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Abstract Between the eighteenth and twentieth centuries, many small cetaceans (particularly dolphins) were killed in large numbers off the coasts of Europe and North Africa, due to perceived competition with fisheries. Dolphins were long considered as pests, responsible for reduced fish catches and damage to fishing gear. This conflict was particularly acute between the second half of the nineteenth century and the first half of the twentieth century, when governments from various countries encouraged and subsidised the extermination of small cetaceans. While the precise number of killings and the effects these had on the past and current status of cetacean populations are largely unknown, historical records and osteological collections can help us appreciate their magnitude. Here we first summarise information available regarding conflict between fishers and small cetaceans in various countries around the Mediterranean and Northeast Atlantic. Then, based on an extensive analysis of historical literature that included landing and bounty reports, and on a review of osteological collections, we provide new and extensive information on conflicts in France and Algeria. For France and Algeria, we (1) provide information regarding the context and chronology of killings and culling campaigns, (2) describe the methods used to deter and kill cetaceans, (3) identify the species affected, and (4) attempt to quantify the number of individuals killed. Our results suggest that tens of thousands of small cetaceans were killed in France and Algeria, primarily between the 1880s and the 1930s. Total mortality of small cetaceans due to human conflict in the Mediterranean Sea and Northeast Atlantic is certainly much higher, as that includes the killings in all other countries where similar conflicts existed. Such a high mortality likely had an important negative impact on dolphin population trajectories, particularly in the Mediterranean Sea. In the second half of the twentieth century, intentional killings largely stopped, but small cetaceans became exposed to a variety of other anthropogenic threats. Reconstructing past mortality can help

us understand current population trends, viability and potential for recovery, as well as help us to set meaningful baselines for conservation.

Keywords: Cetaceans; Historical Ecology; Human-Wildlife Conflicts; Marine Environmental History; Past Abundance and Distribution; Osteological Collections

Introduction and overview

Killings of small cetaceans: from resources to competitors

The relationship between humans and ‘small cetaceans’ (hereafter referring to small dolphins of the family Delphinidae and to Phocoenidae) has been evolving through history. Once considered as useful resources, small cetaceans were used as food (primarily when freshly dead or live-stranded) or to make weapons and tools with their bones during prehistoric times. For instance, there is zooarchaeological evidence of human use in various locations around the Mediterranean and Northeast Atlantic, dating back to the Paleolithic (Pascual Benito et al. 2019), the Lower Mesolithic (Lightfoot et al. 2011, Trantalidou 2008), the Mesolithic-Neolithic Transition (Mannino et al. 2015) and the Late Neolithic (Cauliez et al. 2004). Small cetaceans continued to be used during the Bronze Age (Pascual Benito et al. 2019), and possibly in the Iron Age (Bernal-Casasola et al. 2016), during the Antiquity (Papadopoulos & Paspalas 1999, Pascual Benito et al. 2019) and in pre-Roman times (Bernal-Casasola 2018).

During the Medieval period, all around Europe, small cetaceans were hunted or otherwise used for their meat and blubber. Clear evidence of consumption was reported from the Mediterranean and Atlantic waters of Spain (Garrido 2014, Alcover Cateura 2022, Valdés-Hansen 2004), along the French Atlantic coast (Guizard 2018, Musset 1964, Berthelot 1840), Portugal (Brito 2011), England (Dobney et al. 2007, van den Hurk et al. 2021, 2023), Scotland (Szabo 2008, van den Hurk & McGrath 2021) and the Faroe Islands (Szabo 2008). Interest in the consumption of small cetaceans gradually decreased during the sixteenth century (Fichou & Levasseur 2004, Garrido 2014). In Europe, a change in the perception that humans have of small cetaceans occurred towards the end of the sixteenth century, when these animals were no longer seen predominantly as resources, but rather as competitors for fishery catches. Written records testify to the animosity towards dolphins, which were blamed for reducing fish catches and damaging fishing gear. For instance, a Papal Decree was issued in 1587 “anathematising this vermin”, after concerns were raised in France regarding the effect of dolphins on fisheries (Smith 1995). Additionally, in 1612, Pope Paul V recommended to the bishop of Marseille (French Mediterranean) to show the Holy Cross to dolphins at sea in order to scare them away (Faget 2009). In Spain, the “pilot whales conjuration” was an agreement signed in 1624 between Asturian fishers to hire a clergyman of the Holy Office of the Inquisition to chase away cetaceans (Valdés-Hansen 2004, 2009). From then onwards, historical records indicate an intensification of the perceived conflict between small cetaceans and fishers. The conflict was particularly acute between the second half of the nineteenth century and the first half of the twentieth century, when governments from various countries around the Mediterranean Sea and Northeast Atlantic Ocean encouraged and subsidised the extermination of small cetaceans (Bearzi et al. 2004, Fichou & Levasseur 2004, Valdés-Hansen 2004, 2009, Faget 2009, Garrido 2014, Meliàdò et al. 2020, Sokou et al. 2022; see Figure 1).

Intentional killings in the Mediterranean Sea and Northeast Atlantic

There is abundant evidence in the literature of small cetaceans being deliberately killed due to the perceived competition with fisheries in the Mediterranean and Northeast Atlantic. A brief overview follows for the countries that have published information:

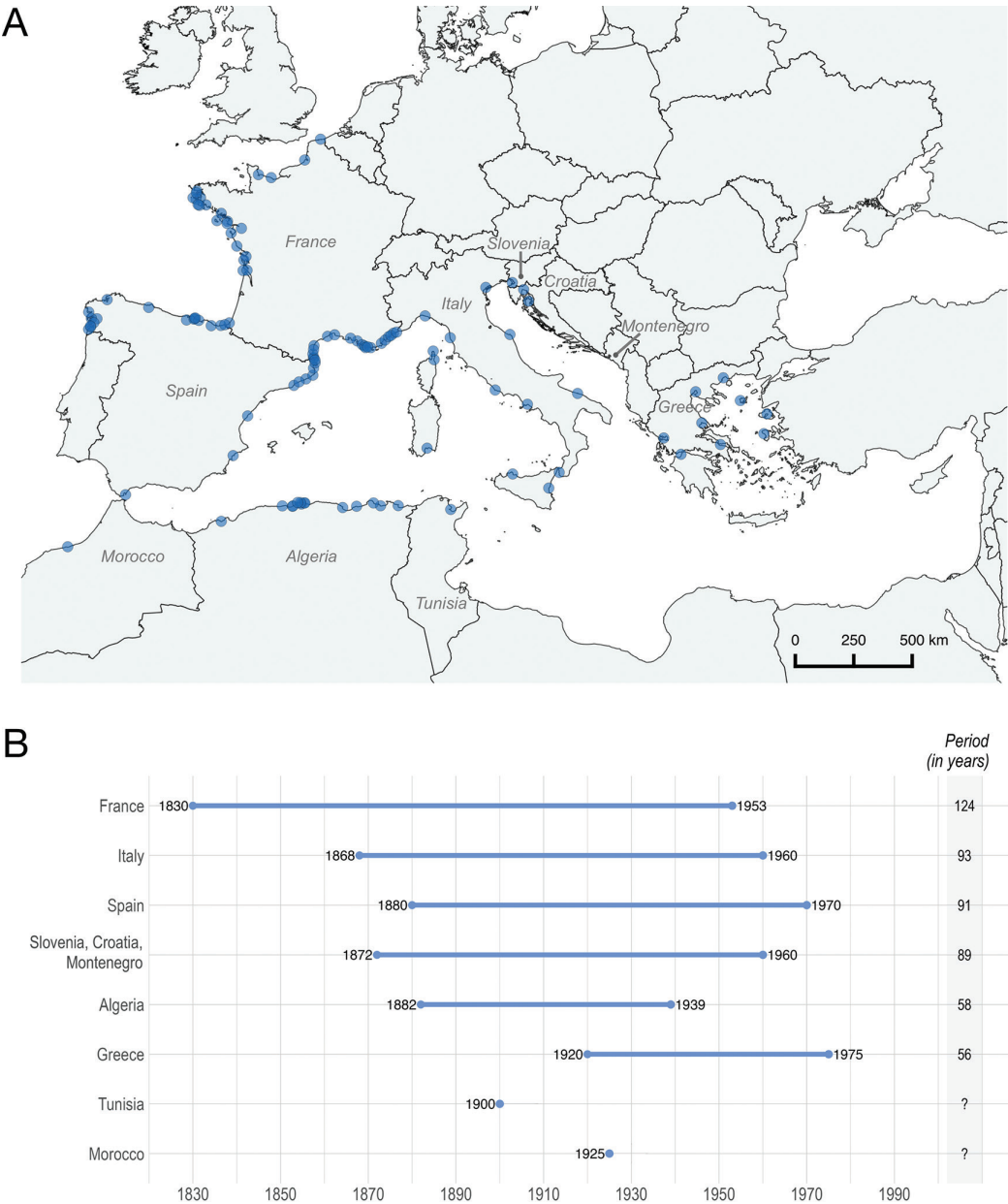


Figure 1 (A) Spatial distribution of the Mediterranean Sea and Northeast Atlantic locations considered in this study, where historical material was available about the conflict between small cetaceans and fisheries (mainly between the eighteenth and the mid-twentieth centuries). (B) Duration of the reported main period of historical conflict between fisheries and small cetaceans around the Mediterranean and Northeast Atlantic. The duration of the conflicts is approximate and is based on the earliest and latest dates in historical documents and published studies, mentioning organised efforts to kill small cetaceans. Information in this figure is based on the following studies – France: Fichou and Levasseur (2004), Faget (2009), this study; Spain: Valdés-Hansen (2004, 2009), Garrido (2014); Slovenia, Croatia, and Montenegro: Bearzi et al. (2004); Italy: Bearzi et al. (2004), Meliàdò et al. (2020); Greece: Sokou et al. (2022); Algeria, Tunisia and Morocco: this study.

Italy

In Italy, requests to receive monetary rewards in exchange for dolphin killings occurred as early as in 1868 (in the Gulf of Genoa), and formal bounties started being issued in 1872 (in Trieste; Bearzi et al. 2004). Subsequently, systematic cullings were implemented all over the country until 1942 (Meliadò et al. 2020). During 1928–1938, bounties paid could reach 100 Lire (the equivalent of approximately 45–90 Euros) if a pregnant female was killed (Bearzi et al. 2004). Using historical records of landings of animals and bounties paid for the killings from 13 Compartimenti Marittimi (Marine Departments) in Italy, Meliadò et al. (2020) reported a total of 6785 dolphins killed between 1927 and 1937. The highest total catches were reported in Ancona (Adriatic Sea) and Palermo (Tyrrhenian Sea), each with more than a thousand animals killed during the 11-year period. The authors also report around 40 animals (i.e., 2.7 ± 0.5 dolphins per year) killed in the Chioggia Compartimento (close to Venice) during the period 1946–1960. Meliadò et al. (2020) also noted that additional mortality of wounded animals that died later was not taken into account in these figures. The authors suggest that the most common species killed were common bottlenose dolphins *Tursiops truncatus* and common dolphins *Delphinus delphis*, and possibly striped dolphins *Stenella coeruleoalba* to a lesser extent. Cetaceans became legally protected under Italian law in 1979 (Bearzi et al. 2004).

Slovenia, Croatia, and Montenegro (“former Yugoslavia”)

In Croatia, bounties were first offered in 1872 in Rijeka (Bearzi et al. 2004). In the Kvarner Gulf (Croatia), Meliadò et al. (2020) reported that about 222 dolphins were killed between 1914 and 1925, 844 dolphins were killed between 1927 and 1937, and 600 dolphins were killed after the Second World War. Bearzi et al. (2004) reported that 335 dolphins were killed in former Yugoslavia (exact location unknown) between 1933 and 1935. The main culling campaign started in Croatia in 1949 (Bearzi et al. 2004). The authors also reported that 788 dolphins were killed between 1955 and 1960 in former Yugoslavia. The campaign was planned to last until 1965, but there was no record of bounties paid after 1960, possibly because of a decrease in the amount of money received for each dolphin killed in 1959. Common bottlenose dolphins and common dolphins were the main species targeted by these campaigns (Bearzi et al. 2004). While culling campaigns in the eastern part of the northern Adriatic stopped around 1960, killings continued until cetaceans became legally protected under the Croatian law in 1995 (Bearzi et al. 2004). The figures above should be considered minimum estimates and provide only a partial indication of the actual number of animals killed across a century.

Greece

In Greece, conflicts between dolphins and fisheries took place during the early phases of fishery development, from the early twentieth century until the mid-1970s, increasing in intensity from the interwar period (1920–1940) onwards (Sokou et al. 2022). The conflict was mainly reported in coastal areas of the northern and central Aegean Sea, and in the eastern Ionian Sea (Sokou et al. 2022), and it involved common dolphins and common bottlenose dolphins (Gonzalvo et al. 2015, Sokou et al. 2022). Dolphins were blamed for net destruction and reduced fish catches, notably in the purse seine fishery (Sokou et al. 2022). In response, fishers called for the extermination of dolphins (Maynou et al. 2011, Gonzalvo et al. 2015, Foskolos et al. 2020, Sokou et al. 2022). Requests were made to allow the use of harpoons, guns and explosives to kill these animals (Sokou et al. 2022). Culling campaigns were encouraged by the Greek government, including through bounties (e.g., 600 Drachmes, approximately 1.76 Euro, per dolphin killed in 1961; Gonzalvo et al. 2015). Turkish experts in cetacean hunting techniques reportedly travelled to Greece to share their know-how (Tonay & Öztürk 2012, Sokou et al. 2022). Fishers also requested monetary compensation for damaged fishing gear, and there were proposals to make use of the skin and fat of killed animals (Sokou et al. 2022).

Tunisia and Morocco

A few documents from Tunisia and Morocco suggest that in the early twentieth century, small cetaceans could be killed due to conflict with fisheries. A newspaper article from 1900 claimed that small cetaceans were responsible for the decline of fish stocks in the Gulf of Tunis (Tunisia; Anonymous 1900g). A newspaper article from 1950 mentioned that on the 10th of August 1900, the Chamber of Commerce encouraged all fishers in Tunisia to kill small cetaceans to receive a 25 Francs reward (Anonymous 1950). In Morocco, a report from 1925 mentioned that the option of offering bounties to kill small cetaceans was being considered (Pérard 1925). Another Moroccan newspaper article from 1934 mentioned the killing of two animals measuring 2.5 m close to Casablanca: one was harpooned and the other was shot (Anonymous 1934c).

