogenic effects have badly influenced common dolphin conservation status in some regions, our study and other recent results suggest that large parts of the southern central Mediterranean Sea are probably still favourable to *Delphinus delphis*. Some Mediterranean regions are not yet covered by long-term dedicated survey effort and deserve the highest research priority.

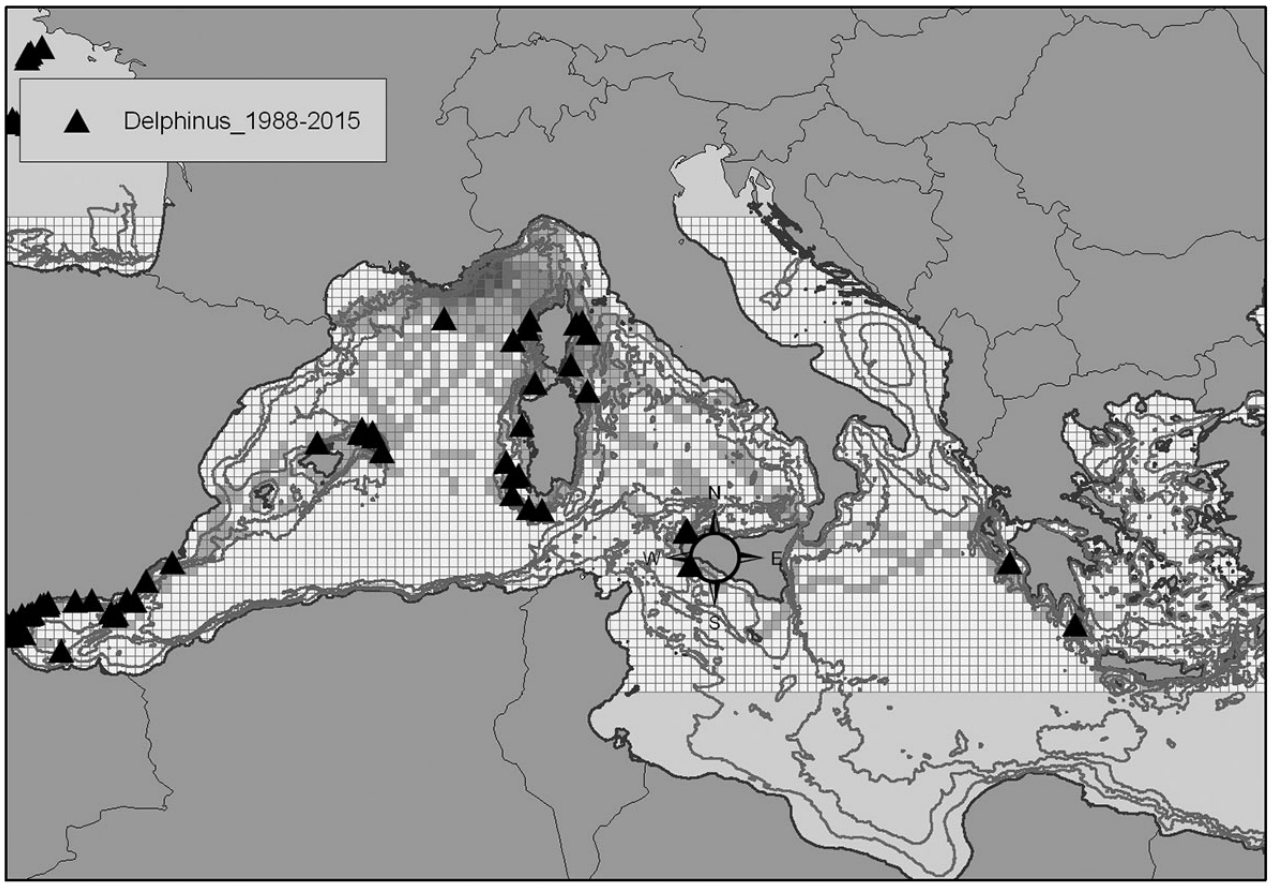

Figure 1: Common dolphin sightings 1988-2015 with an indication of GREC survey effort

Common dolphins (*Delphinus delphis*) in the Central Mediterranean Region: long-term research from Malta

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Cetaceans have been subject of year round long-term research effort in the Central-Southern Mediterranean Sea around the Maltese Islands since 1997, covering an area of 120,000 km^2. Dedicated scientific aerial and marine surveys measured the distribution and abundance of the various species inhabiting these waters using methods described in Vella (1998). Among the species studied, this paper focuses upon the common dolphin, *Delphinus delphis* in this study area. This species/subpopulation rated as endangered in the Mediterranean (EN A2abc - IUCN 2003 - http://www.redlist.org) necessitating particular conservation assessment, monitoring and management planning (IUCN, 2003; Reeves et al., 2003). Long-term research therefore contributes knowledge (Vella, 2000b; 2000, 2001, 2002, 2005, 2006, 2008, 2009, 2010, Vella and Vella 2011, Vella and Vella 2012) required for conservation. Although Mediterranean cetaceans are already legally protected by Maltese law through specific legal notices, this field conservation research constitutes the only dedicated long-term scientific effort around the Maltese Islands useful to the implementation of integrated and effective conservation measures. Common dolphin distribution, abundance, habitat preference, behaviour, and associations with fisheries that are exploited in the same area are among the parameters studied.

