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Agenda Item 7.2

PROPOSAL FOR THE INCLUSION OF THE MEDITERRANEAN SUBPOPULATION OF CUVIER'S BEAKED WHALE (*Ziphius cavirostris*) IN CMS APPENDIX I

Summary

The European Union and its 28 Member States have submitted a proposal for the inclusion of the Mediterranean subpopulation of Cuvier's beaked whale (*Ziphius cavirostris*) in CMS Appendix I at the 11th Meeting of the Conference of the Parties (COP11), 4-9 November 2014, Quito, Ecuador.

The proposal is reproduced under this cover for its evaluation by the 18th Meeting of the CMS Scientific Council.

**PROPOSAL FOR INCLUSION OF SPECIES ON THE APPENDICES OF THE
CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF
WILD ANIMALS**

- A. PROPOSAL:** Inclusion of the Mediterranean subpopulation of Cuvier's beaked whale (*Ziphius cavirostris*) in Appendix I
- B. PROPONENT:** The European Union and its 28 Member States

C. SUPPORTING STATEMENT

1. Taxon

1.1 Classis	Mammalia
1.2 Ordo	Cetartiodactyla
1.3 Familia	Ziphiidae
1.4 Species	<i>Ziphius cavirostris</i> (Cuvier, 1823)
1.5 Common names	Cuvier's beaked whale; Goose beaked whale

2. Biological data

2.1 Distribution

Cuvier's beaked whale is the most widely distributed species of the family Ziphiidae, with a cosmopolitan presence in most oceans in cold, temperate and tropical waters excepting polar and subpolar waters (Leatherwood & Reeves 1983). The northern limits of its distribution are the Aleutian Islands and Alaska in the Pacific and Massachusetts and the Shetlands in the Atlantic; it also inhabits the Mediterranean Sea. In the southern hemisphere it reaches Tierra del Fuego in South America, Cape Providence in South Africa, Tasmania, and south of New Zealand (Rice 1998).

Beaked whales inhabit deep waters that are usually found far from the coast and little is known about their offshore distribution. Resident or partially resident populations of Cuvier's beaked whales have been found in the Ligurian Sea (NW Mediterranean Sea) (Revelli *et al.* 2008), off Bahamas (Claridge & Balcomb 1995), Hawaii (Baird *et al.* 2007; McSweeney *et al.* 2007) and El Hierro in the Canary Islands (Aguilar de Soto 2006).

In the Mediterranean, Cuvier's beaked whales have been described as regular inhabitants of the Hellenic Trench (Frantzis *et al.* 2003), the southern Adriatic Sea based on frequency of strandings (Holcer *et al.* 2003), the northern Tyrrhenian Sea (Gannier and Epinat 2008) and the eastern section of the Alboran Sea (Cañadas *et al.* 2005, Cañadas 2011). The main areas of known concentration of *Ziphius cavirostris* in the Mediterranean are shown in Figure 1 (from Cañadas 2009). Cuvier's beaked whales seem to have a preference for given bathymetric features such as the slope or seamounts (Arranz *et al.* 2011; Arranz *et al.* submitted; Gannier and Epinat 2008). For example, in the Canary Islands this species can be seen all around the archipelago, but there are clear areas of concentration in the waters of the

slope off El Hierro, east of Lanzarote and Fuerteventura (where several mass strandings have been recorded in coincidence with naval exercises, Martín *et al.* 2004) and in seamounts such as La Concepción, located some 60 nm NE of Lanzarote (Fais *et al.* 2010; Arranz *et al.* 2011b). However, *Ziphius cavirostris* is also observed over the abyssal plains in the Mediterranean (Gannier and Epinat 2008). Although local populations (e.g. Bahamas, Hawaii and Spain) show different degrees of spatial fidelity, long range movements have been recorded from Cuvier's beaked whales (Schorr *et al.* 2011), allowing the whales to cross international boundaries in the offshore waters where they inhabit.