Turkey

In the Turkish portions of the Black Sea and Mediterranean Sea, common bottlenose dolphins, common dolphins and harbour porpoises *Phocoena phocoena* were extensively exploited for oil and meat for more than 2300 years, until they became legally protected in 1983 (Tonay & Öztürk 2012). Birkun et al. (2014) suggested that another reason for killing cetaceans could have been conflict with fisheries. The killings peaked in the 1930s, and later in the 1950s and 1970s. Commercial exploitation was particularly intense in the Black Sea, but records indicate that cetaceans were also extensively killed in the Aegean and Marmara Seas. For instance, Tonay and Öztürk (2012) reported that 84.9 tonnes of dolphins were caught in the Turkish Aegean Sea in 1969, which would roughly correspond to 1700 animals (for calculation details, see Tonay & Öztürk 2012). While it was estimated that a few million cetaceans were killed in the Black Sea, there are no such estimates available for the Turkish Mediterranean Sea (Tonay & Öztürk 2012).

Spain

In the Mediterranean Sea off Spain, dolphin killings attributed to conflict with fisheries occurred between the second half of the nineteenth century and the mid-twentieth century (Garrido 2014). In the Costa Brava region (part of Catalonia), conflict could be traced back to 1880 and lasted until the 1970s (Garrido 2014). Three periods of acute conflict were identified: 1903–1905, 1915 and 1960, which correspond to years when catches of small pelagic fishes decreased drastically. Fishers from this region blamed dolphins for low catches and gear damage (affecting gillnets, trawls and purse seines). Common bottlenose dolphins were identified by fishers from Costa Brava as being the main culprit, followed by common and striped dolphins (Garrido 2014). In retaliation, fishers killed dolphins by using harpoons (“dofinera”), explosives and fishing nets modified with attached blades or wooden sticks (Garrido 2014). Hundreds of dolphins could be caught during a single fishing session, and some would be eaten by the fishing community (Garrido 2014). During the period of intense conflict, Spanish fishers operating in Mediterranean waters repeatedly asked the government to take measures to eradicate dolphins. However, these requests were refused, and the killing of dolphins was prohibited in 1905 (Garrido 2014). One reason for such denial may be that fishers from the Atlantic coast of Spain, particularly the ones in Cantabria using the “manjua” (a sort of purse seine), perceived dolphins as being essential to help them detect shoals of fish (Garrido 2014). However, other historical documents indicate that conflict between fishers and small cetaceans also took place in Cantabria (Valdés-Hansen 2004). In 1913, the Spanish government finally issued bounties of 2.5 Pesetas (approximately 0.012 Euros) per dolphin killed in Costa Brava, and these bounties were later increased to 7.5 Pesetas (approximately 0.042 Euros). However, this measure was rapidly abandoned. A few representatives of the Spanish fishing industry also considered commercialising the killing of dolphins to exploit their blubber and meat, but these initiatives were never implemented (Valdés-Hansen 2004, 2009, Garrido 2014), with the exception of a few unsuccessful trials in waters of Andalusia and the Strait of Gibraltar (Aguilar 2013). Garrido (2014) also mentions

that conflict took place in the area of Valencia. While we could find no reports of killings in other regions of the Spanish Mediterranean, we cannot exclude the possibility that such conflict took place in other areas.

Along the Atlantic coast of Spain, the first evidence of dolphin killings dates back to the early seventeenth century in the region of Asturias, with a peak in killings occurring between the eighteenth and mid-twentieth centuries (Valdés-Hansen 2004). Although killings took place along the whole Spanish Atlantic coast, including the regions of Basque Country, Asturias and Cantabria, the most affected region was Galicia. Here, the main species killed was the common bottlenose dolphin, but common dolphins and harbour porpoises were also targeted (Valdés-Hansen 2004). Occasionally, other cetaceans could have been killed, such as striped dolphins and Risso's dolphins *Grampus griseus*, as well as pilot whales *Globicephala* sp. and killer whales *Orcinus orca* (Valdés-Hansen 2004). Fishers killed dolphins using harpoons and guns, and fishing nets were used to trap the animals. In the nineteenth century, fishers in the town of Pontevedra (Galicia) organised common bottlenose dolphin "corridas", which involved trapping dolphins in the town's estuary with large nets and then killing them. These corridas were popular events that took place during festivals (Valdés-Hansen 2004). While fishers operating along the Atlantic coast asked the Spanish government to take measures for the extermination of dolphins, and these requests were usually refused, a few unsuccessful trials were conducted in 1911 by the government, which sent military vessels equipped with torpedoes and machine guns to kill dolphins in unspecified locations. Similar trials took place in Galicia in 1927 (Valdés-Hansen 2004). In addition, the commercial exploitation of small cetaceans was carried out in Galician waters on small whaling boats for a short period around 1925 (Aguilar 2013). Apart from the dolphin "corridas", along the Atlantic coast of Spain there seemed to have been no formal culling campaigns due to perceived competition with fisheries, killings being conducted largely based on the initiative of individual fishers.

Portugal

In mainland Portugal, small cetaceans were killed opportunistically since at least the thirteenth century, with particularly large numbers being killed between the late nineteenth and twentieth centuries (Brito & Vieira 2010, Reiner & Brito 2012). Small cetaceans killed opportunistically (e.g., by using harpoons) by Portuguese fishers could still be found in fish markets around the country in the late 1970s (Teixeira 1979, Brito & Vieira 2010). However, we could find no reports of formal extermination campaigns. Valdés-Hansen (2004) reported that some fishers from Galicia (Spain), who had issues with common bottlenose dolphins in their regions, did not have their fishing gear damaged by dolphins when they fished in Portuguese waters.

British Isles

There seem to be no historical records of culling campaigns of small cetaceans in the British Isles. Of note, Sir Sidney Frederic Harmer, director of the British Natural History Museum between 1919 and 1927, reported that—to his knowledge—there was no conflict between fishers and cetaceans in England (Harmer 1926).

Iceland and Norway

Although they are not considered under our definition of 'small cetaceans', it is interesting to note that in Iceland, hundreds of killer whales were killed in the mid-1950s by the U.S. Navy using machine guns and rockets, after Icelandic fishers complained about these animals damaging fishing gear (Jourdain et al. 2019, Samarra & Esteban 2022). In Norway, fishers complained that killer whales were interfering with the recovery of the Norwegian spring-spawning stock of Atlantic herring (*Clupea harengus*) in the late 1960s, and that may have contributed to the development of killer whale hunting in Lofoten (Øien 1988, Plagányi & Butterworth 2009, Samarra & Esteban 2022).

France

Finally, conflicts were documented on both the Atlantic and Mediterranean shores of France. Fichou and Levasseur (2004) reported dolphin killings in the Atlantic region of Brittany, between the end of the eighteenth and the mid-twentieth centuries, while Faget (2009) described killings in the Mediterranean area of Marseille between the nineteenth and twentieth centuries. These reports are suggestive of intensive culling campaigns that resulted in the killing of many animals over a long period of time. Detailed information about the conflict that took place in France is one focus of the current review (Case study 1).

Scope of the review

Because the present status of small cetaceans may be linked with the levels of mortality they faced in the past (e.g., Bearzi et al. 2004), reconstructing the magnitude of historical killings can help us understand current population demography and trends, including the viability and potential for recovery of populations, as well as set meaningful baselines for conservation.

The practice of killing small cetaceans due to perceived competition with fisheries is well documented in Mediterranean countries like Italy and Croatia, and somewhat consistent information comes from other European areas, particularly Catalonia and the Atlantic coast of Spain, as well as Brittany and the Mediterranean southeast of France. However, there seems to be scant published information on small cetacean killings in several other countries, including North African countries and the Middle East. Filling these gaps and knowing whether, for example, lack of information reflects lack of killings or, alternatively, insufficient research on this subject, would help elucidate the actual magnitude of historical killings.

This study aims to complement the available information with additional investigations intended to assess the magnitude of killings that occurred between the eighteenth and twentieth centuries, with a focus on two particular case studies: France and Algeria. Based on an extensive analysis of historical information that included landings and bounty reports, as well as of osteological specimens from museum collections, we (1) provide information on the context and chronology of killings and culling campaigns, (2) describe the methods used to kill and harm small cetaceans, (3) identify the species affected (when information on morphology, behaviour and feeding ecology is available) and (4) attempt to quantify the number of animals killed.

Records of killings of larger delphinids, such as killer whales, false killer whales and pilot whales, were included, but we did not make a systematic search for these species.

Materials and methods

Search for historical records

Historical sources were accessed through the following open access digitalised repositories: the Biodiversity Heritage Library (<https://www.biodiversitylibrary.org>), the Bibliothèque Nationale de France (<https://gallica.bnf.fr>), the Collection Musée de la carte postale de Baud (<https://www.cartolis.org>), the Ville de Paris/Bibliothèque Forney (<https://bibliotheques-specialisees.paris.fr>) and the Cnum – Conservatoire numérique des Arts et Métiers (<http://cnum.cnam.fr>). As the main countries of interest to this review (France and Algeria) used the French language between the eighteenth and twentieth centuries, the search mostly, but not exclusively, targeted sources in French. The main keywords used to search for information were “dauphin”, “marsouin” and “béluga” (i.e., “dolphin”, “porpoise” and “beluga”, respectively, in English). The words “marsouin” and “béluga” were commonly used in France and Algeria to refer to dolphins and did not necessarily refer to members of the family Phocoenidae or to the beluga *Delphinapterus leucas*. A list of all keywords used to search for information is available in Supplementary Material S1 (Supplementary Table 1.1). More

than 5000 historical documents (including photographs, illustrations, newspaper articles, governmental and scientific reports or publications, and books) dating from the late sixteenth century (i.e., 1551) to the second half of the twentieth century were accessed through open access digitalised repositories. Of these, in total, 311 documents were considered relevant to this work, with the majority of these dating from the nineteenth and twentieth centuries.

Osteological collections

To better understand which species were killed during the period of conflict between the eighteenth and the twentieth centuries, information on Mediterranean small cetaceans held in osteological collections of museums and universities in France and Monaco was collated through public online databases when possible, or via direct contact with curators and conservators, and used to complement the historical documents. The reason for focusing on osteological specimens of small cetaceans from the French Mediterranean, and not French Atlantic waters, relates to the use of the French common name “marsouin” (porpoise in English) in historical documents referring to small cetaceans in the Mediterranean. Harbour porpoises are currently not present in French Mediterranean waters, and the presence of the species in osteological collections from the French Mediterranean could help us understand whether the species occurred and was killed in the Mediterranean during the eighteenth to twentieth centuries.

A total of 18 institutions (museums, universities and research institutes) provided information on their collections of Delphinidae and Phocoenidae. Of these, 12 collections included at least one specimen that came from the Mediterranean, while six did not have any Mediterranean specimens in their collection (see Figure 2 for the list of institutions). The 12 institutions provided information on 298 specimens. Among these, seven specimens were identified as coming from outside of the Mediterranean (from Africa (exact provenance unknown), Antarctica, the Arctic, North Sea, or the South or Northeast Atlantic) and were thus subsequently removed from the analyses. We also removed from further analyses any specimens that had a known date of acquisition after 1940 ($n = 57$), after the end of the period of conflict between fishers and small cetaceans in France, and specimens that could be identified as duplicates of individuals that were already included ($n = 8$). Among the remaining 226 specimens, 106 came from the Mediterranean and 120 had an unknown provenance. Among the Mediterranean specimens, 63 were labelled as coming from the French Mediterranean and Monaco. The rest of the specimens came from Algeria ($n = 20$), Spain ($n = 5$) and unidentified Mediterranean locations ($n = 18$).

The information collected on each specimen consisted of the species (and, if it had been recently re-identified, the species it was originally thought to be), museum code, collector, type of specimen (e.g., entire skeleton and skull only), method of conservation (e.g., formalin and dry mounted), date and place of provenance, cause of death, sex, age class and length of the specimen. Not all the above information was available for every specimen.

As the species could not be confirmed for some of the specimens, the certainty of species identification was assessed based on the information provided by each institution. Identification was judged reliable when carried out in recent years by experts trained in cetacean osteological identification, and it was judged uncertain when institutions indicated that it was not done recently (e.g., identification dated from the nineteenth century) or when no information on certainty of identification was provided. When possible, photographs and measurements were obtained to confirm that the identification was correct. Four institutions (i.e., Université de Montpellier, Muséum Départemental du Var, Muséum d'Histoire Naturelle de Toulouse, Muséum d'Histoire Naturelle de Nîmes) provided photographs for 49 of the specimens whose identification was not reviewed recently. Institutions were asked to provide photographs showing the underside of skulls, to allow identification based on the absence or presence of palatal grooves (to discriminate between common dolphins and other species, since the former is the only relevant species with this feature).

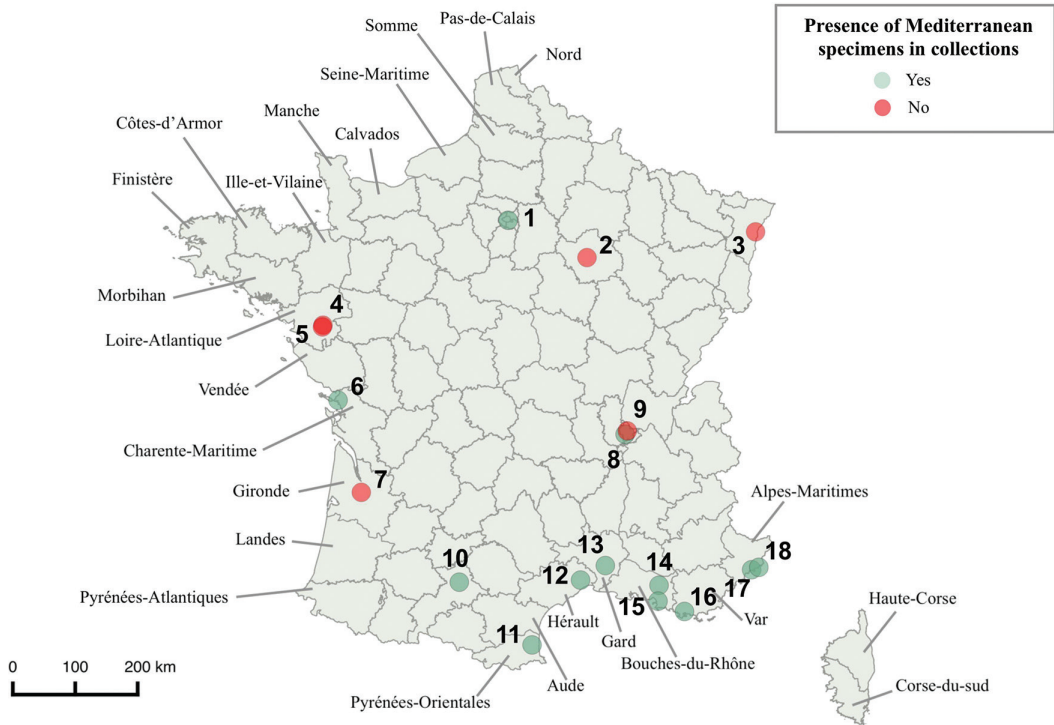


Figure 2 Map of France, with names of coastal “départements”. Numbers correspond to the location of institutions that provided information on their odontocete osteological collections. The presence of Mediterranean specimens in their collection is indicated by green dots and the absence is indicated by red dots. In green: (1) Muséum National d’Histoire Naturelle de Paris; (6) Muséum d’Histoire Naturelle de La Rochelle; (8) Musée des Confluences de Lyon; (10) Muséum d’Histoire Naturelle de Toulouse; (11) Muséum d’Histoire Naturelle de Perpignan; (12) Université de Montpellier; (13) Muséum d’Histoire Naturelle de Nîmes; (14) Muséum d’Histoire Naturelle d’Aix en Provence; (15) Muséum d’Histoire Naturelle de Marseille; (16) Muséum Départemental du Var; (17) Muséum d’Histoire Naturelle de Nice; and (18) Institut Océanographique de Monaco. In red: (2) Muséum d’Histoire Naturelle de Troyes; (3) Musée Zoologique de Strasbourg; (4) Université de Nantes (collection de zoologie); (5) Muséum d’Histoire Naturelle de Nantes; (7) Muséum d’Histoire Naturelle de Bordeaux; and (9) Université Claude Bernard Lyon 1 (collection de zoologie).