The study area includes most of the fishing area utilised by Maltese fishermen. Outside the 25nm zone or "conservation zone" around the Maltese Islands, Maltese fishermen share the area with numerous other fishermen from other Mediterranean and Non-Mediterranean countries. Knowledge of the impacts of these trends on common dolphins is necessary for both sustainable resource utilisation and effective preservation of legally protected species such as common dolphins. A first attempt to draw a picture of the status of this species in the Mediterranean Sea and to which this research has contributed in the past, had pointed towards further research needs (Bearzi et al., 2003; IUCN 2003), as did the ECS workshop outputs in 2004 focusing on this species (Stockin et al., 2005). Therefore such research is an important contribution, which may complement efforts in other regions of the Mediterranean through potential research networking.

The overall group sizes for *D. delphis* in this region varies according to the time of year, with summer and autumn being the seasons with encounters of larger group sizes offshore which tend to diffuse as they get closer inshore (from 200 individuals to 25 individuals or less per group). The organization of the group structures are best analyzed through aerial surveys which allow for the study of how conformations may change according to time of the year, the distance from shore and their activities. Coverage of the relatively large and plastic home range sizes is also more efficiently achieved through aerial surveys encompassing larger distances in shorter time. The marine surveys undertaken allow for the gathering of close-up

photos required for useful identification purposes and for examination of behaviours, that are also useful to monitoring efforts of the individuals inhabiting these waters. Ongoing long-term research efforts in this region are to be sustained so as to assess the efficacy of the recently established marine protected areas both coastal and offshore in the study area. While impacts of ongoing anthropogenic activities are still monitored to address the extent to which the spatial distribution of these activities may affect this endangered species both within and outside protected areas in the central and southern Mediterranean around the Maltese Islands as increasing maritime activities are envisaged.

Occurrence and distribution of short-beaked common dolphin (*Delphinus delphis*) in Italian waters: the power of networking

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The short-beaked common dolphin (*Delphinus delphis* Linnaeus, 1758), once present throughout the Mediterranean Sea, in the last two decades declined in numbers throughout the central and eastern basins and in 2003 the Mediterranean 'subpopulation' was listed as endangered in the IUCN Red List of Threatened Animals. In the Italian waters, the species was reported to be regularly present in low numbers around Ischia (about 50 individuals) and Lampedusa islands (<250 individuals) and rare in all other seas.

Thanks to a common effort carried out by a network of research groups in Italy, we present here combined data on presence, distribution, group size, and association with other species. The data were collected through visual surveys from 2000 to 2014, in different areas (the Pelagos Sanctuary, the central and southern Tyrrhenian Sea, the Sicily Channel and the western Ionian Sea). All surveys were conducted by trained observers in good weather condition (Beaufort <3), from different platforms (ferries, sailing vessels, inflatables, fishing/motor boats, oceanographic vessels).

A total of 5182 encountered individuals was collected from 286 sightings (n=48 from ferries; 238 from other platforms) in both pelagic and neritic habitats. Most sightings occurred in the Tyrrhenian Sea namely in the central (n=78 mainly around Ischia, where yearly encounter rates declined between 2000 and 2013, and no common dolphin encounters were documented in 2014 and 2015; Pace et al., 2016 submitted) and southern basins (n=106 mainly in the Messina Strait). Of the remaining sightings, 55 occurred in the Pelagos Sanctuary area, 41 in the Sicily Channel (mainly around the Lampedusa Island) and 6 in the western Ionian Sea.

The presence of immature animals (juveniles, calves, and newborns) was repeatedly documented around Ischia Island only. Mixed groups of common dolphin with other cetacean species were recorded in all study areas on 78 occasions, with striped dolphin (*Stenella coeruleoalba*) observed in 58 cases and bottlenose dolphin (*Tursiops truncatus*) in 10 (all

near Lampedusa Island). Other associated species included Risso's dolphin (*Grampus griseus*), sperm whale (*Physeter macrocephalus*), and fin whale (*Balaenoptera physalus*).

Preliminarily pooled data on short-beaked common dolphins in Italian waters showed the great potential of our new research network and provided a novel picture on the status of presence and distribution of the species over the study period.