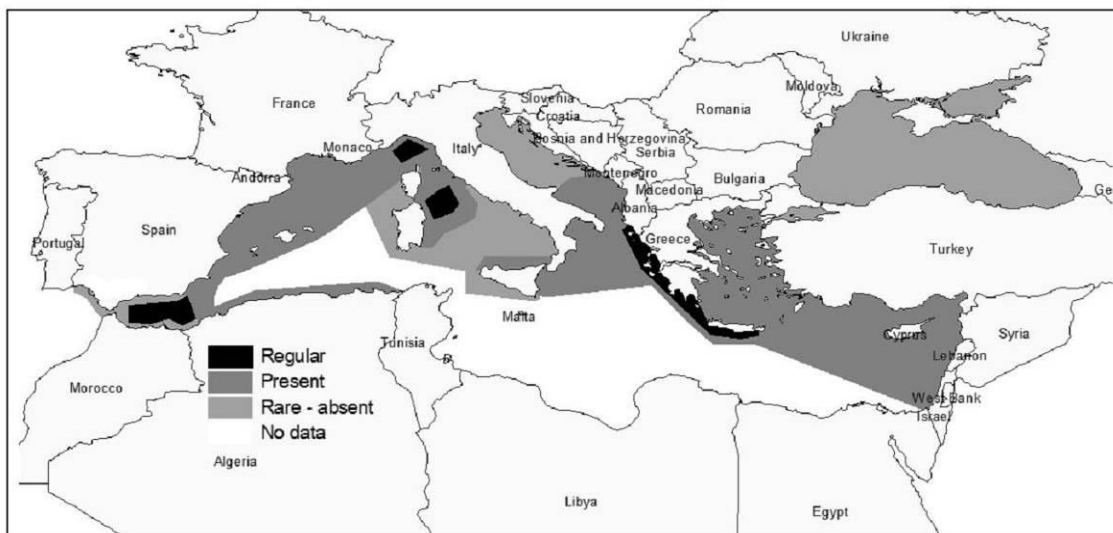


Figure 1: Map of known distribution of Cuvier's beaked whale in the Mediterranean Sea, updated until 2009, from Cañadas (2009).

There is evidence that Cuvier's beaked whale has genetically isolated populations within its distribution area (Dalebout *et al.* 2008). In the case of the Mediterranean, the best currently available evidence indicates that the sub-population definition (according to IUCN) of less than one migrant per year is met, given the low mtDNA haplotypic diversity of Mediterranean animals, together with the fact that some haplotypes have been found only in Mediterranean individuals (Dalebout *et al.* 2005). Further evidence of the null or low interchange of individuals between the Mediterranean and Atlantic populations is provided by the strong survey effort carried out in the Strait of Gibraltar: more than 23,004 km of cetacean survey effort from 1999 to 2006 (all seasons) under conditions in which Cuvier's beaked whales could have been sighted (Beaufort 3 or less), resulting in no sightings of Cuvier's beaked whales (de Stephanis *et al.* 2007).

2.2 Population

The size of local populations of Cuvier's beaked whales has been studied in Hawaii (Baird *et al.* 2007), off El Hierro in the Canary Islands (Aguilar Soto *et al.* 2010), in the European Atlantic waters (Cañadas *et al.* 2011) and in the Mediterranean (Ligurian Sea, Rosso *et al.* 2009, and South-West Mediterranean Sea, Cañadas 2011). Results show that local populations are small: the abundance of *Ziphius cavirostris* is comparable both in Hawaii and El Hierro (best estimate of 56 whales in Hawaii and 44 whales regularly using the waters off El Hierro). These results were based on photo-ID data applied to mark-recapture analysis, same that an analysis of photo-ID data (2002-2008) in the Gulf of Genova (Eastern Ligurian Sea) that yielded an estimate of 96-100 animals (left and right side identifications respectively) using an open population model (Rosso *et al.* 2009). The Eastern Ligurian Sea is known as an important concentration area for Cuvier's