The Université de Montpellier and the Muséum d’Histoire Naturelle de Nîmes also provided measurements on five different locations of the mandibles for 23 out of the 49 photographed specimens. These measurements were compared with those of 383 modern specimens of 21 known species within the database “Osteological Reference for Cetaceans in Archaeology-Manual (ORCA – Manual)” (van den Hurk 2020). Using principal component analysis and linear discriminant analysis, a species identification was attributed when measurements from the 23 specimens fell within clusters belonging to particular species. Details on the methodology are available in Supplementary Material S1 (Supplementary Figure 1.1 and Supplementary Table 1.2).

As the identifications could not be confirmed by examining the specimens in person, and photographs sometimes did not allow us to assess the presence or absence of palatal grooves, all species identifications based on the analyses of photographs and mandible measurements ($n = 49$) were classified as uncertain. When species identification based on photographs and on mandible measurements did not match, the identification based on mandible measurements was retained as the final species identification. If mandible measurements did not support identification to the species level,

specimens were classified only to the family or higher level (e.g., Delphinidae, unknown cetacean and non-cetacean).

Case study 1: France

Context and perceptions

Our review of historical information from France suggests that conflict between humans and small cetaceans encompassed the whole period surveyed, from the sixteenth century to the twentieth century. Records mentioning conflicts were scarce between the sixteenth century and the late eighteenth century. From then onwards, records became abundant. These documents suggest that the intensity of conflict increased starting from the late eighteenth century, reaching a peak between the 1880s and the 1930s, and the conflict ending in the 1950s. Along the Mediterranean and Atlantic coasts of France, but particularly in the Mediterranean, small cetaceans were blamed for scaring fish away, eating large amounts of fish, therefore reducing catches, and damaging the nets when attempting to take fish stuck in meshes (referred to as “depredation” in Anonymous (1903a), but see Bearzi and Reeves (2022) where the use of this word is questioned) and when they accidentally get entangled in the nets (bycatch, which often also resulted in injury or death) (Perrier 1889, Gourret 1894, Léotard 1894, Caffarena 1887, Le Gall 1904, Legendre 1926a, 1929, Fichou & Levasseur 2004, Faget 2009). Although attitudes towards small cetaceans were generally hostile, there apparently was an exception: some fishers in the French Basque country considered small cetaceans to be essential to localise shoals of sardines and had developed fishing techniques to use small cetaceans to detect and catch fish (Legendre 1926a, Anonymous 1895a, 1903b). The main fisheries affected by the conflict were targeting shoaling fish such as sardines, anchovies and, to a lesser extent, mackerels (e.g., Legendre 1926a, 1929, Fichou & Levasseur 2004, Faget 2009). In the case of damage to fishing gear, the fishers often needed days or weeks to repair damaged fishing gear, which reportedly cost up to several hundreds of Francs (Legendre 1926a). Note: the value of the old Franc has fluctuated over time. Conversions into Euros are available for the years 1901–1960 from the currency converter tool of the Institut National de la Statistique et des Études Économiques, taking the inflation rate into account; the conversions from old Francs to Euros provided in this chapter are approximate. The value of the Franc varied between 4.27 and 0.02 Euros over the period 1901–1960 (Institut National de la Statistique et des Études Économiques 2022). As a result of the damage caused by small cetaceans, some fishers were reportedly reluctant to deploy their nets and even considered stopping fishing for commercially important species (Legendre 1926a, Anonymous 1894a, 1898a). Figure 3 shows two examples of fishing nets allegedly damaged by small cetaceans in the French Atlantic and Mediterranean.

Fishers’ complaints regarding the negative impact of small cetaceans were amplified by local newspapers through sensational articles. Media propaganda claimed that there was an “open war” between fishers and small cetaceans (Anonymous 1893a) and that the “brave” fishers had to be “protected” (Anonymous 1931a). Articles depicted small cetaceans as vile animals that had to be “annihilated” (Anonymous 1898b). Small cetaceans were considered as pests that should be exterminated in the same way as wolves, bears, foxes, moles, mice and cockchafer (Anonymous 1894b). For instance, one newspaper article referred to these animals as “monsters”, “sea pirates”, “voracious enemies”, “nuisance species” and “brigands” and encouraged the readers to “destroy” and “get rid of” them (Anonymous 1894b). This kind of loaded language was also common among naturalists and scientists. For instance, the President of the Naturalists Association from Nice and the Alpes-Maritimes, Eugène Caziot, wrote in the Association’s bulletin:

The ancients have given us tales for pleasure, marvellous stories that Cuvier was naive enough to suppose true, at least some of them. Dolphins are, in reality, stupid, brutal, voracious animals, having only

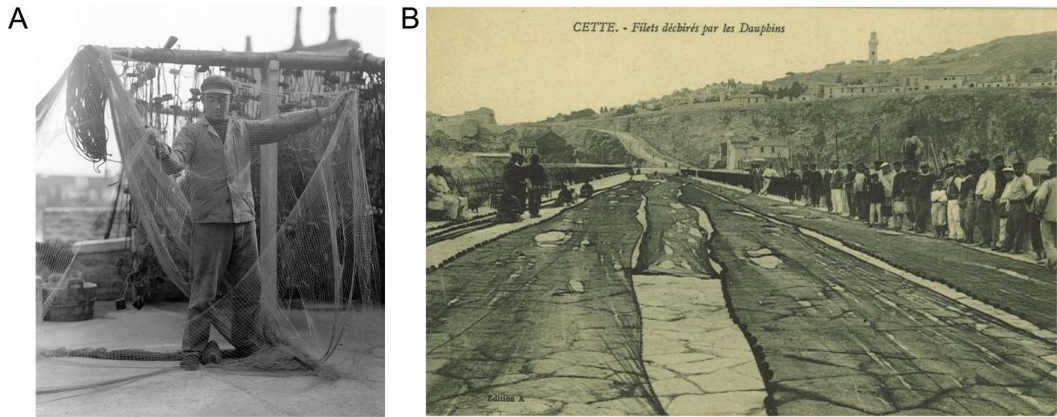


Figure 3 Damage to fishing nets in (A) Brittany (Atlantic) and (B) city of Sète (Mediterranean Sea). Legends indicate: (A) “Audierne – The damages made by the béluga”, photograph by François Kollar, entitled “Pêcheurs. Les dégâts du béluga”, published between 1931 and 1934; (B) “Cette – Nets damaged by dolphins”, published around 1910. Photograph (A) was provided by Ville de Paris / Bibliothèque Forney and is visible at: <https://bibliotheques-specialisees.paris.fr>; photograph (B) was provided by Collection Musée de la carte postale – Baud and is visible at: <https://www.cartolis.org>.

enough intelligence to devour their prey and reproduce their species. They are unfortunately all too often seen in the vicinity of Nice.

—Caziot (1913)

Caziot (1913) reused, almost verbatim, the description of dolphins given by Pierre Larousse in his Dictionary of 1870 (Larousse 1870), which highlights the long-standing animosity towards these animals. Both fishers and journalists called on the French government to act to remedy the situation (Anonymous 1893a, Legendre 1926a). Various solutions were suggested to exterminate cetaceans, and military workers from the French Navy, as well as fishers and other seafarers, were encouraged to kill these animals and, in the case of fishers and seafarers, to exploit them commercially, e.g., by marketing their skin to make leather or their meat as food (Anonymous 1893a, 1903a, Legendre 1926a).

Methods to kill small cetaceans

Mobilisation of the fishing community and the military

To encourage the organised killing of small cetaceans by the fishing community, the French government, counties’ representatives and Prud’homies (i.e., collectives of fishers from the French Mediterranean; see for instance Decugis 2015) offered monetary rewards, also called bounties, for each animal caught. Details about the information found in historical material regarding these bounties are available in Supplementary Table 2.1. The available information suggests that bounties were issued as early as in the 1830s and that the bounty system stopped in 1927. There was mention of bounties paid in all the Mediterranean “départements” (counties) of France (see Figure 2 for a map of these “départements”), except for the “départements” of Aude and Corse-du-sud. While some accounts referred to France as a whole, we could find no specific mention of bounties in French Atlantic “départements”. However, previous work by Fichou and Levasseur (2004) indicates that bounties were also issued in the Atlantic “départements” (e.g., in the region of Brittany). Bounties were awarded to fishers or other seafarers on the condition that the head of the killed “porpoise”

(in this case, small cetacean) was shown to the administration in charge of delivering the bounties (Anonymous 1901a). To avoid frauds (e.g., reusing the same head several times to obtain more money), the head was destroyed when handed to the administration (Anonymous 1901a). The value of the bounties varied markedly across years and areas, from a maximum of 35 Francs (approximately 149 Euros) per “porpoise” head in Marseille in 1899 (Anonymous 1900a) to a minimum of 2.50 Francs (approximately 10 Euros) in 1910 (location not provided; Legendre 1926a). However, because catching small cetaceans was no easy task and demanded extra efforts, numerous fishers did not systematically engage in the hunting of small cetaceans, and many complained about the situation not improving. In response to these complaints, the government occasionally offered monetary compensation for damaged nets. For instance, in 1868, 833 Francs were distributed among 13 boat owners (Anonymous 1889).

Fishers were not the only ones involved in small cetacean killings. After the fishing community called for the help of the government, the French Navy deployed several types of military vessels along the Mediterranean and Atlantic coasts. The first request for the use of military vessels dates back to 1872 (Anonymous 1872). The most commonly used vessels were torpedo boats (“torpilleurs”, see Figure 4). Other types included counter torpedo boats (“contre-torpilleurs”), fishery control boats (“garde-pêches”), tug boats (“remorqueurs”), cannon ships (“cannonnières”) and small warships (“avisos”).

Military vessels patrolled the French coast in search of small cetaceans. Once these were detected, officers on board would use various methods to kill the animals. Torpedo boats were equipped with cannons of 37 mm and 75 mm (Legendre 1926a), as well as cavalry lances (see Figure 6 and the next section for more details). Supplementary Table 2.2 provides information on the vessels used to kill small cetaceans in France. The first account of military vessels sent by the government to patrol the Atlantic coast of France dates back to 1903, in the region of Brittany, whereas in the Mediterranean, the first account dates back to 1883, in the region of Provence-Alpes-Côte d’Azur. The last accounts are from 1953 in the Atlantic and 1932 in the Mediterranean. Over a period of at least 71 years (1883–1953), at least 27 military vessels (10 in the Atlantic, 16 in the Mediterranean



Figure 4 “The boat Chasseur 115, in charge of killing ‘bélugas’ (i.e., most likely dolphins) in the waters where sardines are caught”. Photograph taken on the 16th of September 1932, Belle-Île (Morbihan, Brittany). Agence de presse Mondial Photo-presse. (Source: Bibliothèque Nationale de France (<https://gallica.bnf.fr>)).

and 1 in an unknown location) were deployed along the shores of France. Deployment of torpedo boats had particularly high costs. For instance, more than 180,000 Francs (approximately 205,000 Euros) were spent in 1923 for the deployment of the boats *MISTRAL* and “321” in the French Atlantic and for the boat “339” in the French Mediterranean (Anonymous 1923a).

The scientific community played an important role in the quest for the eradication of small cetaceans. Scientists developed or conceived some of the extermination methods and disseminated information in scientific essays to encourage killings and commercial exploitation (Legendre 1926a, 1929). Boats belonging to scientific institutes were occasionally used to hunt small cetaceans or to test some of the killing methods. Boats employed for these purposes included *LE ROLAND* in 1901, owned by the laboratory Arago in the Pyrénées Orientales (Anonymous 1901b), and the *NÉREIS* in 1926, owned by the laboratory of Concarneau (Legendre 1929).

Killing methods and frequency of use

A variety of methods was deployed by the fishing community and the military to kill small cetaceans. Attempts were made to identify and assess efficient and cost-effective ways of eradicating these animals, for instance, through surveys in fishing ports, as done in 1901 by the Minister of the French Navy (Anonymous 1903d), or by creating expert commissions, as done in 1923 (Pérard 1925) and 1925 (Legendre 1929). Often, these enquiries concluded that the methods employed did not produce satisfactory results, that some methods were too expensive or dangerous and that the best way of eradicating small cetaceans was relying on the private initiative of fishers, rather than involving the military or other government entities. A system of bounties was often regarded as the best solution (Anonymous 1903d), but it was also recommended to keep searching for new methods of killing (Legendre 1926a). Supplementary Table 2.3 lists some of the methods employed to kill small cetaceans during the years 1865–1953.

A common method included a “herding and beaching” technique (Legendre 1926a, Anonymous 1873), where fishers would spot a group of animals, herd them towards shallow waters and finally trap them, force them to beach and kill them. Harpoons and fishing nets (used on purpose to catch small cetaceans) were also considered as effective ways of killing the animals (Legendre 1926a; Figure 5A). In addition to fishing nets being used with the purpose of intentionally trapping small cetaceans and then killing them (for instance with harpoons), small cetaceans could also be caught incidentally in fishing gear during normal fishing operations. When live animals were bycaught, fishers would sometimes free them in order to avoid gear damage (in the past, fishing gear was made of relatively fragile fabric such as hemp, cotton or linen). When live animals could not be released, the fishers would pull them onboard to kill them (Garau 1909).