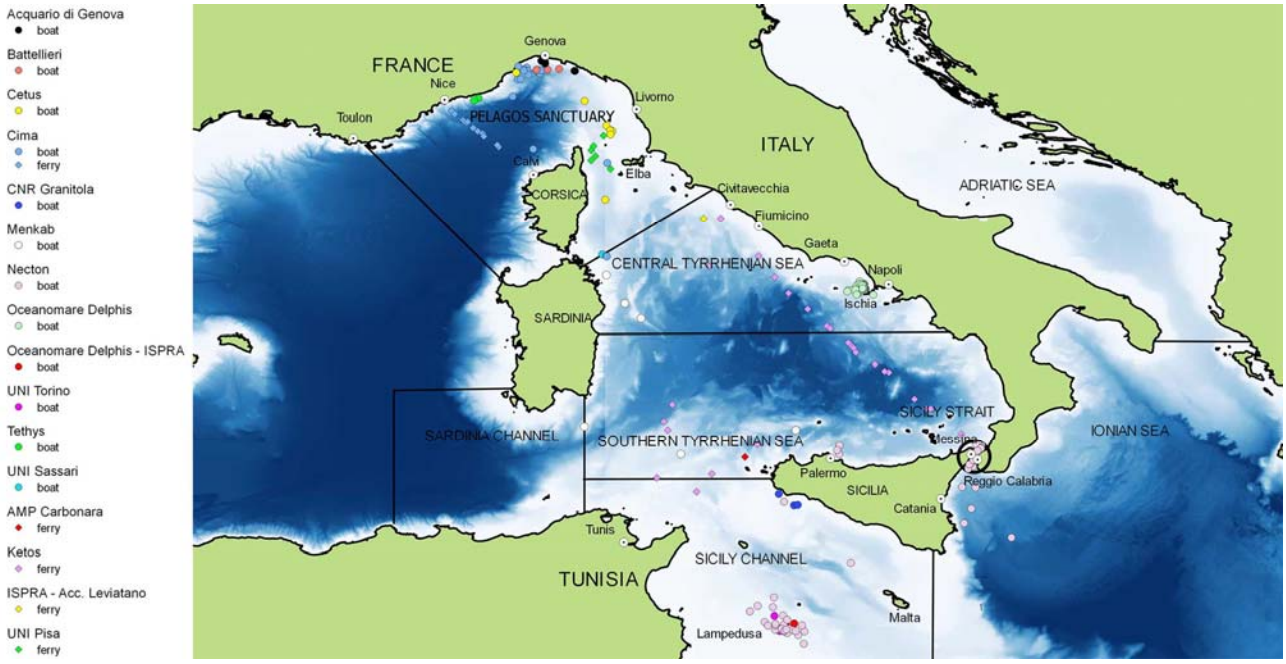

Figure 1: Common dolphin sightings in Italian waters

What can be immediately seen from this study is that the islands of Ischia and Lampedusa and the Strait of Messina could be significant (possibly critical) areas, that can play a key role for these endangered animals to perform basic biological processes for survival, persistence and wellness (*i.e.* feeding/breeding). There are strong arguments for the protection of these areas through specific management strategies to be developed and applied.

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Dorsal edge markings and patches analysis in short-beaked common dolphin (*Delphinus delphis*): comparison of photo-identification catalogues from different Italian regions

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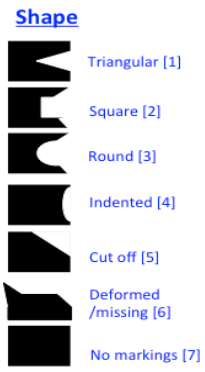
Photo-identification is a powerful method of using natural markings to identify individuals of a target species. It allows the collection of key data for wildlife conservation e.g. to estimate abundance (as long as the underlying assumptions are met) and population parameters (survival, recruitment, and population growth rate), to produce models of population social structure as well as animal movements, migration patterns, and life span.

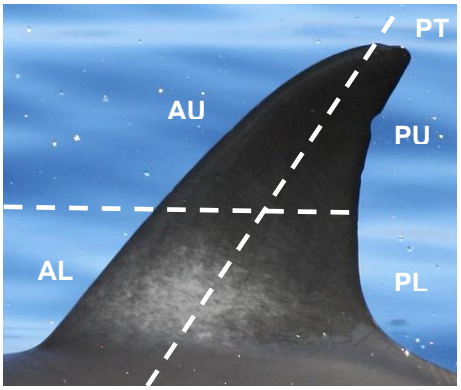
In this study we: a) performed common dolphin photoidentification in Italian waters, b) described the distribution of marks within groups in different locations, c) matched identified animals, and d) estimated their movements between different areas.