beaked whales. In the northern Alboran Sea, spatial modelling of line transect data (1992-2007) yielded an abundance estimate of 102 animals with a CV=32.1% (corrected for availability bias using biologging data from an animal instrumented with DTag in the Alboran Sea; Oedekoven *et al.* 2009). Line-transect surveys for the Cuvier's beaked whale in the whole Alboran Sea (79,532 km²) provided an abundance estimation of 0.015 animals per km² (CV=0.30, 95% CI=868-1621) (also corrected for availability bias; Oedekoven *et al.* 2009). Results highlight a relatively high density of Cuvier's beaked whales in this area, when compared to other areas of the world. Surveys in other parts of the Mediterranean have resulted in few sightings (e.g. Gannier and Epinat 2008). A possible explanation is that *Ziphius cavirostris* concentrates in preferred habitats in the Mediterranean and occurs in lower density or as vagrants in other areas.

Mean group size is fairly constant across the whole Mediterranean basin where data have been collected, ranging from 2.2 to 2.6 individuals (Cañadas *et al.* 2005, Ballardini *et al.* 2005, Scalise *et al.* 2005), except in the western Ligurian Sea with a mean of 4 (sd=2) (Azzellino *et al.* 2008). Social organization is unknown, although the intermediate levels of mtDNA diversity observed in Cuvier's beaked whales suggest that social groups are unlikely to be strongly matrifocal (Dalebout *et al.* 2005).

The cryptic behaviour of Cuvier's beaked whales, species that spend most of their time diving (Tyack *et al.* 2006), makes necessary long temporal investment to record enough photographic sample size as to apply statistical analysis for photo-ID based population abundance estimates. Also, the diving behaviour of the species introduces a large availability bias when using line transect surveys to estimate the abundance of *Ziphius cavirostris*, because they are visible at the surface only for some 8% of their time (Aguilar de Soto com. Pers). This means that our power to detect demographic changes is low. Moreover, the difficulties on discriminating beaked whale species at sea has resulted in line transect cetacean surveys in some areas, such as the Pacific, yielding pooled abundance estimates for all beaked whales of genus *Mesoplodon*, *Berardius* and *Ziphius* in the area (Barlow and Forney 2007). The resulting abundance estimates have a large coefficient of variation (CV>0.6) due to the rarity of Ziphiidae sightings. In sum, the probability to detect even a dramatic reduction in the abundance of Ziphiidae species is considered very low (Taylor *et al.* 2007). Populations of Cuvier's beaked whale present genetic isolation (Dalebout *et al.* 2008), making it more relevant to protect regional stocks subject to local threats, such as the subpopulation of Cuvier's beaked whales in the Mediterranean.

2.3 Habitat

Cuvier's beaked whales usually inhabit deep waters far from the coast. However, in the Canary Islands, where deep waters are found very near the coast, this species has been observed both close to the coast (<1km) in shallow depths (200m) (Arranz *et al.* 2008) and at long distance from the islands (up to 140 km) at 2000 m depth (Fais *et al.* 2010). Cuvier's beaked whales perform long and deep foraging dives. In the Mediterranean the maximum values recorded for a dive were 90 minutes and up to 1,995 m, although average dives are shorter and shallower (Tyack *et al.* 2006, M. Johnson, P. Madsen & N. Aguilar pers. com). Schoor *et al.* (2014) registered record dives of 2,992 m of depth and 135 minutes of duration in the Pacific. During each foraging dive these whales attempt to capture 20-30 prey in mesopelagic and benthopelagic waters (Aguilar de Soto 2006, Revelli *et al.* 2009).