When military vessels were used, cetaceans were shot with cannons, torpedoes and rifles, as well as killed using explosives (Legendre 1926a, Caffarena 1887; Figure 6A). Guns were also distributed by the government directly to the fishers to encourage them to kill more cetaceans (Anonymous 1903e; Figure 6B). Finally, cavalry lances were used by both military personnel and fishers (Anonymous 1930a; Figure 6A).

Besides the methods mentioned above, other techniques developed by scientists, engineers and other workers proved to be difficult to implement due to either high cost, dangerousness or ineffectiveness (Supplementary Table 2.3). Such methods were usually abandoned after a few trials. Some examples are given below.

Bellot’s needles This method (“aiguilles de Bellot”) was developed in 1892 by Mr. Bellot, a factory worker from Douarnenez (Brittany). Originally used to kill foxes in Provence (Gourret 1894), it consisted of two long needles (8–10 cm long) made of steel, which were attached together centrally by a piece of rubber and tied at the ends using catgut. The needles were inserted into fish bait (sardines or other small fish), which were then thrown into the sea, with the intention that small cetaceans would eat them. Once ingested, the catgut pieces at both ends of the system dissolved, and the two

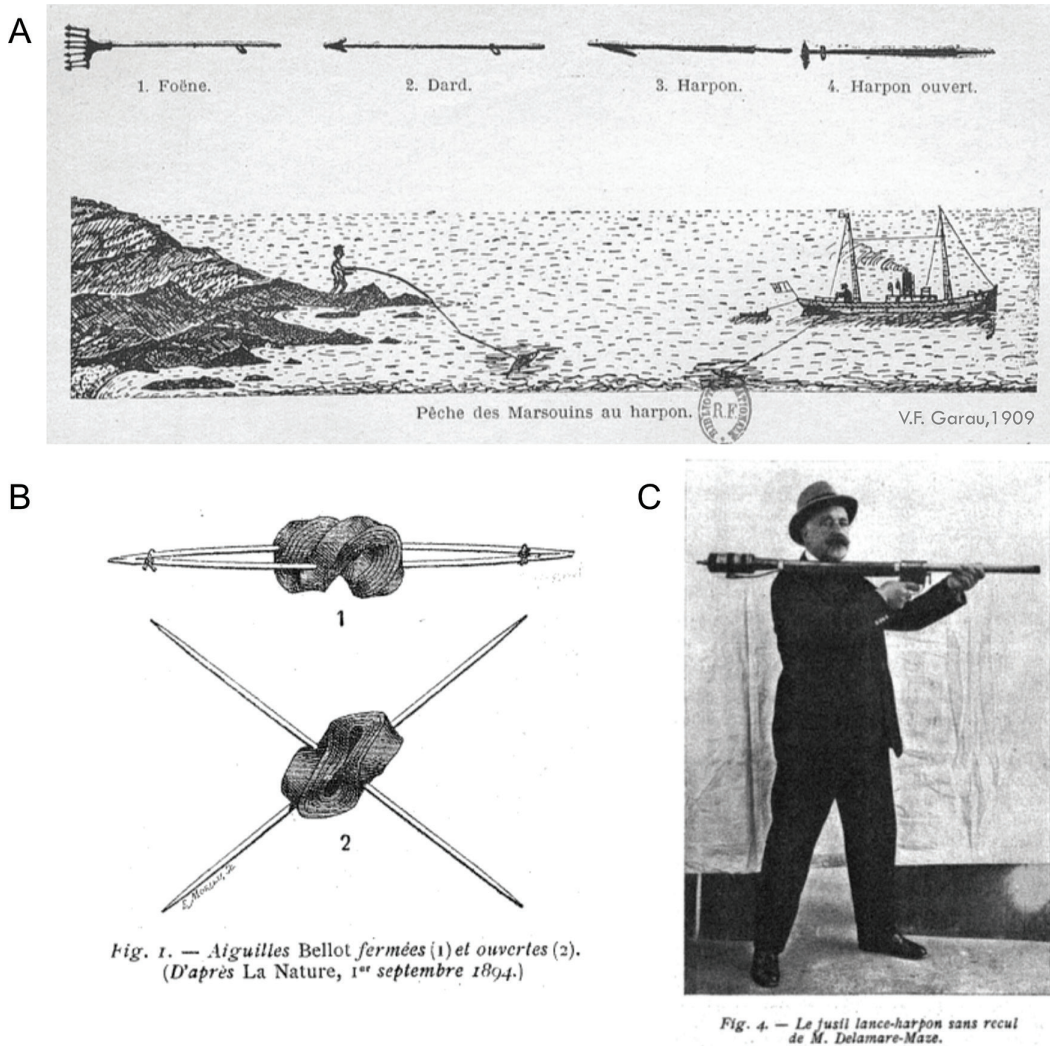


Figure 5 Examples of methods employed to kill small cetaceans in France. (A) Types of harpoons used to catch small cetaceans. Legend indicates “Fishing porpoises with harpoons. 1. Foëne; 2. Dart; 3. Harpoon; 4. Open harpoon”; (B) Bellot’s needles: (1) shows the needles closed, tied up at the extremities by pieces of catgut; (2) shows the needles opened once the catgut dissolved due to gastric juices in the stomach of the animal. Legend indicates “Bellot’s needles closed (1) and opened (2). (From La Nature, 1st of September 1894)”; (C) Harpoon rifle. Legend indicates: “Harpoon rifle invented by Mr. Delamare-Maze”. Photograph (A) was provided by Bibliothèque Nationale de France (<https://gallica.bnf.fr>) and is visible in Garau (1909). Photographs (B) and (C) were provided by the Cnum – Conservatoire numérique des Arts et Métiers (<http://cnum.cnam.fr>) and are visible in Legendre (1926a).

needles would pivot so as to be at 90 degrees to each other, thus perforating the wall of the digestive tract and resulting in the death of the animal (Figure 5B). Approximately 35,000 Bellot’s needles were distributed in fishing ports along the French Atlantic and Mediterranean shores: 15,000 in 1893, 10,000 in 1894 and 10,000 in 1915. This method apparently gave mixed results: reportedly, it worked in some regions (e.g., in the cities of Auray and Noirmoutier) and had no results in others (e.g., in Nantes and Royan). While the suggested explanation for these mixed results was that small

A



B



Figure 6 Further examples of methods employed to kill small cetaceans in France. (A) The illustration shows a variety of methods to kill small cetaceans onboard warships: handguns, rifles, cannons and cavalry lances. One of the animals caught with a lance is tied to a rope. The legend indicates: “Torpedo boats hunting porpoises” (Anonymous 1903c). (B) The illustration shows fishers hunting for dolphins in the region of Brittany (Atlantic). A warship with seamen shooting is visible in the background. The legend indicates: “Hunting dolphins in the bay of Douarnenez” (Anonymous 1903e). Both illustrations were provided by Bibliothèque Nationale de France (<https://gallica.bnf.fr>).

cetaceans were reluctant to ingest the dead fish used as baits (Léotard 1894, Anonymous 1895a), it is unclear how that would explain the differences observed among different areas.

The Ocellus method The Ocellus method was developed by engineer Mr. Ocellus and tested between 1893 and 1895 in La Ciotat and the Gulf of Marseille (Mediterranean). The system consisted of an electric cable connected to a battery installed onboard a ship, attached to a long (around 400m) “sardinal” (a net to catch sardines), deployed in waters up to 100m deep, with dynamite attached to the net every 15 m (Ropers 1906). The net was deployed in areas where shoals of sardines were detected. When a group of small cetaceans approached the net to feed on sardines, an electric current resulted in the dynamite explosion. The effectiveness of this method is unclear: there are reports mentioning deaths of between 1 and 80 animals (Anonymous 1893a, 1895a). Eventually, the technique was judged inefficient, expensive and complicated and thus abandoned (Legendre 1926a).

Harpoon rifles A harpoon rifle (“fusil lance-harpon sans recul” in French), which is a small version of the whaling harpoon cannon, was developed around 1926 (Legendre 1926a; see Figure 5C). A few trials were made, including some in the area between Concarneau and Camaret (Brittany), onboard the fishery control vessels PÉTREL and CALEBAS, as well as the vessel NÉRÉIS owned by the Maritime Laboratory of Concarneau. After these trials, harpoon rifles were abandoned (Legendre 1929).

Other methods Several other methods were deployed, but their frequency of use or success was not reported. For instance, Anonymous (1908a) reported that priests were being paid to pray, specifically to take away small cetaceans’ taste for sardines. Noisy rockets were shot to scare the small cetaceans away (Pérard 1925). Other methods were proposed but never implemented. One of the most bizarre, developed in 1896 in Marseille (Bouches-du-Rhône), aimed to attract small cetaceans by producing a bright underwater light, which was supposed to “hypnotise” the animals and allow for their capture (Anonymous 1895a, Legendre 1926a). There were requests to use explosive balls, gas projectiles and poison (e.g., poisoned tubes and poisoned sardines), as well as proposals to inoculate small cetaceans with rabies (Legendre 1926a). In 1890, it was suggested to use poisoned baits, but this method was judged dangerous and not implemented (Legendre 1926a). In 1891, the Minister of the Navy ordered explosive cartridges to the pyrotechnic factory of Toulon, specifically to kill small cetaceans (Anonymous 1900b). In 1914, a deputy of Morbihan (Brittany) requested permission to put explosive mines in places frequently used by small cetaceans, but this request was also not implemented due to the associated costs and dangers (Legendre 1926a). There was a proposal to build small speedboats and to fly seaplanes and airships dedicated to hunting small cetaceans (Anonymous 1930a,b, 1922a, Legendre 1926a). In the area of Brest (Brittany), it was proposed to deploy the seaplane GOLIATH to kill small cetaceans, with steel arrows, bombs and bullets, but it was never used as fishers were afraid of being harmed during the operations (Fichou & Levasseur 2004).

Regional differences

Although a variety of methods was implemented along the coasts of France, there were differences in frequency among regions. For instance, in 1894, 10,000 Bellot’s needles were distributed to fishers in Normandy (northern France), Brittany (north-west), Vendée, Charentes-Maritimes and Gironde (Bay of Biscay), Bouches-du-Rhône and Var (Mediterranean). While Bellot’s needles were used by most fishers in these locations, some fishers from the Pyrénées-Atlantiques (French Basque Country) categorically refused to use the needles, arguing that small cetaceans were essential to help them detect shoals of fishes and they had no intention of killing them (Anonymous 1895a). Nonetheless, small cetaceans were still killed in the French Basque Country. For instance, Figure 7G shows fishers from Biarritz (a city in the French Basque Country) posing with a dead harpooned

common dolphin, described as a “sardine school destroyer”. Some of the killing methods, such as the Ocellus method, were only implemented in the Mediterranean. Moreover, the deployment of military vessels in the Atlantic seems to have occurred more often in the region of Brittany, whereas the entire French Mediterranean coast was patrolled by these vessels in search of small cetaceans to kill.

Effectiveness of killing methods

Government articles, official reports from dedicated commissions and interview surveys emphasised the need to commercialise the exploitation of small cetaceans. Authors often referred to other countries, where the commercial exploitation of cetacean blubber, skin and meat was profitable (e.g., in England and along the Black Sea; Gourret 1894, Le Gall 1904), when calling for increased killings in France. However, such commercialisation never occurred, with the exception of a few unsuccessful trials to market canned cetacean meat prepared in the canning factories of Concarneau, Quiberon and Guilvinec (Finistère and Morbihan, in the region of Brittany; Fichou & Levasseur 2004). Another proposal involved the development of sport hunting for small cetaceans (Pérard 1925).

Reports describing the inefficiency of some methods in certain areas raise the question of whether animals were in fact killed. For instance, René Legendre (1929), the deputy director of the Maritime Laboratory in Concarneau (Finistère, Brittany), suggested that the fishery control vessel PÉTREL had never succeeded in killing small cetaceans and that harpoon rifles were never used after the initial trials in Concarneau (Legendre 1929). One document from 1931 also suggested that the Navy was aware of the ineffectiveness of military vessels, but that the boat CHASSEUR 115 was nevertheless required to patrol the shores of Brittany in order to reassure fishers (Anonymous 1931b). However, other documents suggested that the deployment of military vessels was effective. For instance, Fichou and Levasseur (2004) mentioned a document reporting that the boats CAPITAINE-MEHL and “132” arrived in Port-Vendres in April 1907 to “protect” the sardine fisheries in the Mediterranean, and after patrolling the area between Cap Cerbère and La Nouvelle 277 times, the commander believed that their presence had protected fishers’ nets against cetaceans’ attacks. While reports tend to be unclear and non-quantitative, at least 27 vessels were deployed along the shores of France for at least 71 years. Considering the presumably significant costs associated with keeping these military vessels engaged in fishery support over several decades, it could be argued that small cetaceans were being killed, although in unknown numbers.

Use of small cetaceans after killing

Many historical records attest to the practice of consuming the meat of small cetaceans in France, particularly during the Middle Ages (Musset 1964) and the Renaissance (Van Beneden & Gervais 1880). Between the tenth and fourteenth centuries, there was an intense fishery in Normandy, with small cetacean meat sold in markets around the country and exported to other countries as well (Fischer 1881). It should be noted that in the Middle Ages, cetaceans were not perceived as mammals but rather as fish, and as such, they were consumed by religious communities during periods of fasting (Fichou & Levasseur 2004, Guizard 2018, van den Hurk 2020, van den Hurk et al. 2021). In French monasteries, the meat was consumed until at least the seventeenth century (Dubuc 1968). The oil extracted from the blubber was also used in monasteries for lighting (Musset 1964, Berthelot 1840, Fischer 1881). The meat of small cetaceans was eaten at the tables of the royals until at least the seventeenth century (Clavel 2001). This taste for dolphin and harbour porpoise meat decreased from the seventeenth century onwards (Fichou & Levasseur 2004). Zoology essays from the late eighteenth century and mid-nineteenth century suggest that small cetaceans were still consumed occasionally at the time (Fichou & Levasseur 2004). For instance, Bonnaterre (1789) wrote about the flesh, blubber and intestines of *Delphinus tursio* (most likely the common bottlenose dolphin) being eaten (no location was provided). However, some accounts from the early nineteenth century

questioned the use of this “tough” and “mediocre” meat (Berthelot 1840), with some authors expressing disgust towards dolphin and porpoise meat (Lesson 1838).