Basing on recommendations provided by Urian et al. (2015), photos were selected using consistent criteria (*e.g.* focus, exposure, entire dorsal fin visible, and others). Thereafter, the best available right and/or left image for each individual was scored for image quality, with each numeral being scored between 1 and 3. Only individuals with a score of 2 or above were used in the photoidentification analysis (only in few cases, *i.e.* highly recognizable individuals, a score of less than 2 was considered). Images were then cropped around the dorsal fin and visible part of the body.

Individuals with distinctive dorsal fin profiles, prominent dorsal edge markings (DEMs) suitable for reliable long term identification, and/or clearly visible white patch were considered for the photoidentification analyses (Bamford and Robinson 2015), measuring the position and shape of DEMs and the characteristics of the white patch on both sides of the fin of some animals. White patches were used to confirm a match but not as a unique distinctive feature.

We considered five distinctiveness levels : 1=unmarked (low distinctiveness), 2=very small notches/markings (low distinctiveness), 3=two or more marks of reasonable size/fairly unique marking (medium distinctiveness), 4=several, obvious markings, unique shapes (high distinctiveness), 5=extremely obvious mutilations (high distinctiveness). DEMs' shape and position were classified as in Fig. 1.





PU	Posterior Upper
PL	Posterior Lower
AU	Anterior Upper
AL	Anterior Lower
PT	Posterior Tip

Figure 1: DEM's shape and positions

Over 20,000 images were analysed in 67 photoidentification encounters and 293 animals were individually identified. All the analyzed animals showed a low-medium level of fins' distinctiveness, with a significant difference between the Ischia Island and all other areas. As for the distribution and for the marks types we found an overall prevalence of indented marks in the upper posterior margin of the dorsal fins. The analysis of white patch position showed the prevalence of diffused white patches over the fin and white patches in basal position. The Multiple Correspondence Analysis (MCA) run on DEMs shapes/positions/white patches and other marks evidenced that unmarked animals and indented shape marks in the upper posterior position of the dorsal fin, together with diffused white patches and completely white ones, and other marks (tooth rakes) explained 74.16% of the sample variability.

As conservation of management units is increasingly being recognized as a requirement for preventing biodiversity loss and common dolphins could range/disperse widely between a network of geographic areas, future studies should compare identification data by other researchers across the Mediterranean, thereby increasing spatial scale and sample size, providing more accurate home range, and abundance estimates for common dolphins in the basin.

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Conservation genetics of the short-beaked common dolphin (*Delphinus delphis*) in the Mediterranean Sea: state of the art and future research.

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Mediterranean Sea common dolphins are listed as 'endangered' in the IUCN Red list, due to their reported decline since the middle of the 20th century. However, little is known about the number or distribution of populations in this region. Furthermore, the mechanisms and factors that shape population structure in these highly mobile species are still unknown, leaving still open taxonomic issues also in the Mediterranean/Black Sea region. Population genetics has been proven to be a useful tool to identify population boundaries, investigate population history and to provide information often difficult to obtain with standard survey methods.

Here we present a brief review of the outcomes of the latest genetic studies on the common dolphin (*Delphinus spp*) with focus on the Mediterranean population. We further discuss how genetic information can be successfully utilized in supporting the formulation of conservation measures.

The genus *Delphinus spp* exhibits a world-wide distribution, however its taxonomy is still subject to debate and the factors that drive its population structure, especially on a small geographic scale, are not well understood (Natoli et al., 2006, Amaral et al. 2011, 2012). A first genetic analysis of Black Sea, Mediterranean Sea and eastern North Atlantic samples found small but significant population differentiation across the basin between the Eastern (Greece) and the Western Mediterranean populations at both nuclear and mtDNA markers (microsatellite $F_{ST} = 0.052$, mtDNA $F_{ST} = 0.107$, p-values=0.001) (Natoli et al., 2008). No significant genetic differentiation at either marker was observed among the Eastern North Atlantic populations, though the Alboran population (inhabiting the Mediterranean waters immediately adjacent the Atlantic Ocean) showed significant mtDNA genetic differentiation compared to the Atlantic populations. Subsequent analyses suggested that population structure between the Eastern (Greece) and Western Mediterranean evolved recently and is likely to have been reinforced by a recent bottleneck event (Moura et al., 2013). The timing of this recent bottleneck was estimated to have been within 50 generations, consistent with a proposed anthropogenic influence (Bearzi et al., 2003). Directional estimates of gene flow suggested movement of females out of the Mediterranean (Natoli et al., 2008), and preliminary research on kinship structure suggested that this might be related to prey resources competition (Moura, pers. com.), which may be relevant to the population decline. We discuss how adaptation to different environments and/or foraging strategies may be driving factors for differentiation in this species, and highlight how regional collaboration among researchers in different disciplines (Moura et al., 2012, Spitz et al., 2010) is important to gain a better understanding of the status of Mediterranean common dolphins.