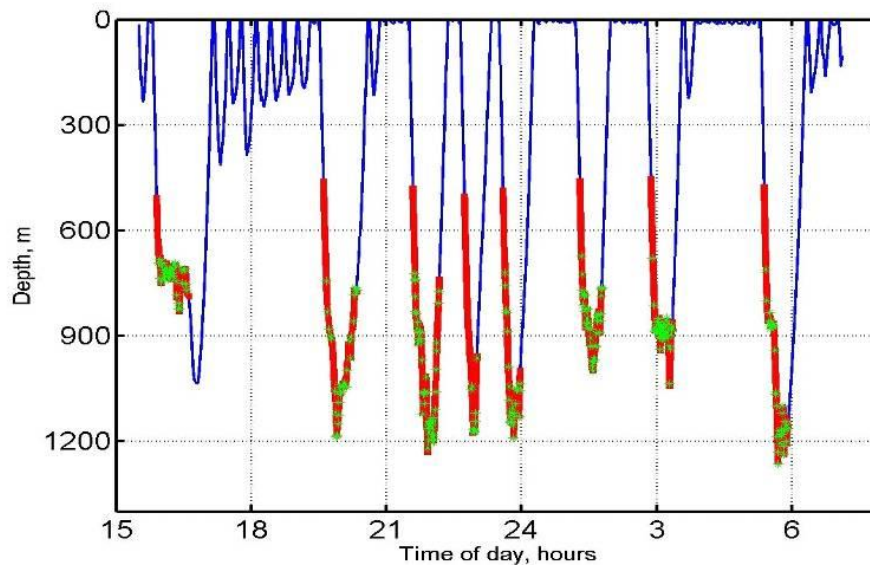


Figure 2: Dive profile of a Cuvier's beaked whale tagged with Dtag in the Mediterranean Sea, showing in red the echolocating foraging phase of the dives, and with green asterisks the location of the prey capture attempts (buzzes). From Aguilar de Soto *et al.* (2006).

2.4 Migrations

There are little data on the migratory movements of Cuvier's beaked whales and the few existing studies indicate that these species show territorial fidelity in some areas (McSweeney *et al.* 2007; Baird *et al.* 2007; Aguilar Soto *et al.* 2010). However, long range movements have been recorded from Cuvier's beaked whales (Schorr *et al.* 2011), allowing them to cross international boundaries in the offshore waters where they inhabit. The ranges that Cuvier's beaked whales have been shown to travel are much higher than the separation among boundaries of national waters in the Mediterranean Sea. Moreover, this species inhabit deep waters that in some parts of their distribution include both national and international seas. These large movement capabilities have been demonstrated by individuals tagged in the Pacific (Schorr *et al.* 2014), showing that one of the animals travelled 400 km before returning to the initial tagging place in less than a month. It is very possible that this trans-boundary pattern of distribution of the species is common in other areas, which would make the conservation of its populations an international concern.

3. Threat data

The Report of the Working Group on Marine Mammals, in the 17th meeting of the Scientific Council of CMS in 2011 (UNEP/CMS/ScC17/Report Annex III), included the Mediterranean population of Cuvier's beaked whale in the "Additional recommendations for submission of listing proposals for Appendix I", according to the following: *"It was noted that the Mediterranean population of the species was genetically distinct and contained fewer than 10,000 mature individuals. It was thought to be experiencing continuing decline due to a number of threats including noise from military sonar and seismic surveys (which had been linked to mass strandings), bycatch in drift gillnets and ingestion of plastic debris. A recent regional assessment by the IUCN classified the Mediterranean population as Vulnerable. It was recommended that the Parties be urged to consider developing a proposal for Appendix I listing of the population."*

3.1 Direct threats

Acoustic pollution

Atypical mass strandings of Cuvier's beaked whales have been associated to naval exercises involving the use of intense mid-frequency sonar or underwater charges (Martín *et al.* 2003, Fernández *et al.* 2005). The latest case has been recorded as recently as the 1st of April 2014, with at least five animals stranding in Crete (A. Frantzis, report to marmam and ECS mailing lists). When necropsies were performed the results show a common pathologic pattern including multiorganic haemorrhages (Fernández *et al.* 2005). Some mass strandings of Cuvier's beaked whales have been recorded also in coincidence with seismic prospections (Malakoff 2002), although in these cases it was not possible to perform a proper veterinary analysis to elucidate the causes of death. Annex I presents a partial listing of atypical mass strandings involving Cuvier's beaked whales. Beaked whales are the most common species in these atypical strandings, suggesting a special sensitivity of Ziphiids to acoustic pollution. Within the family Ziphiidae, Cuvier's beaked whale is the most commonly affected species. It is unknown if this reflects the cosmopolitan distribution of the species, resulting in a larger overlap with impacting activities, or a higher sensitivity of this species. Local populations of Cuvier's beaked whales are small, and some mass strandings involving numerous animals, such as those recorded in several areas of the world (Annex I) might represent an important demographic impact on discrete local populations (Aparicio *et al.* 2009). For example, after the beaked whale mass stranding in Bahamas 2000, sightings of Cuvier's beaked whale became rare in the area and whales previously photo-identified have not been sighted during several years (Balcomb and Claridge 2001).