Even though the meat of small cetaceans appears to have fallen out of favour, it was still consumed during the period of most acute conflict between fishers and cetaceans (i.e., between the early nineteenth and the mid-twentieth centuries), when it even regained some popularity (Legendre 1926a) and was sold in markets, for example, in the Paris market, where it was sold for 10 Francs kg⁻¹ in 1926 (Legendre 1926a). During this period, several authors stated that harbour porpoise or dolphin meat was tasty (e.g., Anonymous 1903d, Legendre 1926a) although others reported that it was sold rarely, as customers did not like it (Anonymous 1929). Some documents refer to sausages made with the meat of small cetaceans (“saucisson de marsouin”), as well as to ventral and dorsal muscles being consumed (Anonymous 1903f). In 1934, small cetacean meat (“exquis suprême de marsouin aux herbes marines”) was served at the spring banquet of the Société Nationale d’Acclimation in Paris (Anonymous 1934a). In the historical material reviewed, there is no mention of small cetaceans being consumed for religious reasons during the period of acute conflict with fisheries.

The carcasses of small cetaceans were also used as agriculture fertilisers, for example, in La Rochelle around 1894 (Anonymous 1894c, Fichou & Levasseur 2004). Some carcasses, however, were simply piled up on the quays of ports, where they were left to rot (Fichou & Levasseur 2004).

Species of small cetaceans killed

Knowing which species of small cetaceans were killed by fishers and navy personnel during the conflict is critical to understand if and how the populations suffered from direct removals. However, species determination is mostly hampered by the lack of photographs in the documents accessed. Thus, historical records (text and other iconography) and osteological collections were used to identify the species, when possible.

Information from historical records

Species identification relying on photographs One way of identifying species reported in historical documents is by using photographs of appropriate quality. Photographs associated with the words “marsouin”, “béluga”, “dauphin”, “souffleur”, “squal”, “taupe” and “cétacé” helped us to understand the use of these words. Our search yielded a total of 12 photographs, all published in the early twentieth century, which permitted a reliable identification of the species caught or killed by fishers. Of these, seven were of common dolphins (four in the Bay of Biscay (Figure 7F, G, J, K), two in the English Channel (Figure 7E, I) and one in the Mediterranean (Figure 7H)). Figure 7H, taken from Pourcel (1910), shows a pregnant common dolphin and her male foetus caught by a fisherman from Carqueiranne (close to Toulon, Var) in 1910. This animal most likely corresponds to the specimen 1-M-5-DELDEL-(1)/1910, kept by the Muséum Départemental du Var. The text associated with the photograph identifies the animal as *Delphinus delphis mediterraneus*, which was stated to be rare in the region of Toulon (Pourcel 1910). However, Pourcel (1910) differentiated between *Delphinus delphis mediterraneus* and *Delphinus delphis*, which may imply that the latter was not rare in that region. Two of the 12 photographs portrayed harbour porpoises: one caught in the Bay of Biscay (Figure 7L) and one caught in the English Channel (Figure 7D). The search also revealed that species other than cetaceans were also occasionally associated with the name “porpoise” and “dolphin”. For instance, three photographs showed different species of sharks. Figure 7A and C shows sharks reported as “porpoises”, and 7B shows a shark reported as “dolphin”.

Identification of species based on common names Historical records often use common names in French to refer to small cetaceans in general, which prevents the determination of the species involved in the conflict with fishers. Two of the most common terms were “marsouin” and “béluga”,

which translate as porpoise and beluga in English, although these names did not necessarily refer to members of the family Phocoenidae or to the beluga *Delphinapterus leucas*. Normally, the common names in French referred to dolphins, particularly to small members of the family Delphinidae. The word “marsouin” was used throughout France, whereas “béluga” was mainly used along the Atlantic coast of France and more specifically in Brittany. Other commonly used words included “dauphin”, “souffleur”, “squale” and (more rarely) “taupe”, which can be translated in English as dolphin, blower, shark and mole, respectively. Below, we discuss which species correspond to these common names.

Marsouin The word “marsouin” (porpoise) was used to refer to dolphins, without distinguishing between species (e.g., Rolland 1877). To refer to actual harbour porpoises, French fishers used “poursille” or “poursil”, or various other names depending on the region (see Supplementary Table 2.4 for a list of common names used to refer to Delphinidae and Phocoenidae between 1798 and 1900). In Brittany, fishers reportedly perceived that the “poursil” was not involved in conflict with fishing activities (Legendre 1926a). Nonetheless, Figure 7 shows photographs of harbour porpoises killed in the English Channel in 1910 (D) and in the Bay of Biscay in 1926 (L), which is indicative of the species sometimes being among those killed in French Atlantic waters. Figure 7 also shows photographs published around 1910 (F) and in the 1930s (J), with legends referring to *D. delphis* as “marsouins”, and photographs published in the 1930s (A) and around 1905 (C), with legends referring to sharks as “marsouins”. This highlights the variety of species that the term encompassed at that time.

Physical descriptions of “marsouins” in historical documents often did not match those of *P. phocoena*, but rather those of dolphins. For instance, some reports mentioned “marsouins” as having pointy beaks (e.g., Caffarena 1887). In the sixteenth century, Belon (1551) had already noted that dolphins were wrongly called “marsouins” in France. Nonetheless, some of the descriptions, mainly those from zoology textbooks, actually seem to correspond to harbour porpoises. It should be noted that authors during that period tended to quote work from others without verifying the information themselves, which could result in an author describing a species without ever having seen it.

While the presence of *P. phocoena* is established in the Northeast Atlantic, reference to “porpoises” in the vast majority of historical documents from the French Mediterranean Sea raises the question of whether the species was indeed present in the French Mediterranean between the eighteenth and the twentieth centuries. Genetic analyses have shown that harbour porpoises were present in the Mediterranean basin thousands of years ago, but have likely disappeared from it during the second half of the Holocene period (ca. 5.5 ka), after conditions became unsuitable for the species at the end of the African Humid Period (14.8–6 ka) and the Mediterranean Sapropel S1 period (ca. 9.5–6.5 ka) (Fontaine et al. 2014, Fontaine 2016). Nowadays, harbour porpoises are largely absent from the Mediterranean, apart from a few stranding records in the western basin (e.g., Cabezón et al. 2004), presumably vagrant individuals from the Atlantic population, and free-ranging animals in the northern Aegean Sea (Cucknell et al. 2016) which presumably derive from the Black Sea population.

Scientists from the late nineteenth century with experience in cetology did not mention the presence of harbour porpoises in the French Mediterranean. For example, Fischer (1881) did not consider harbour porpoises as being present in the French Mediterranean. According to Van Beneden and Gervais (1880):

The harbour porpoise does not exist, at least to my knowledge, in the Mediterranean. I did not see any taken on the coasts of France during my long stay in Montpellier, and my excursions along the coast, from Cerbère and Collioure to Menton, have not yet brought me across one. It does not exist either in the Italian collections that I visited, particularly in those of Bologna, Pisa, and Naples, and I do not find it either among the Delphinids that were sent to me from the coasts of Algeria.

INTENTIONAL KILLINGS AND CULLING OF SMALL CETACEANS

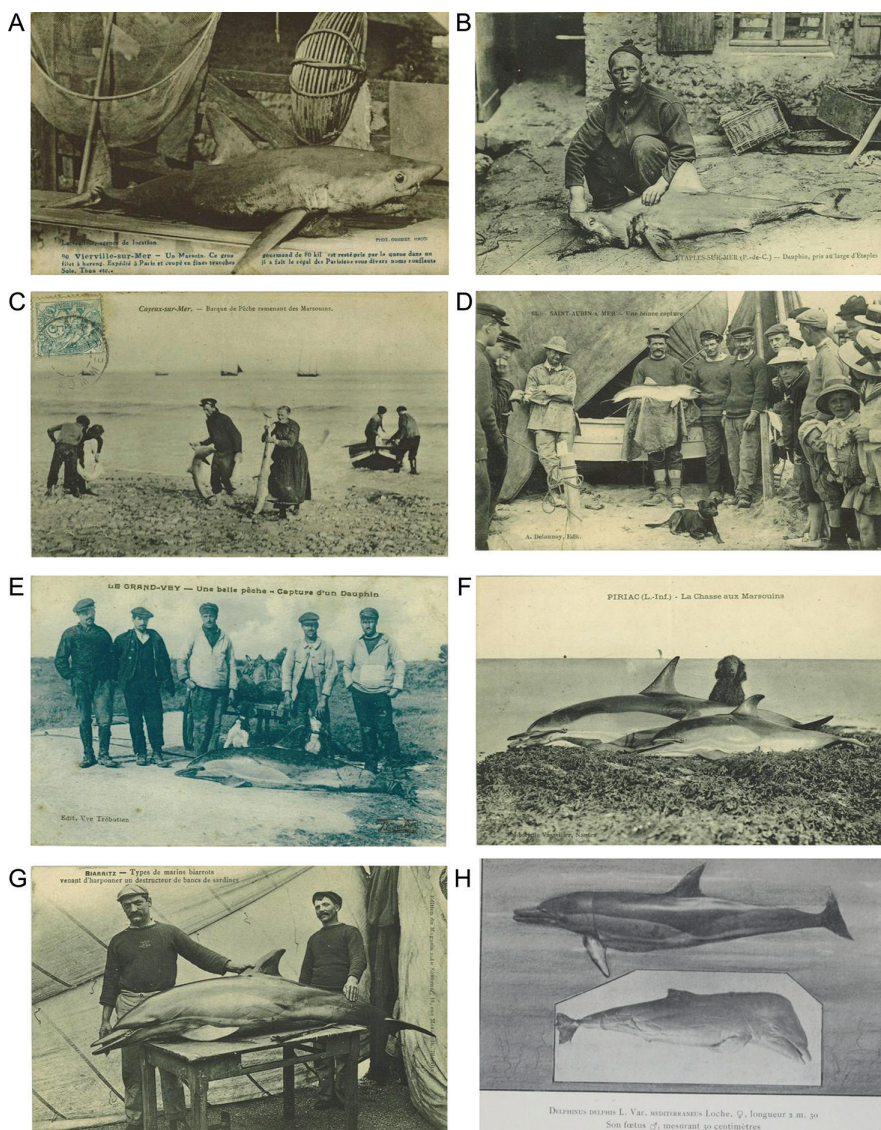


Figure 7 Photographs of small cetaceans and sharks caught in France between the 1900s and the 1930s. (A) A shark, probably caught in the “département” of Calvados. The description indicates: “Vierville-sur-Mer – A porpoise. This 80kg glutton was caught by its tail in a herring net. Shipped to Paris and cut into thin slices, it was a treat for Parisians under a variety of names: sole, tunas, etc.”, published in the 1930s; (B) A shark, probably caught in the “département” of Pas-de-Calais. The description indicates: “Étaples-sur-Mer (Pas-de-Calais) – Dolphin, taken offshore Étapes”, published around 1907; (C) Small sharks, probably caught in the “département” of Somme. The description indicates: “Cayeux-sur-Mer. – boat bringing back Porpoises”, published around 1905; (D) A harbour porpoise, probably caught in the “département” of Calvados. The description indicates: “Saint-Aubin-sur-Mer – A great catch”, published around 1910; (E) A common dolphin, probably caught in the “département” of Manche. The description indicates: “Le Grand-Vey – A good fishing trip – capture of a Dolphin”, published in the 1930s; (F) Two common dolphins, probably caught in the “département” of Loire-Atlantique. The description indicates: “Piriac – Porpoise hunting”, published around 1910; (G) A common dolphin probably caught in the “département” of Pyrénées-Atlantiques. The description indicates: “Biarritz – seamen from Biarritz who just harpooned a destroyer of sardines shoals”, published

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around 1910; (H) A common dolphin probably caught in the “département” of Var. The description indicates: “*Delphinus delphis* L., Var. *Mediterraneus* Loche, female, length 2.30 metres. Her male foetus, measuring 30 centimetres”, published in 1910; (I) A common dolphin probably caught in the “département” of Somme. The description indicates: “Cayeux-sur-Mer – Catch of a dolphin weighting 200 kg”, published around 1910; (J) A common dolphin’s head, from an animal probably caught in the “département” of Loire-Atlantique. The description indicates: “Piriatic – A porpoise head”, published in the 1930s; (K) A common dolphin caught in the “département” of Finistère. The description indicates: “A 2.15 metres long dolphin harpooned by tuna fishers and brought to the laboratory in Concarneau”, published in 1926; (L) A harbour porpoise caught in the “département” of Finistère. The description indicates: “A 1.80 metres long porpoise brought to Concarneau”, published in 1926. Photographs (A)–(G), (I) and (J) were provided by the Collection Musée de la carte postale – Baud and are visible at: <https://www.cartolis.org>. Photographs (K) and (L) were provided by the Cnum – Conservatoire numérique des Arts et Métiers (<http://cnum.cnam.fr>) and are visible in Legendre (1926b). Photograph (H) was provided by Bibliothèque Nationale de France (<https://gallica.bnf.fr>) and is visible in Pourcel (1910).

Béluga The word “béluga” was used in the region of Brittany to refer to the small cetaceans involved in conflict with fishers targeting small fish (mainly sardines). René Legendre, deputy director of the Maritime Laboratory in Concarneau (Finistère), tried to elucidate the identity of the Breton fishers’ “béluga”, which was evidently not the actual beluga, *Delphinapterus leucas*.

Legendre (1926a, 1929) suggested that the term was introduced by Breton fishers from Douarnenez (Finistère). Some Breton fishers believed that these “bélugas” could actually be Risso’s dolphin *Grampus griseus*, a delphinid that tends to whiten with age. However, Legendre doubted that the species called “béluga” was the Risso’s dolphin, as most of the cetaceans killed by fishers (mainly tuna fishers) and brought back to his laboratory were common dolphins. Over the course of his career at the Maritime Laboratory, Legendre (1926b) received hundreds of killed common dolphins, in addition to a few harbour porpoises and only one common bottlenose dolphin. Therefore, the author was convinced that the species called “béluga” were in fact common dolphins and common bottlenose dolphins, and possibly sharks as well. He based his conclusions on observations that the common dolphin was the species most killed by fishers, that a common bottlenose dolphin caught in Audierne (Finistère) had pieces of nets in its stomach and that sharks he had dissected in his laboratory had sardines (without their heads, suggesting they had been taken from a net) in the stomach. In addition, he noted that some fishers reported that the “béluga” turned on its back to chew on the nets, which, according to him, could refer to shark behaviour. Legendre excluded harbour porpoises, since he believed that they were rare in the Atlantic (being mainly present in the English Channel and the North Sea) and that Breton fishers called them “poursil” and not “béluga”. He also said that harbour porpoises were “innocents” and too small to be confused with the “béluga”. He also excluded Risso’s dolphins, considering that this species was rarely stranded or caught and that stomachs of the few specimens that were dissected mainly contained octopuses and “pebbles”, very few cod bones and no sardines (which were said to be the main prey of the “béluga”) (Legendre 1926a).