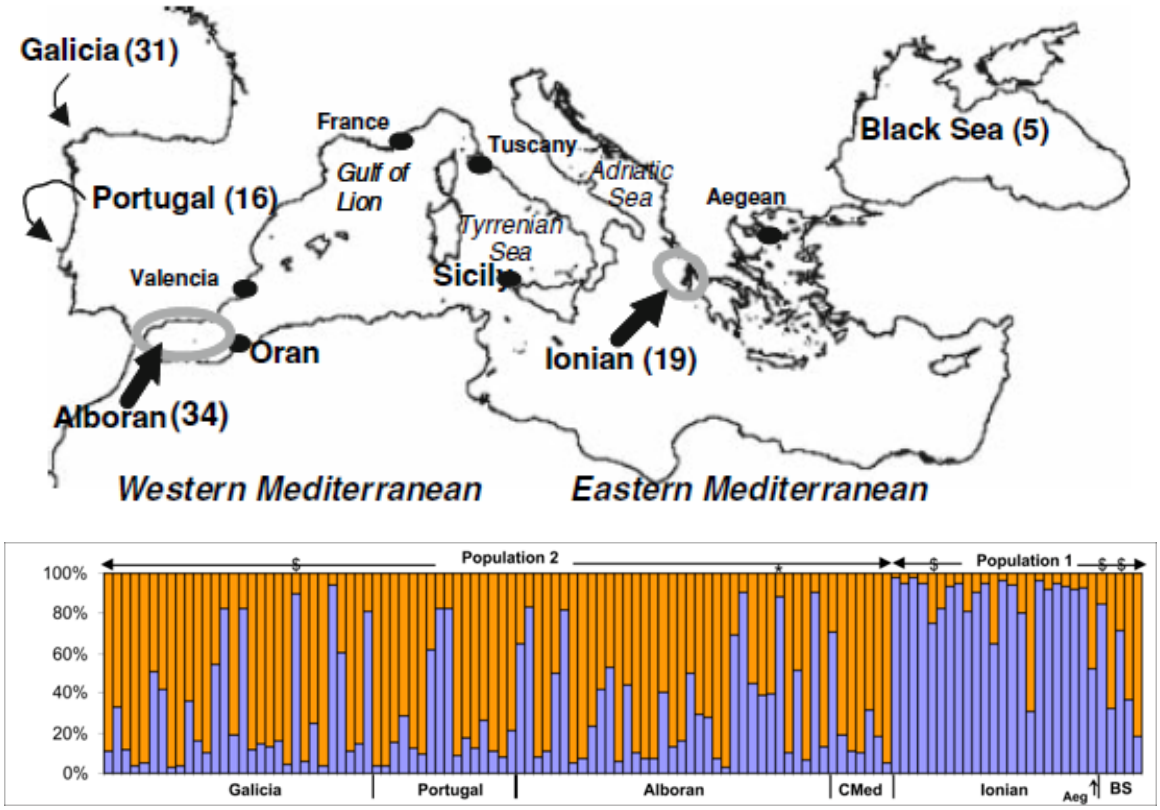

Figure 1. Map illustrating the origin and number of the common dolphin samples from the Mediterranean Sea and near Eastern North Atlantic analysed in Natoli et al. (2008). Below the STRUCTURE analysis profile, based on nine microsatellite markers showing clear differentiation between the samples from the Ionian Sea and the rest of the dataset.

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A preliminary study on population structure of the short-beaked common dolphin (*Delphinus delphis*) in the Turkish Seas based on mtDNA sequences