Cañadas (2011) presents the following review: of 224 recorded stranding events of Cuvier's beaked whales in the Mediterranean, 15 involved 2 animals (9.8% of the total) and 12 involved 3 or more animals (totaling 80 animals; 26.1% of the total) (Podestà *et al.* 2006). Four of these strandings were definitely associated with naval activity so far: 1) Valencia, Spain in February 1996 (Filadelfo *et al.* 2009); 2) Kyparissiakos Gulf, Greece in May 1996 (Frantzis 1998); 3) Ionian Islands, Greece in October 1997 (Frantzis 2004, Filadelfo 2009); 4) Algerian coasts, in 2001 (Filadelfo *et al.* 2009). In the other cases, either no appropriate data were collected or the analyses were inadequate for assessing the potential association (Podestà *et al.* 2006). An atypical mass stranding of 4 Cuvier's beaked whales occurred in SE Spain in January 2006. This event was coincident in time and space with military manoeuvres of NATO (Draft EIS/OEIS 2007), and necropsies of the animals showed "Gas and Fat Embolic Syndrome", previously associated with anthropogenic acoustic activities, most probably anti-submarine active mid-frequency sonar used during the military naval exercises (Jepson *et al.* 2003, Fernández *et al.* 2004, 2005, Cox *et al.* 2006). The Mediterranean Sea is a militarily strategic area and is also of increasing interest for hydrocarbon exploration and exploitation. All military, geological or oceanographic activities involving high intensity noise carried out in the proximity of Cuvier's beaked whales are of concern.

One of the first reports noticing the causal relation between naval sonar and mass strandings of beaked whales was provided by Frantzis (1996) in the Greek Mediterranean Sea. In spite of the strong worldwide effects of this report, still the last case of mass mortalities recorded in coincidence with naval sonar has been in the Mediterranean, on the 9th of February 2011, when two Cuvier's beaked whales live stranded in the vicinity of a major NATO exercise in east Sicily (A. Frantzis report to marmam and ECS mailing lists).

Accidental captures and interactions with fisheries. Bycatch.

Bycatch of beaked whales has been documented in different fisheries and geographical areas, from the Mediterranean to the Pacific, involving mainly Cuvier’s beaked whales but also species of genus *Mesoplodon* and unidentified beaked whales (di Natale 1994; Carretta *et al.* 2008). Fourteen Cuvier’s beaked whales were reported as having been captured intentionally between 1972 and 1982 (11 in French waters and 3 in Spanish waters), all shot and 1 also harpooned (Northridge 1984).



Figure 3: Sign of interaction with fisheries, a hook from a long-line in the external ocular region of a Cuvier’s beaked whale off El Hierro, in the Canary Islands. (Photo: University of La Laguna, with permit from the Canary Islands Government).

Ship collisions

There are sparse reports of ship collisions with ziphids, but the regularity of these events is not quantified. In the Canary Islands Cuvier’s beaked whales are the third species in number of whales stranded with sign of ship collisions (n=7 whales, 12% of the cetaceans observed with collisions, Carrillo and Ritter 2010)

3.2 Habitat destruction or modification

The increase of ocean background noise, produced mainly by shipping noise, is one of the parameters that affect the quality of the marine environment and that can mask the ultrasonic vocalizations of beaked whales in some cases (Aguilar de Soto *et al.* 2006). These authors present an example of a large vessel passing in the vicinity of a Cuvier’s beaked whale diving at 700m depth. The noise produced by the ship reduced the distance at which the whale could echolocate for prey by more than 50%, while the distance at which the whale could detect communication signals from conspecifics was reduced by more than five times. The passage of the vessel coincided with a dive containing half of the usual prey capture attempts than in normal dives by the same animal. Results suggest that the whale could react to high level noise by changing its foraging and diving behaviour (Aguilar de Soto *et al.*, *op. cit.*).