Souffleur The word “souffleur” and its variants (soufflur, souflur) were mainly used to refer to common bottlenose dolphins (Supplementary Table 2.4). However, “souffleur” was sometimes used to refer to other members of the family Delphinidae (Bouvier 1891) or even to cetaceans generally (Companyo 1841). “Souffleur” could be used to refer to common dolphins and occasionally to harbour porpoises, sperm whales *Physeter macrocephalus*, pilot whales and Risso’s dolphins (Supplementary Table 2.4).

Dauphin This word was principally used to refer to the species common dolphins and, to a lesser extent, to common bottlenose dolphins. The terms “nésarnak” (and its variants nesarnak or nasar nack) and “souffleur” were more often used to refer to common bottlenose dolphins (see Supplementary Table 2.4). A few documents use the word “dauphin” to refer to other members of the family Delphinidae (e.g., harbour porpoises and killer whales, in Companyo 1841).

Squale Some documents mention “squares” as being responsible for damaging fishing gear and removing fish from nets. In modern French, the term “squalé” refers to the shark. A newspaper article reported dolphins (“marsouins” in the text) taking fish from nets (Anonymous 1894a) and then used both terms “cetaceans” and “squares” to refer to the same dolphins. Legendre (1929) wrote about fishers potentially confusing cetaceans and “squares” (used here to refer to sharks). Photographs in Figure 7A–C clearly show sharks, and their associated legends refer to them as being “marsouins”. A newspaper article reported that “these were not the typical ‘marsouins à bec de cane’ (porpoises with a long beak), but rather sharks, with a rounded head, a mouth placed ventrally, and a typical way of turning on their back to feed” (Anonymous 1903c). Bounties of 10 or 25 Francs were offered in the Gard “département” in 1900 to capture sharks and “lamies” (a word that currently refers to sharks of the genus *Lamna*) that destroyed nets (Anonymous 1900a).

Taupe The word “taupe” means mole in English. This term was used to refer to common bottlenose dolphins and harbour porpoises (Supplementary Table 2.4), possibly because of the dark grey-brown colour of the mole, which may resemble the colour of both of these cetacean species. In contemporary French, the term “taupe de mer” refers to sharks of the genus *Lamna*.

Identification of species based on scientific names Scientific names of cetacean species have varied greatly over the centuries, sometimes making it difficult to know which species is being described, especially when the reports lack photographs or illustrations. In addition, some of the reports may have been written by individuals with limited knowledge of cetaceans, leading to the dissemination of potentially incorrect information. While the identification of the cetacean species involved in conflict with fishers is often challenging, two species were clearly identified by several authors as competing with fishers in French waters, namely, the common dolphin and the common bottlenose dolphin. Where a different scientific name was used in the past, we refer to the scientific name as given in the cited reference but also mention the contemporary common name.

In the late nineteenth century, common dolphins were believed to be a common species in both the Atlantic and Mediterranean waters of France (e.g., Fischer 1881, Bouvier 1891). Some authors considered the species as being the most abundant cetacean in French waters, particularly in the Mediterranean (Flower 1879, van Beneden 1889). Gervais (1864) differentiated common dolphins (*Delphinus delphis*) from striped dolphins (*Delphinus tethyos*) based on the presence of palatal grooves in the former, and noted that unlike common dolphins, striped dolphins were rare in the French Mediterranean. He also noted that common bottlenose dolphins (*Tursiops tursio*) were far less common than common dolphins in the same area (Gervais 1864). Some reports regarded common dolphins as the main species responsible for conflict with fishers. For instance, Van Beneden and Gervais (1880) wrote that “fishermen have always feared the common dolphin because of the damage it does to their nets; hence it is the only species that was first well known”. Caziot (1913) reported that “*Delphinus delphis*, L. is only too well known to Mediterranean tuna fishermen for the great damage it does to their nets called madragues”. Madragues were fixed nets acting as traps that were used to fish tunas around the eastern Mediterranean coast of France until the beginning of the twentieth century (Farrugio 2012).

Bouvier (1891) reported that common bottlenose dolphins *Tursiops tursio* (Fabricius) were well known for causing damage to fishing nets around the coasts of France. According to the author, the killing of common bottlenose dolphins gave rise to celebrations in the city of Nice (Alpes-Maritimes). People adorned the killed dolphins with flowers and marched with their catch triumphantly through the streets, stopping in front of the homes of rich people, who could offer monetary compensation for the loss of fish and the damage to the nets caused by these dolphins (Bouvier 1891).

The harbour porpoise *Phocoena communis* was the only species identified as not being involved in the conflict with fishers in Brittany (Legendre 1926a,b). Van Beneden (1889) mentioned that a few harbour porpoises were killed in French Atlantic waters and subsequently donated to museums, but it is not known why these animals were killed. In addition to harbour porpoises, there are a few records from museum collections of other cetacean species, such as striped dolphins, Risso’s dolphins, pilot whales and killer whales, killed in the Atlantic and Mediterranean waters of France, but again it is not known why these animals were killed, and there was no indication of these other species being involved in conflict with fishers in the region at that time (Van Beneden 1889).

Identification of species based on morphology, behaviour and feeding ecology The identification of species reported in historical texts can occasionally benefit from information on morphology, behaviour and feeding habits. Historical reports sometimes included contradictory information regarding the morphology of animals. For instance, an article described how the “porpoise” was different from *Delphinus delphis* since it was smaller (1.5 m), but then went on saying that its beak was 15–20 cm long, narrow, cylinder shaped and similar to a goose’s beak (Anonymous 1903b). Most morphological descriptions referred to animals 2–2.5 m long, weighing 40–110 kg, with a grey colour, swimming in groups, in pairs or alone (e.g., Anonymous 1894a, 1895b, 1898b,c, 1903b, 1909, Fichou & Levasseur 2004). This information does not allow for species identification, unless accompanied by additional information, for example, about particular behaviours or the prey

targeted. For example, one report (Pérard 1925) mentioned that small cetaceans were waiting for and then following trawlers, a common behaviour among common bottlenose dolphins, worldwide (Bonizzoni et al. 2022). There were also records of animals entering rivers to chase fish (particularly mullets) in shallow waters (e.g., Anonymous 1898b), which is another common behaviour among common bottlenose dolphins (Silber & Fertl 1995). Interactions between small cetaceans and fishers mainly occurred in coastal waters, but some killings were also reported “offshore” (i.e., in Brittany, Legendre 1926a). Some sources mentioned the prey species that were targeted by the cetaceans. This type of information sometimes allowed us to infer the predator species, based on comparisons with contemporary diet studies. However, the fish species targeted by the fisheries in the late nineteenth century and early twentieth century are nowadays eaten by several different cetacean species, and in any case, caution is required because cetacean diets may have changed over the last 100 years.

The main reported prey of small cetaceans in French Atlantic waters were sardines and anchovies (e.g., Anonymous 1903b, 1930a). In this area, in the last two decades, sardines are a known prey of common dolphins and common bottlenose dolphins, as well as of harbour porpoises (Spitz et al. 2006a, Meynier et al. 2008, Marçalo et al. 2018). They also constituted a small fraction of striped dolphin diet off Portugal (Marçalo et al. 2021), but not in French waters (Spitz et al. 2006b). Anchovies are prey of common, common bottlenose and striped dolphins, as well as harbour porpoises (Spitz et al. 2006a,b, Meynier et al. 2008). Mulletts were also mentioned in some reports (e.g., Fichou & Levasseur 2004), and these are the prey of common bottlenose and occasionally of striped dolphins in French waters (Spitz et al. 2006a,b), and of common bottlenose and common dolphins (although to a lesser extent) off the Iberian Peninsula (Silva 1999, Santos et al. 2007, Marçalo et al. 2018).

In the Mediterranean, the main fisheries reported to be suffering from conflict with small cetaceans were those targeting sardines, anchovies and mackerels (e.g., Anonymous 1894a, 1895b, 1898a,d, 1900a). In this region, sardines are part of the present-day diet of common dolphins (Bearzi et al. 2006, Larbi Doukara 2015, Giménez et al. 2018, Milani et al. 2018) and common bottlenose dolphins (Blanco et al. 2001, Larbi Doukara 2015, Bräger et al. 2016, Giménez et al. 2017, Borrell et al. 2021). They also represent a small fraction of the diet of striped dolphins (Meotti & Podestà 1997, Gómez-Campos et al. 2011, Aznar et al. 2017, Saavedra et al. 2022). Anchovies and mackerels are part of the diet of common, common bottlenose and striped dolphins (Meotti & Podestà 1997, Blanco et al. 2001, Gómez-Campos et al. 2011, Larbi Doukara 2015, Aznar et al. 2017, Giménez et al. 2017, 2018). Conflict with fisheries targeting mullets was also mentioned (e.g., Anonymous 1898b), and mullets are normally targeted by common bottlenose dolphins (Scheinin et al. 2014, Giménez et al. 2017, Milani et al. 2018). Finally, one report mentioned a conflict with fishing for bogues (Anonymous 1898d), which are part of the diet of common, common bottlenose and striped dolphins (Würtz & Marrale 1993, Gómez-Campos et al. 2011, Larbi Doukara 2015, Aznar et al. 2017, Giménez et al. 2017, 2018).

Information from osteological collections

The review of osteological collections of Delphinidae and Phocoenidae held in French institutions revealed that the most common species, in decreasing order of importance, were the common dolphin, long-finned pilot whales *Globicephala melas*, striped dolphins, common bottlenose dolphins and Risso’s dolphins (Table 1). Other species present within the collections were killer whales, short-finned pilot whales *Globicephala macrorhynchus*, harbour porpoises, false killer whales *Pseudorca crassidens* and unidentified Delphinidae. However, species identification could not be confirmed for all specimens (see Table 1 and Supplementary Table 2.5). Results from the identification of the 49 specimens whose identification was not reviewed recently, based on the analyses of photographs and mandible measurements, are presented in Supplementary Material S1 (Supplementary Figure 1.2, Supplementary Tables 1.3 and 1.4).

The confirmed species acquired by institutions during the period of acute conflict between fishers and small cetaceans (i.e., during 1841–1940) were long-finned pilot whales ($n = 6$), common dolphins ($n = 5$), common bottlenose dolphins ($n = 2$), striped dolphins ($n = 1$), Risso's dolphins ($n = 1$), killer whales ($n = 1$), short-finned pilot whales ($n = 1$) and harbour porpoises ($n = 1$).

However, there are doubts about the two harbour porpoise specimens included in Table 1. The specimen MNHN-ZM-AC-1993-64, a harbour porpoise with a certain identification held at the Muséum National d'Histoire Naturelle de Paris (MNHN), was collected in Palavas (“département” of Hérault) in 1870. The specimen was previously identified as *Orcinus orca* or *Globicephala melas* and was later re-identified as *P. phocoena* (Céline Bens/MNHN, pers. comm.). The original identification as *O. orca* is still attached to the skull of the specimen. Van Beneden and Gervais (1880) and Van Beneden (1889) mentioned a very young killer whale *Orcinus orca* stranded on the beach of Palavas (Hérault), unknown date, which could correspond to specimen MNHN-ZM-AC-1993-64, implying that the harbour porpoise skull present in the MNHN collection may have been mislabelled. However, this could not be confirmed. The second specimen of harbour porpoise corresponds to a record of an animal caught by fishers in the area of Marseille in 1841, from the Muséum d'Histoire Naturelle de Marseille (MNHM). The specimen was recorded as being “un très gros marsouin indigène” (a very large native porpoise; Borrelly 2021). As discussed above, the word “porpoise” may not refer to actual harbour porpoises. In addition, this specimen is currently not present in the zoological collection of the MNHM, and it does not appear in more recent records (many specimens were destroyed and replaced between 1850 and 1870; Christophe Borrelly/MNHM, pers. comm.). Therefore, it was impossible to verify whether this specimen was a *Phocoena phocoena*. In summary, the information obtained from French osteological collections cannot confirm the presence of harbour porpoises in the French Mediterranean.

Among the 63 cetacean specimens originating from the French Mediterranean and Monaco, 42 had an unknown cause of death. Thirteen specimens were reportedly killed by humans: six were harpooned, four were “captured” (without further information) and three were “captured in fishing nets”. An additional eight specimens were found stranded. Among the 13 specimens killed by

Table 1 Summary of the Specimens from the French Mediterranean and Monaco Held in French Institutions

Species	Period/Year of Acquisition Known (1841–1940)		Period/Year of Acquisition Unknown		Total
	Species Identification Certain	Species Identification Uncertain	Species Identification Certain	Species Identification Uncertain	
<i>Delphinus delphis</i>	5	13	0	0	18
<i>Globicephala melas</i>	6	5	0	0	11
<i>Stenella coeruleoalba</i>	1	1	2	4	8
<i>Tursiops truncatus</i>	2	4	0	2	8
<i>Grampus griseus</i>	1	7	0	0	8
<i>Orcinus orca</i>	1	1	0	0	5
<i>Delphinidae</i>	0	3	0	0	3
<i>Phocoena phocoena</i>	1 ^a	1 ^b	0	0	2
<i>Globicephala macrorhynchus</i>	1	0	1	0	2
<i>Pseudorca crassidens</i>	0	1	0	0	1
Total		54		12	63

Information on the certainty of species identification is provided.

^a Indicates specimen MNHN-ZM-AC-1993-64, a harbour porpoise whose provenance could not be confirmed (Muséum National d'Histoire Naturelle de Paris).

^b Indicates a “harbour porpoise” caught by fishers in the area of Marseille in 1841, whose identification could not be confirmed (Muséum d'Histoire Naturelle de Marseille).

humans, two were common dolphins (both “captured”), four were long-finned pilot whales (three harpooned and one “captured”) and three were Risso’s dolphins (one “captured”, one “captured in fishing nets” and one harpooned). The collections also included one striped dolphin and one killer whale, both harpooned, and one common bottlenose dolphin and one false killer whale, both “captured in fishing nets”.