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The short-beaked common dolphin is a cosmopolitan species, showing an extremely wide distribution in all oceans including the Mediterranean and the Black Sea. Its Black Sea population has been suggested as the subspecies *Delphinus delphis ponticus* Barabash-Nikiforov, 1935 due to its genetic (Rosel et al., 1994; Natoli et al., 2008) and morphological differences (Amaha, 1994). Although significant differentiation was detected between the Black Sea and Mediterranean common dolphins based on mtDNA in previous studies, the sample size was relatively small (less than 10) (Rosel et al., 1994; Natoli et al., 2008). In this study, mtDNA sequences of 15 individuals collected between 2003 and 2015 in the Turkish Black Sea coast (5 western, 2 eastern), Istanbul Strait (3) and Marmara Sea (5), revealed nine haplotypes, seven of which were new. Five of these new haplotypes were detected in the Turkish Straits System (TSS, consisting of the Istanbul Strait, Marmara Sea and Çanakkale Strait), connecting the Black Sea and Mediterranean Sea. The two primers, L15926 and H00034 (Rosel et al. 1994) and conditions (Natoli 2004), were used to amplify and sequence a partial 428 base pair-long mtDNA fragment of the control region. 45 haplotypes (from 113 samples) previously reported (Rosel et al. 1994; Natoli et al. 2008) (GenBank U02639–U02641, EU365129-EU365173), from the same mitochondrial region, were also included in the analysis. Moreover, based on Φst values (Table 1), we detected genetic differentiation of the Black Sea population from the Atlantic population, supporting the previous inference that the Black Sea common dolphins had been differentiated from those in the Atlantic. However, no differentiation was detected between the populations in the Black Sea and any of the other populations. At the same time, the results suggest that the common dolphins in the Turkish Black Sea and TSS waters might have some degree of genetic connectivity to the western Mediterranean and Atlantic populations, as the haplotype network, including the newly discovered ones, do not show any obvious geographical clusters (Figure 1). More samples from the Turkish waters will be sequenced with the same mtDNA marker for a better understanding of the genetic population structure of this species, within the scope of an on-going project, CetaGen.

Table 1. Φst values of the population calculated by using pairwise differences method.

	Black Sea	TSS	Aegean	East Med.	West Med.	Atlantic
Black Sea	0.00000					
TSS	-0.02403	0.00000				
Aegean	-0.27650	-0.35165	0.00000			
East Med.	0.04024	0.02176	-0.23585	0.00000		
West Med.	0.01328	-0.01724	-0.05247	**0.09532***		
Atlantic	**0.06251***	0.00541	-0.07832	**0.10239***	**0.03874***	0.00000

* indicates statistically significant genetic differentiation at $P < 0.05$.

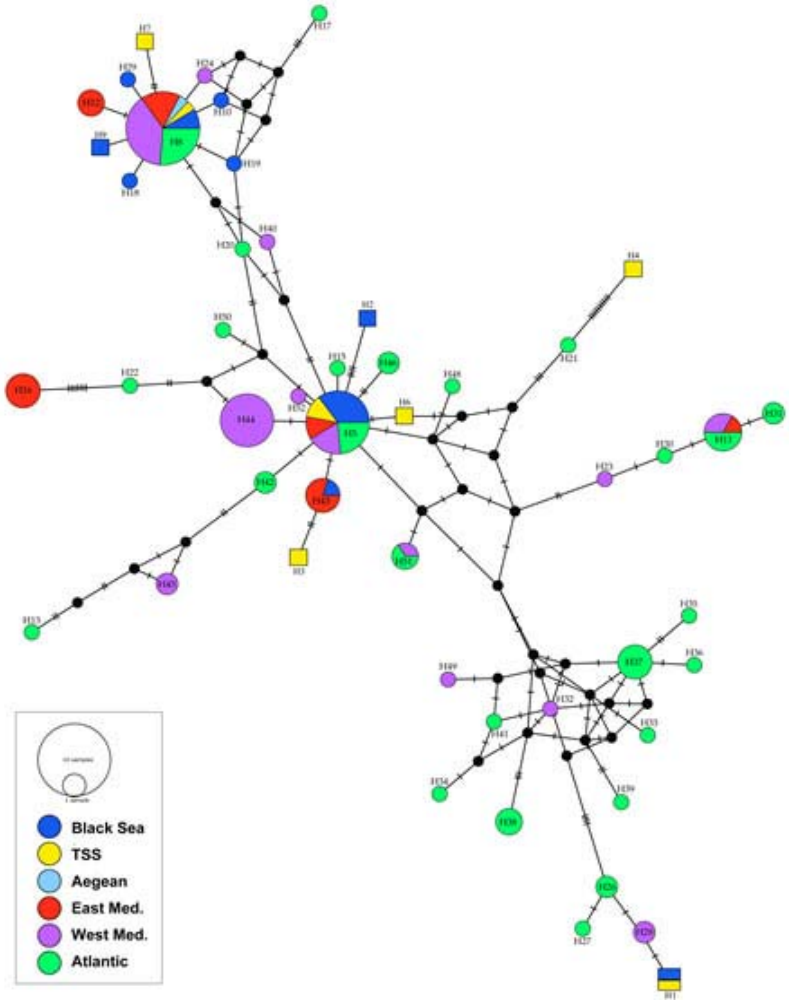

Figure 1. Haplotype network for the mitochondrial control region. Circles represent the haplotypes identified by Rosel et al. (1994) and Natoli et al. (2008) as well as in the present study. The sizes of the circles are proportional to the frequency of each haplotype. Squares represent the new haplotypes from this study. Black circles represent hypothetical haplotypes. Each line between haplotypes represents a single mutational step between haplotypes. Gaps are treated as missing data by PopART, which resulted in three haplotypes that were different due to indels being categorized as identical to three other haplotypes.