3.3 Indirect threats

Deep-water fisheries are increasing worldwide as shallow-water stocks dwindle. There are already pilot deep-water fisheries targeting the deep scattering layer, mainly the large biomass of Myctophyd fishes. These constitute important taxa sustaining pelagic deep-water trophic webs. Cuvier’s beaked whales rely on finding stable resources at depth, attempting to capture some 20-30 prey per dive (Tyack *et al.* 2006), and there is the potential for competition for

resources with deep-water fisheries. Competition for resources has been linked to population effects in several species of marine mammals.

3.4 Threats connected especially with migrations

The distribution of beaked whales in deep international waters overlaps in discrete times and geographical areas with activities of potential impact, such as hydrocarbon exploration and naval exercises. These activities may influence migratory movements of *Ziphius cavirostris*, as avoidance of acoustic sources (military sonar), at received levels as low as 140 dB re 1 μ Pa, have been reported in beaked whales that stayed at distances of 16 km from areas of naval exercises in the Bahamas (Tyack *et al.* 2011).

3.5 National and international utilization

Cuvier's beaked whales are not subject of dedicated hunting in the Mediterranean Sea.

4. **Protection status and needs**

4.1 National protection status

Within European range states of the Mediterranean subpopulation of Cuvier's beaked whales this species is protected, thanks to its inclusion in the EU Habitat's Directive (Orden Cetacea, Annex IV). This has turned into different levels of protection stated by the national legislation of different countries.

4.2 International protection status

Cetaceans are protected by the EU Habitat Directive and Cuvier's beaked whale is included in the IUCN and in Appendix II of CITES.

4.3 Additional protection needs

Local populations of Cuvier's beaked whales are small (Baird *et al.* 2007; Aguilar *et al.* 2010) and this makes them potentially vulnerable to repetitive anthropic impacts (Aparicio *et al.* 2009). Given the difficulties in quantifying the abundance and demographic trends of beaked whale populations (Taylor 2008) it is important to apply the precautionary principle and consider the effects of acoustic pollution and other impacts in their distribution area.

5. **Range States**

For the Mediterranean sub-population of the Cuvier's beaked whale, the Range States include¹ ALBANIA, ALGERIA, CROATIA, CYPRUS, FRANCE, GREECE, ISRAEL, ITALY, Lebanon, MALTA, MONTENEGRO, MOROCCO, SLOVENIA, SPAIN, SYRIA, Turkey. Data is lacking as regards EGYPT, LIBYA and TUNISIA.

¹ CMS members in capitals.

6. Comments from Range States

To be determined

7. Additional remarks

The inclusion of Cuvier's beaked whale in Appendix I of the CMS is expected to promote the application of mitigation measures for activities that endanger the species, such as acoustic pollution. Cañadas (2009) reports the following:

“One probable hot-spot for Cuvier's beaked whales in the Mediterranean, the eastern section of the Ligurian Sea, is included within the Pelagos Sanctuary created by Italy, France and Monaco. However, no management or conservation measures have been taken as yet specifically for this species. A SPAMI (Specially Protected Area of Mediterranean Importance) under the Barcelona Convention has been proposed for the northern half of the Alboran Sea and the Gulf of Vera in Southern Spain (Cañadas *et al.* 2005), but it has not yet been designated. This proposed area includes another of the probable hot-spots for Cuvier's beaked whales: the deep waters off southern Almería. The Hydrographic Office of the Spanish Navy has agreed not to use active sonar in that area (C. Gamundi, Subdirector of the Hydrographic Office of the Spanish Navy, pers. comm.). The Second Meeting of the Parties to ACCOBAMS adopted Resolution 2.16 on ‘Assessment and Impact Assessment of Man-made Noise’ (ACCOBAMS 2004). In this Resolution, and by recommendation of the Scientific Committee of ACCOBAMS, Parties are urged to ‘to take a special care and, if appropriate, to avoid any use of manmade noise in habitat of vulnerable species and in areas where marine mammals or endangered species may be concentrated, and undertake only with special caution and transparency any use of manmade noise in or nearby areas believed to contain habitat of Cuvier's beaked whales (*Ziphius cavirostris*), within the ACCOBAMS area’. Parties are also urged to facilitate national and international research on this subject, to provide protocols or guidelines developed by military authorities with respect to use of sonar in the context of threats to cetaceans, and to consult with any profession conducting activities known to produce underwater sound with the potential to cause adverse effects on cetaceans, recommending that extreme caution be exercised in the ACCOBAMS area. Resolution 2.16 also encourages ‘the development of alternative technologies and require the use of best available control technologies and other mitigation measures in order to reduce the impacts of man-made noise sources in the Agreement area’.”

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ANNEX I
Examples of atypical mass strandings of beaked whales

Year	Place	Species and number Zc=Cuvier's, Me=Gervais', Md=Blainville's beaked whales	Coincident activity (when information is available)
1914	United States	Zc (2)	
1960	Sagami Bay, Japan	Zc (2)	US Fleet
1963	Gulf of Genoa, Italy	Zc (15+)	Naval exercises
1963	Sagami Bay, Japan	Zc (8-10)	US Fleet
1964	Sagami Bay, Japan	Zc (2)	US Fleet
1965	Puerto Rico	Zc (5)	
1966	Ligurian Sea, Italy	Zc (3)	Naval exercises
1967	Sagami Bay, Japan	Zc (2)	US Fleet
1968	Bahamas	Zc (4)	
1974	Corsica	Zc (3), Striped dolphin (1)	Naval patrol
1974	Lesser Antilles	Zc (4)	Naval explosion
1975	Lesser Antilles	Zc (3)	
1978	Sagami Bay, Japan	Zc (9)	US Fleet
1978	Suruga Bay, Japan	Zc (4)	US Fleet
1979	Sagami Bay, Japan	Zc (13)	US Fleet
1980	Bahamas	Zc (3)	
1981	Bermuda	Zc (4)	
1981	Alaska, United States	Zc (2)	
1983	Galapagos	Zc (6)	
1985	Canary Islands	Zc (12+), Me (1)	Naval exercises
1986	Canary Islands	Zc (5), Me (1), ziphid. (1)	
1987	Canary Islands	Me (3)	
1987	Italy	Zc (2)	
1987	Suruga Bay, Japan	Zc (2)	US Fleet
1987	Canary Islands	Zc (2)	
1988	Canary Islands	Zc (3), bottlenose whale (a beaked whale) (1), pygmy sperm whale (2)	Naval exercises
1989	Sagami Bay, Japan	Zc (3)	US Fleet
1989	Canary Islands	Zc (15+), Me (3), Md (2)	Naval exercises
1990	Suruga Bay, Japan	Zc (6)	US Fleet
1991	Canary Islands	Zc (2)	Naval exercises
1991	Lesser Antilles	Zc (4)	
1993	Taiwan	Zc (2)	
1994	Taiwan	Zc (2)	
1998	Greece	Zc	NATO naval exercises
2000	Bahamas	Zc, Md	US naval exercises
2002	Canary Islands	Zc, Md	Spanish naval exercises
2004	Canary Islands	Zc (4)	Spanish naval exercises
2011	Sicily	Zc (2)	Naval exercises

Table modified from Dolman, Green, Heskett, Reynolds and Rose (2006). Report to the Advisory Committee on Acoustic Impacts on Marine Mammals by the Marine Mammal Commission. More information in Brownell *et al.* (2004), Espinosa *et al.* (2005), Frantzis (2004), IWC (2004), Moore and Stafford (2005).