In addition to specimens with a known provenance from the French Mediterranean and Monaco, there were 143 specimens without a known provenance (see Supplementary Table 2.5). Of these, 27 were acquired prior to 1940, and 116 did not have a date of acquisition. The species acquired prior to 1940 were common bottlenose dolphins ($n=9$), long-finned pilot whales ($n=3$), killer whales ($n=3$), common dolphins ($n=2$) and Risso’s dolphins ($n=1$), all species that are currently present in the Mediterranean. There was also one specimen of spinner dolphin *Stenella longirostris* and one short-finned pilot whale, neither of which is currently known to occur in the Mediterranean. Among the 116 specimens with an unknown date of acquisition, the most common species were the striped dolphin, common bottlenose dolphin, common dolphin, long-finned pilot whale, Risso’s dolphin, unidentified *Stenella* sp., harbour porpoise, pygmy killer whale *Feresa attenuata*, false killer whale and rough-toothed dolphin *Steno bredanensis*, all currently present in the Mediterranean. There were also species not presently known to occur in the Mediterranean: the pantropical spotted dolphin *Stenella attenuata*, spinner dolphin, Fraser’s dolphin *Lagenodelphis hosei*, Indo-Pacific humpback dolphin *Sousa chinensis* and Clymene dolphin *Stenella clymene*.

Zoological museums tend to hold specimens acquired around the world as well as locally sourced, and the latter may have been particularly important for small museums. Historical documents from the eighteenth to twentieth centuries confirm that curators of zoological collections obtained at least some specimens from their own region. For instance, Louis Companyo (1867), who was the director of the Muséum d’Histoire Naturelle de Perpignan, acquired one specimen (specimen 2008.0.3) of *Globicephala melas* that was part of a large group of which some individuals were caught and other stranded close to Barcarès (Pyrénées-Orientales) in 1864. Companyo (1867) mentioned that Paul Gervais, Dean at the Université de Montpellier, brought four animals from the same group to the collection of his university. The collection of the Université de Montpellier currently holds one specimen of *G. melas* which is probably one of the animals mentioned above. Thus, it is possible that some of the specimens of unknown provenance in Supplementary Table 2.5, which were identified as species known to occur in Mediterranean waters, were sourced locally from the French Mediterranean.

To summarise, based on the evidence from historical documents and osteological collections, the main species involved in conflict with fishers in French Atlantic and Mediterranean waters were common bottlenose dolphins and common dolphins. In addition, other species such as striped dolphins, pilot whales or Risso’s dolphins were killed in both the French Atlantic and the Mediterranean, as well as harbour porpoises in the French Atlantic only, but these species were not the main target.

Minimum estimates of numbers of small cetaceans killed

Estimating the total number of small cetaceans killed during the main period of conflict is a difficult task. Firstly, no time series of bounties being actually paid were found in our review of historical literature. Bounty reports are most likely available in non-digitalised archives (e.g., municipal or council archives), and thus, a search in these physical archives could potentially provide comprehensive time series of bounty rewards. For example, by accessing archives of the city of Sète (Mediterranean coast), Faget (2009) collated records of bounties offered to fishers for a total of 254 small cetaceans, between 1904 and 1910. Secondly, even if such time series could be accessed, bounties would only be likely to reflect a fraction of the actual number of animals killed (Bearzi et al. 2004). Furthermore, only fishers and other seafarers claimed bounties, while the mortality caused by the military would not be reflected in bounty reports.

The difficulty of recovering and bringing carcasses (that could weigh up to a few hundred kilograms each) back to the port sometimes forced fishers to abandon the carcasses at sea (Anonymous 1900c). Fishers could also have killed small cetaceans without knowing or caring about monetary rewards. For example, Legendre (1926a) wrote about tuna fishers who had harpooned many dolphins in the offshore waters of Brittany in order to get fresh meat. These fishers reportedly felt that a 10 Francs (approximately 7 Euros) bounty per dolphin head was worthless in comparison to the 500–600 Francs (approximately 356–427 Euros) they received per tuna, and consequently, they did not ask for bounty rewards. In addition, when small cetaceans were killed by torpedoes or bombshells, it was impossible to determine how many were killed, “because bombshells are only leaving behind fragments of skin, flesh, and other body parts” (Anonymous 1909). When shot with guns, animals reportedly tended to sink and rarely floated so that they could be collected (Legendre 1912). Shooting may also fail to kill the animals immediately, but the wounds could lead to a later death. Other killing methods (e.g., Bellot’s needles, see Methods to kill small cetaceans) would also have resulted in later deaths and lack of carcass recovery.

While exact numbers cannot be computed, information from historical records and osteological collections allows us to make minimum estimates that help us appreciate the magnitude of killings around the shores of France. Supplementary Table 2.7 collates records of small cetaceans killed between 1826 and 1954, based on the historical material reviewed in this study. When adding up the numbers from Supplementary Table 2.7, a minimum estimate of 8860–8907 animals is obtained, based solely on reports of anecdotal kills mentioned in newspapers articles, a few photographs of killed animals, a few specimens reported from museum collections and a few years of bounty rewards reported by some authors. In summary, these figures clearly substantially underestimate the number of animals killed.

The bounty rewards were reported by (1) Fichou and Levasseur (2004), who accessed historical documents and found that thousands of small cetaceans were killed during a 5-year period between 1894 and 1898 (location unknown, most likely in French Atlantic waters); (2) Legendre (1926a), who reported 5590 animals killed during a 5-year period between 1921 and 1925 (location unknown); and (3) Faget (2009), who counted a total of 254 animals killed during a 7-year period between 1904 and 1910, exclusively by fishers from the city of Sète (French Mediterranean). Sète was just one among many locations in France where fishers were rewarded with bounties, and it was also a small city in comparison with, for instance, Marseille (Mediterranean coast), the latter city being a place where fishers notoriously complained about small cetaceans and where high bounties were being offered (Perrier 1889, Anonymous 1882). In total, between 6660 and 6707 animals killed in France were counted, which included 644 animals in the French Atlantic, between 425 and 472 in the French Mediterranean and 5591 in unknown provenance (i.e., from either the Atlantic or Mediterranean shores of France). In addition to these numbers, “hundreds”, “thousands” and “many” more animals killed in the French Atlantic were mentioned in historical reports (see Supplementary Table 2.7; Legendre 1926b, Fichou & Levasseur 2004), which adds up at least 2200 animals (assuming that “hundreds” corresponds to a minimum of 200 individuals, and “thousands” corresponds to a minimum of 2000 individuals), thus increasing this minimal estimated number from Supplementary Table 2.7 to 8860–8907 kills.

Finally, one should consider that (1) the main period of conflict in France lasted for more than a century; (2) bounty rewards were offered for about a century (with the first indication in the 1830s and the last indication in 1927, with variations over time and regions depending on the budget available); and (3) at least some of the methods used to kill small cetaceans were particularly effective (e.g., harpoons and nets, as well as the guns, bombshells and torpedoes used by military vessels for at least 71 years). Taking into consideration the whole historical scenario, it is likely that at least tens of thousands of small cetaceans, mainly common dolphins and common bottlenose dolphins, were killed in the Mediterranean and Atlantic waters of France, particularly in the French Mediterranean, between the eighteenth and the mid-twentieth centuries.

Case study 2: Algeria

Context and perceptions

Algeria was a French territory from 1830 through 1962, and thus, historical documents from the French government included information about this country. These documents the existence of conflict between fishers and small cetaceans off the coasts of Algeria between the end of the nineteenth century and the mid-twentieth century. Algerian newspapers provide additional evidence of conflict. The context was the same as in France: small cetaceans being blamed for reducing catches (mainly of sardines), taking fish from the nets, damaging fishing gear and occasionally getting entangled in such gear (Anonymous 1901c).

Methods to kill small cetaceans

Since at least the 1880s, Algerian fishers started asking for bounty rewards for cetacean killings, as happened in France (Anonymous 1882). These requests were approved in 1900, when it was decided to offer a 25 Francs (approximately 107 Euros) bounty per animal killed (Anonymous 1900d). Administrative issues delayed implementation for a few years, and the first indication of bounty payments for killing “porpoises” (most likely dolphins) and seals (most likely the Mediterranean monk seal, *Monachus monachus*) dates back to 1904 (Jonnart 1904, 1908). Before the implementation of bounties, Algerian fishers were granted financial compensation (between 20 and 25 Francs per event) for the damage caused by small cetaceans to their nets (Anonymous 1903g). Bounties were paid for 36 years, from 1904 to 1939 (the latter date being associated with the last indication of an annual budget dedicated to bounty payments; Anonymous 1939c). Monetary compensation for each animal killed ranged between 5 and 10 Francs, depending on the year. In the documents reviewed, we could find no mention of the 25 Francs bounty proposed in the early decision reported by Anonymous (1900d).

The most common method to kill small cetaceans was to use fishing nets (mainly “lamparos” and “bonitières”, i.e., surrounding nets) to trap the animals (Steeg 1922). Fishers would then use harpoons to kill the trapped animals. Cetaceans were also incidentally caught in fishing nets, and if fishers could not release them to avoid gear damage, they killed them using harpoons (Garau 1909). In addition, fishers used guns and harpoons to target animals swimming close to their boats. Guns and harpoons were normally considered as the most efficient killing methods and were distributed to fishers by the government (Anonymous 1908b). However, reservations were expressed about the danger of distributing guns to fishers (e.g., in case of altercations), and the use of harpoons was preferred (Anonymous 1908b). Other methods included harpoon rifles (Anonymous 1937) and dynamite (Anonymous 1900e). The use of Bellot’s needles was considered (Anonymous 1893b), but we could find no evidence of implementation. As for France, military ships and fishery control vessels were sent to patrol Algerian waters to kill small cetaceans, from at least 1902 through 1913 (Anonymous 1902a, 1903a, 1904a, 1913, Jonnart 1907, 1908, 1910, Lutaud 1911). The names of six of these vessels were identified in the historical material reviewed. These were the boats FLIBUSTIER, FORBAN, MOULOUYA, CHIFFA, CHÉLIFF and DAGUE (Anonymous 1902a, 1913, Révoil 1902).

Algerian fishers regularly consumed the meat of the small cetaceans they killed (Anonymous 1912), and consumption of cetacean meat was further encouraged by the press (Anonymous 1935). The meat was also sold in fish markets. For instance, common bottlenose dolphins and common dolphins, as well as monk seals, could be found in Algier’s fish market (Drouet 1887).

Species of small cetaceans killed

Information from historical records

Species identification relying on photographs Three photographs showing dolphins were found in the historical material from Algeria dating back to the late 1930s. Figure 8A shows a dead dolphin (possibly a striped or a common dolphin) killed by seafarers, Figure 8B shows a killed common dolphin and Figure 8C shows a group of common dolphins swimming, which documents their presence in Algerian waters. In all cases, these dolphins are referred to as “marsouins”.

Identification of species based on common and scientific names Fewer words were used to refer to dolphins in Algeria than in France, the most common being “marsouin” (porpoise), followed by “dauphin” (dolphin). The animals were also occasionally called “souffleur” and “taupe” (blower and mole, respectively; Anonymous 1902b), “squale” (shark; Jonnart 1908, Lutaud 1911) and “poisson” (fish) in some newspapers (Anonymous 1900f, 1928). In newspapers, the word “marsouin” was often used to refer to common dolphins and possibly also to striped dolphins. The word “souffleur” is still being used in Algeria and other North African countries to refer to common bottlenose dolphins (Larbi Doukara 2015).

In a catalogue of animals from Algeria, Loche (1858) identified the common bottlenose dolphin as one of the species of Delphinidae inhabiting the waters of Algeria. Drouet (1887) listed *Tursiops tursio* (Gerv.), *Delphinus algeriensis* (Loche) and *Delphinus mediterraneus* (Loche) as being sold in fish markets. Whereas the identification of *Tursiops tursio* (Gerv.) is certain, there is confusion regarding the use of *Delphinus algeriensis* (Loche) and *Delphinus mediterraneus* (Loche). *Delphinus algeriensis* was described by Loche (1860) from a specimen caught near Algiers in 1859, and the description corresponds to a striped dolphin. This is confirmed by an illustration of the specimen in Bouvier (1891), which is reproduced from Fischer (1881). The name *Delphinus mediterraneus* was used to refer to both common and striped dolphins. For example, a common dolphin caught close to Toulon (French Mediterranean) was identified as a *Delphinus delphis mediterraneus* by Pourcel (1910; Figure 7H). A striped dolphin caught near Algiers in 1860 (most likely corresponding to the specimen MNHN-ZM-AC-1860-132, currently held in the collection of the Muséum National d'Histoire Naturelle de Paris) was first misidentified as a *Delphinus delphis mediterraneus* and later identified as *Stenella coeruleoalba*. This striped dolphin was also described as being a *Delphinus delphis mediterraneus* in Bouvier (1891), and the illustration shows a striped dolphin.

A newspaper article describing the conflict between fishers and small cetaceans in Algeria mentioned that “three species of ichthyophagous cetaceans inhabit the Algerian coasts: the marsouins (*Delphinus delphis*), the souffleurs (*Nelphinus tursio*), and the taupes (*Delphinus communis*)” (Anonymous 1902b). Descriptions of the appearance and behaviour given by the author suggest that the “marsouins” could be common and/or striped dolphins (described as occurring in large groups, fast swimming and displaying aerial behaviour, not longer than 2.35 m). The “souffleurs” could be common bottlenose dolphins, described as being solitary animals or swimming in pairs, slower and less commonly seen than the “marsouins”, and reaching 3.50 m. Finally, the description of the “taupes” (rarely seen, less than 1.60 m long) might refer to harbour porpoises. As discussed earlier, harbour porpoises disappeared from the western Mediterranean thousands of years ago (Fontaine et al. 2014, Fontaine 2016), but it cannot be excluded that the species occurred sporadically in Algerian waters in the nineteenth and twentieth centuries, given that a few stranded individuals were reported in recent decades (e.g., Cabezón et al. 2004).