Acknowledgments

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Will there be any reward for common dolphin perseverance?

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Once common and relatively abundant in the Inner Ionian Sea Archipelago, short-beaked common dolphins have declined dramatically over the past couple of decades. From approximately 150 individuals using the Archipelago in 1996, only 15 were observed in 2007. Monitoring of local fishing fleet and ecosystem modelling approaches showed that reduced prey availability, caused by overfishing of small pelagic stocks, induced this sharp decline. Consequently, in 2009, a call for action was issued by several NGOs and marine mammals conservation experts, manifesting their fear of an "immediate risk of complete eradication" of common dolphins from the area. Such a negative common dolphin trend in the Inner Ionian Sea Archipelago was not considered to be a consequence of emigration or long-range movements because, the species appeared to be rare in, or absent from, the adjacent waters including the Hellenic Trench and the Ionian Sea. Despite this highly discouraging scenario, survey effort in the Inner Ionian Sea Archipelago continued between 2008 and 2015 and showed a regular presence of common dolphin groups although at low frequencies. In addition, several groups were reported beyond the geographical limits of the Archipelago by the Ionian Dolphin Project sightings network, or found through an extensive search on the online video-sharing website YouTube. These observations, contrarily to what was formerly believed, suggested the presence of common dolphins in neighbouring areas, which prompted us to conduct a survey between the islands of Corfu and Ithaca-Cephalonia at the end of summer 2015.

Photo-identification effort conducted in the Inner Ionian Sea Archipelago between 1995-2015 resulted in 205 photo-identified common dolphins. Of those, 69 individuals were seen only once. From the remaining 136 dolphins, 64 showed a relatively strong site-fidelity until 2003 not to be seen again in the area since then. Eleven individuals were newly identified during the last decade. Only 61 common dolphins that were regularly identified throughout the period 1995-2003 were also occasionally identified in the Inner Ionian Sea Archipelago in subsequent years; moreover, 20 of those were also photo-identified during the 2-weeks survey conducted beyond the historical limits of our study area.

The information provided here evidences for the first time that the formerly highly-resident common dolphins have effectively dispersed and roam over a wider area moving occasionally into the Inner Ionian Sea Archipelago. Our findings raise the question that, if timely conservation action is taken, common dolphin perseverance in the Inner Ionian Sea Archipelago may lead to the "re-colonization" of their former wonderland. Fishery management measures are urgently needed to reduce current over-exploitation. As EC funding tools exist to compensate the affected fisheries, this may be a 'win-win' situation, where existing regulations can be effectively implemented to solve a specific conservation problem, with the added value of protecting marine biodiversity, ensuring continued ecosystem services, preserving artisanal fisheries and bringing long-term benefits to human society.

Short-beaked common dolphins in the Gulf of Corinth are Critically Endangered

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Cetaceans having restricted ranges and disjunct distributions can become isolated and are especially vulnerable to anthropogenic impacts. Further divergence can occur as groups become resident within discrete and geographically separated subareas. Short-beaked common dolphins *Delphinus delphis* in the Ionian Sea are genetically different from those of other Mediterranean and Atlantic areas, and those living in the Gulf of Corinth (GOC)—a 2,400 km^2 semi-enclosed deep inlet of the Ionian Sea—may have diverged even further. We investigated the status and geographic range of common dolphins in the GOC based on five years (2011–2015) of survey effort from small boats. We used photo-identification and a robust design capture-recapture approach to estimate dolphin abundance based on 60,592 high-resolution digital images. Common dolphins were always found in mixed-species groups with striped dolphins *Stenella coeruleoalba*. Striped and common dolphins averaged 94.5% and 1.6%, respectively, whereas the remaining 3.9% were animals of intermediate pigmentation (likely hybrids). Abundance was estimated as 22 common dolphins (95%CI 16–31), 55 'intermediate' animals (95%CI 36–83), and 1,324 striped dolphins (95%CI 1,158–1,5151). Dedicated survey effort totalling 21,435 km yielded no evidence of movements across the entire western quarter of the GOC, which leads to Mediterranean waters through a shallow strait. Common dolphin movements appeared to be limited to the central portion of the GOC, largely within an area of approximately 900 km2 where waters are 500–900 m deep. Studies conducted since the mid 1990s also produced no records in the shallow westernmost portion of the GOC, or in the adjacent Gulf of Patras and Prokolpos Patron. A population viability analysis incorporating demographic and environmental stochasticity indicated that, within a three-generation time, common dolphins in the GOC are likely to either go extinct or remain below the IUCN Red List threshold of 50 mature animals. Such trend was predicted irrespective of potential negative impacts resulting from hybridisation (e.g. genetic and demographic swamping) or anthropogenic threats (including overfishing, industrial pollution and noise disturbance). Under standard criteria provided by the IUCN Red List to assess extinction risk, common dolphins in the GOC constitute a geographically and otherwise distinct conservation unit (subpopulation) with little or no demographic exchange, which qualifies as Critically Endangered based on 1) small population size (point estimate 22 individuals); 2) limited dispersal and extent of occurrence; 3) reproductive isolation; 4) occurrence within a geographically and ecologically distinct area in which a single threatening event can rapidly affect all individuals; 5) low (<50) predicted abundance of mature animals in a three-generation time; 6) suspected hybridisation with a 60-fold larger population of striped dolphins; and 7) extant anthropogenic impacts. Management action is urgently needed to prevent eradication of common dolphins from yet another part of the Mediterranean Sea—a region where these animals have been classified as Endangered since 2003.