Identification of species based on morphology, behaviour and feeding ecology Morphological descriptions of small cetaceans killed were available in a few newspaper articles and referred to animals 2–2.50 m long and weighing 90 kg (Anonymous 1934c, 1938, 1939b), as well as to animals of 3–3.50 m long weighing around 250 kg (Anonymous 1923b, 1924, 1934b), and to larger animals



Figure 8 Photographs of dolphins published in Algerian newspapers in the late 1930s. (A) A dolphin (possibly a striped or a common dolphin) killed by seafarers. The legend indicates: "A porpoise hunt offshore of Guyotville. The boat Chéragas is back to the harbour after a successful hunt with the T.C.F crew" (Anonymous 1937); (B) A common dolphin captured by fishers. The legend indicates: "A porpoise captured in waters offshore Lapérouse. A porpoise measuring 2.12m and weighting 92kg was captured in waters offshore Lapérouse by Mr. Jean Ganouste, posing in the centre of the picture, surrounded by his friends." (Anonymous 1938); (C) A group of common dolphins. The legend indicates: "A curious picture of porpoises taken by our fishing boxers" (Anonymous 1939a). All photographs were provided by Bibliothèque Nationale de France (<https://gallica.bnf.fr>).

weighting 400–600 kg (Anonymous 1900c,e,h, 1925). Although this information alone does not allow for identification to the species level, the lengths and weights would match those of several Mediterranean Delphinidae. In the western Mediterranean, common and striped dolphins can reach lengths slightly above 2 m (Di-Méglio et al. 1996, Larbi Doukara 2021), common bottlenose dolphins can reach 3–3.50 m (Sharir et al. 2011) and Risso's dolphins can reach 3–4 m (Bearzi et al. 2011). The reports of animals weighting 400–600 kg might correspond to large Risso's dolphins (animals of 3.2 m can reach 500 kg in the Faroe Islands; Bloch et al. 2012) or to young individuals of larger species of Delphinidae (e.g., pilot whales, killer whales and false killer whales).

Small cetaceans were seen in large groups, in pairs or alone (Anonymous 1900e,h, 1902b, 1904b, 1925, 1939b). Interactions between small cetaceans and fisheries appeared to be mainly coastal (Anonymous 1899a, 1900c,e,h, 1923b, 1924, 1928), but considering that Algeria has a narrow continental shelf, interactions with pelagic species such as striped dolphins would not be rare. Garau (1909) reported various types of interactions with fishing gear. At the time, fishing nets were made of delicate fabrics such as linen, cotton and hemp (Garau 1909), which meant they could easily be damaged. The “sardinal”, a type of gillnet used to catch sardines, round sardinellas and anchovies, was the gear reported to be most frequently damaged by small cetaceans when they fed on prey stuck in meshes. According to Garau (1909), the animals also damaged several other types of gear such as gillnets, beach seines, bottom pair trawl nets and tuna traps. Interestingly, the term “déprédation” (depredation) was used in two articles (Imbert 1900, Anonymous 1931c), showing that this loaded word (Bearzi & Reeves 2022) was already in use more than one hundred years ago. Damage could also be caused by small cetaceans that became incidentally entangled in surrounding nets and beach seines (Garau 1909). While Garau (1909) did not report bycatch of small cetaceans in “madragues” (tuna traps), cases of incidental mortality in these nets were reported from other Mediterranean areas (e.g., in Italy; Anonymous 1881). Some animals were reported to feed on fish discarded by bottom pair trawlers (Anonymous 1899b, 1901c, 1922b), which is a common behaviour among common bottlenose dolphins, worldwide (Bonizzoni et al. 2022). Recent work on dolphin interactions with fisheries in Algerian waters indicates that the main species of cetaceans bycaught in drift gillnets and trawlers in recent years are common bottlenose, common and striped dolphins (and occasionally Risso's dolphins, long-finned pilot whales and goose-beaked whales; Larbi Doukara 2015, 2021). Common bottlenose dolphins were also reported to forage in proximity and within fishing nets, including trawl nets (Larbi Doukara 2015).

The main prey species targeted by small cetaceans in Algerian waters were shoaling fish, mainly sardines and anchovies (Jonnart 1906, 1908, Garau 1909, Anonymous 1899a, 1900d,e, 1902c, 1928, 1931c), in addition to round sardinellas and bonitos (Anonymous 1923c, 1931c). Sardines and anchovies are part of the present-day diet of common dolphins and common bottlenose dolphins in Algeria (Larbi Doukara 2015) and in other regions of the western Mediterranean (e.g., Blanco et al. 2001, Giménez et al. 2017, 2018). They are also part of the diet of striped dolphins in the western Mediterranean (Gómez-Campos et al. 2011, Aznar et al. 2017, Meotti & Podestà 1997). Common dolphins feed on round sardinellas in Algerian waters (Larbi Doukara 2015) and in the western Mediterranean (Gimenez et al. 2018). While historical documents also mention bonitos as being targeted by small cetaceans, the bonito species to which they referred is unclear. The Atlantic bonito (*Sarda sarda*) was not found to be part of the diet of common dolphins and common bottlenose dolphins in Algerian waters (Larbi Doukara 2015), but it may be targeted by common bottlenose dolphins in other areas (e.g., in Portugal, Dos Santos et al. 2007, and in the Black Sea, Gladilina & Gol'din 2014). The prey species listed above are normally not targeted by Risso's dolphins and pilot whales in the Mediterranean, both species being mainly teuthophagous (Bearzi et al. 2011, Praca et al. 2011), nor by killer whales (which principally feed on tunas in the Strait of Gibraltar; Esteban et al. 2016). Little is known about the diet of false killer whales in the Mediterranean, but in other areas the species appears to feed mainly on cephalopods and various species of fish, but not on shoaling fish (Zaescharmar & Estrela 2020).

Information from osteological collections

French osteological collections of small cetaceans provided information on four specimens acquired from Algeria during the period of intense conflict with fisheries. These comprised three common dolphins and one striped dolphin from the second half of the nineteenth century (1860–1876). There were also an additional 16 specimens with an unknown date of acquisition: 10 specimens could be common dolphins (species identification is uncertain) most likely acquired in the twentieth century (date unavailable), four were striped dolphins and one was a pilot whale, all acquired prior to 1978–1983 (the dates of entry in the collection of the Muséum National d'Histoire Naturelle de Paris). Finally, there was one common bottlenose dolphin with an unknown date of acquisition. Information on the cause of death was available for only one of the 20 specimens listed: a striped dolphin “captured” in 1860 (specimen MNHN-ZM-AC-1860-132, kept at the Muséum National d'Histoire Naturelle de Paris; Loche 1860).

The limited information available from the osteological collection does not allow us to draw clear conclusions. However, based on the evidence reported above from historical documents, the main species involved in conflict with fishers in the waters of Algeria were common bottlenose dolphins and common dolphins, as well as striped dolphins (probably to a lesser extent). In addition, some larger species (e.g., Risso's dolphins and pilot whales) may have been killed, but were likely not the main target given their feeding preferences (i.e., small shoaling fish are not their main prey).

Minimum estimates of numbers of small cetaceans killed

Several historical documents provided information on small cetaceans killed in Algeria between 1900 and 1939 (Supplementary Table 3.1). This information included (1) the annual budgets available to pay bounties, (2) the budgets that were spent and (3) the number of animals killed annually, which were reported in government documents. Information was not consistently available across years. Additional information on the killing of small cetaceans was found in newspaper articles.

Bounties were paid between 1904 and 1939. Annual budgets varied between 1500 and 2500 Francs per year and were described as “bounties to eradicate porpoises and seals”. However, no reference to seals was found in the reports, which only refer to “porpoises”. In some years, the entire budget was used to pay bounties, and in some cases, the budget was reportedly insufficient (e.g., in 1909), whereas only a small fraction of the budget was spent in other years (e.g., in 1919 and 1920). Bounties between 5 and 10 Francs were paid per animal killed, depending on the year. The numbers of bounties claimed, corresponding to the number of animals killed, were registered by “département”. These included Algiers, Oran, Bône (a name used during the colonisation period for the city of Annaba) and Philippeville (the city of Skikda) and varied between 30 and 434 animals killed per year between 1904 and 1939. Numbers were not available for all years. Minimum estimates, based on the information found in the consulted documents, totalled 5769 animals killed. Of these, 5725 were reported in government documents, and 44 were reported in newspaper articles. It cannot be excluded that these 44 animals killed that were reported in newspapers were duplicates of killing events also reported in government documents. Because the numbers of animals killed per year during the period when bounties were paid were available for only 24 out of 36 years, estimates for the missing years were calculated based on the total budget available, the budget spent and the amount of money given per animal. These estimates yielded 2159–2583 extra animals killed, resulting in 7928–8352 animals killed between 1900 and 1939 (see calculation details in Supplementary Table 3.1). Numbers did not always match: for instance, in 1924, one document indicated 181 animals being killed, but when calculating the numbers killed based on the budget spent (2460 Francs) and the amount of the bounty for that year (10 Francs per animal), 246 animals would have been killed.

Although the numbers above include extrapolations and estimates, the consulted documents provide clues suggesting that even the maximum estimate in Supplementary Table 3.1 is likely to underestimate the actual number of killings. More specifically: (1) numbers of small cetaceans killed by fisheries control vessels and military vessels were not accounted for; (2) bounties were unlikely to be claimed for every animal killed; and (3) some of the methods employed to kill cetaceans, such as dynamite, may destroy the bodies, making it difficult to bring the head back to shore in order to claim a bounty. For instance, one newspaper article mentions that two kilos of dynamite were thrown into the middle of a group of 15–20 cetaceans, which resulted in almost all of them being killed and sinking to the seafloor, with the exception of two animals. However, due to their heavy weight (reportedly 400–500 kg), only one of these two animals was brought to shore (Anonymous 1900c). Another article indicated that three small cetaceans were shot and only two of them subsequently stranded (Anonymous 1925). Finally, another article reported that fishers caught a large animal (3.4 m) and that it required several boats to take it out of the water due to its heavy weight (Anonymous 1923b). Fishers working from small boats or on their own could have difficulty handling heavy animals (such as common bottlenose dolphins) and lifting the body on board. Consequently, some of these small cetaceans could not always be landed. Additionally, wounds caused by guns, harpoons and dynamite could have resulted in animals evading capture and dying later.

Overall, the historical documents reviewed suggest that the number of small cetaceans killed in Algeria between 1900 and 1939 is in the order of 10,000.

Final remarks

Between the eighteenth and twentieth centuries, small cetaceans (particularly dolphins) were killed in large numbers off the coasts of Europe and North Africa, due to perceived competition with fisheries. Dolphins in these areas were long considered as pests responsible for reduced fish catches and damage to fishing gear. Such conflict was particularly acute during the second half of the nineteenth century and the first half of the twentieth century, when governments from various countries encouraged and subsidised the extermination of small cetaceans. In the Mediterranean, intentional killings and culling campaigns took place, with varying intensity, particularly in France, Italy, “former Yugoslavia” (in our study; Slovenia, Croatia and Montenegro), Algeria, Greece, Spain, and possibly in Turkey, Tunisia and Morocco, while in the Northeast Atlantic, they took place in France and Spain (Figure 1).

Our review of historical documents and osteological collections focused on the conflict between fishers and small cetaceans in France and Algeria, and it uncovered exceptionally high levels of animosity and a strong determination to eradicate these animals, which was consistent with information from other areas (e.g., the seas around Italy and “former Yugoslavia”; Bearzi et al. 2004, Meliàdò et al. 2020). Therefore, future efforts should aim to uncover information in multiple languages, with emphasis on geographical areas that have not been the focus of historical research. In addition, more comprehensive research should be conducted in physical libraries to reveal the actual extent of mortality of small cetaceans documented by recorded bounties. We acknowledge that our study did not manage to encompass all the potential sources of information, to the extent that the number of killings reported here might be just the tip of the iceberg.

While the precise numbers of killings remain largely unknown, our review provides an appreciation of their possible magnitude. Our results suggest that tens of thousands of small cetaceans were killed in France and around 10,000 were killed in Algeria, primarily between the 1880s and the 1930s. Total mortality of small cetaceans in the Mediterranean Sea and Northeast Atlantic due to human conflict is certainly much higher, as that includes the killings in all other countries where similar conflicts existed. For instance, minimum estimates in Italy and “former Yugoslavia” approached 10,000 dolphins killed (Bearzi et al. 2004, Meliàdò et al. 2020). As described in our

study, killings also occurred in unknown but possibly significant numbers in Greece, Spain, Tunisia and Morocco. Off the Mediterranean coast of Turkey, small cetaceans were killed primarily for commercial purposes (at least 1700 animals). Finally, little is known about the numbers of small cetaceans killed intentionally in Portugal, and virtually nothing is known about historical killings in parts of the Middle East. By combining all these exceedingly imprecise and partial figures, one may conclude that, at the very minimum, 40,000 small cetaceans were killed. However, for all the reasons explained in our manuscript, the actual numbers were certainly far greater. Such a high mortality most likely had important negative impacts on population trajectories, particularly in the Mediterranean Sea (Bearzi & Reeves 2021). For instance, common dolphins were considered to occur regularly in the Mediterranean before the mid-twentieth century, but are nowadays a rare sight in most of the region (Genov et al. 2021, Bearzi & Genov 2022). In the inner Mediterranean Sea, common dolphins are currently listed as Endangered in the International Union for Conservation of Nature Red List of Threatened Species (Bearzi et al. 2022). Intensive culling and killing campaigns in the past may have contributed to the decline of this species, in combination with more recent impacts such as prey depletion and habitat degradation (Bearzi et al. 2004, 2022, Bearzi & Genov 2022). Furthermore, the species is presently rare in French Mediterranean waters. For instance, there were no common dolphin records during aerial surveys in recent years (Panigada et al. 2024), and only 21 strandings of common dolphins were recorded in the last 30 years (Dars et al. 2023).

In the second half of the twentieth century, intentional killings largely stopped, coinciding with a widespread change in the perception and use of marine megafauna (Mazzoldi et al. 2019), and the beginning of legal protection of all cetaceans in European waters. However, European cetaceans have become increasingly exposed to a variety of other anthropogenic threats (Bearzi & Reeves 2021). While the deliberate killings have largely stopped, conflict between fisheries and small cetaceans is still occurring in European waters (e.g., Snape et al. 2018). In some areas, dolphins continue to be considered as pests, and there are reported cases of fishers still seeing culling as an appropriate measure to mitigate conflicts (Gonzalvo et al. 2015, Pardalou & Tsikliras 2018).

Documenting past events and their consequences can not only deepen our understanding of the long-term relationship between humans and the marine environment but also encourage us to reflect on the lessons learned and strive not to repeat our past mistakes. Given that some populations of small cetaceans have been the target of massive killings for centuries, their past abundance and distribution around the Mediterranean and Northeast Atlantic may be different from what we know today, largely or entirely as a consequence of these killings. Historical ecology and environmental history (Holm et al. 2001) have the potential to provide historical baselines of cetacean diversity, abundance and distribution (Brito & Vieira 2010), while contributing datasets of historical documents and osteological collections that can help us to investigate population trends, viability, and potential for recovery, as well as to set meaningful baselines for conservation (Bearzi & Reeves 2021). This study represents a step in that direction.

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