A stranding record of the short-beaked common dolphin (*Delphinus delphis*) in Algerian West Coast, during 2007-2011

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Marine mammal strandings represent a major and valuable source of biological information on causes of mortality for cetacean populations. This study aims to describe the strandings of the common dolphin along the Algerian west coast, and to examine the proportion of human and non-human induced mortality affecting this population.

Between 2008 and 2012, 52 specimens of cetaceans were recorded along the Algerian west coast, 14 (26.9 %) of which were *Delphinus delphis*. The spatial distribution of common dolphin strandings is shown in Figure 1. All strandings recorded are individual cases, no mass strandings having been reported during the study period.

In order to examine the proportion of human and non-human induced mortality affecting this population, necropsies were conducted. In 10 cases an interaction with some type of fishing gear had occurred, 3 cases of mortality were attributable to non-human related causes, and only one cause of death could not be determined due to condition of the carcass (severely decomposed).

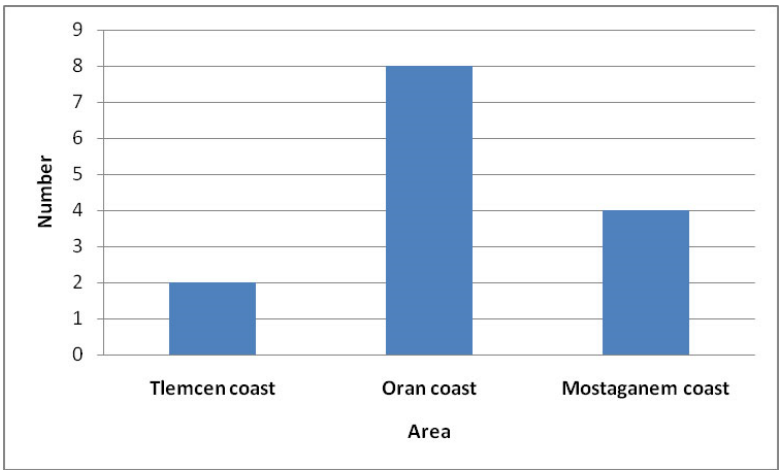

Figure 1: Spatial distribution of the Common dolphin (*Delphinus delphis*) stranded in Algerian west Coast (2008-2012).

Status of the North-east Atlantic common dolphin population; recommendations and actions for conservation and management

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The common dolphin is one of the most numerous cetacean species in the North-east (NE) Atlantic and plays a key functional role within the ecosystem as a top predator. However, the most recent assessment of the conservation status of the NE Atlantic population under Article 17 of the Habitats Directive was "Unfavourable-Inadequate" in 2013, due to unfavourable population, habitat for species and future prospect. The main pressures and threats in this region include bycatch, pollution and underwater noise; though there are major knowledge gaps in the extent of their effects. In recent years various conservation and management practices have been employed, including the identification of a management unit and implementation of national observer bycatch programmes and bycatch mitigation measures under EC Regulation 812/2004. Collection of data and samples through national stranding programmes has enabled assessments of life-history parameters, dietary requirements and the effect of stressors such as by-catch and pollutants. However, in order to improve the conservation status of the NE Atlantic population a number of key actions are required. These include the implementation of a conservation plan, finalisation of a management framework procedure and coordination among Member States bycatch monitoring programmes for assessment of the population bycatch rate. In addition, monitoring the state of the management unit through frequent large-scale surveys and continued assessment of the independent and interactive effects of multiple stressors. Above all, improvement of the conservation status is hindered by a lack of overarching legislation for cetaceans in European waters that ensures the effective protection of cetaceans from all threats. This paper will provide an overview of the current state of NE Atlantic common dolphin population and outline the key recommendations and actions for conservation and management.