REPORT OF THE ACCOBAMS EMERGENCY TASK FORCE FOR STRANDINGS

Issue: Emergency Task Force for Strandings

1. Action requested

The Scientific Committee is invited to:

a. **consider** the report of the ACCOBAMS Emergency Task Force for Strandings,
b. **provide recommendations** to the Parties on this issue**.**

2. Background

During the Eight Meeting of Parties to ACCOBAMS (November 2022, Malta), Parties requested the creation of a regional Task Force for stranding events : The ACCOBAMS Emergency Task Force for Stranding events (**AETFS**).

It aims at assisting emergency and unusual cetacean mortality events and more specifically to:

- monitor and report strandings and bycatch data in the area in a common and real time repository in order to note any deviation from the average stranding rate for the area, period and species;
- collect information on ongoing military exercises involving underwater noise sources to be monitored, and to enhance passive acoustic monitoring;
- routinely carry out complete postmortem investigations, including acoustic trauma, according to Resolutions 7.13 and 7.14, with remote advice and support from ACCOBAMS Experts (telenecropsy);
- collect and preserve tissue samples in double: 1) to be stored and analyzed in Country by local laboratories and stored in a centralized Tissue Banks (University of Padova and Schmalhausen Institute of Zoology of National Academy of Sciences of Ukraine) and 2) to deliver samples to European countries to be analyzed for a second opinion, and stored as a back-up tissue Bank;
- deliver brain tissue to the University of Padova for molecular and microscopic examination, and ears to the University of Liege and Hannover for microscopic examination so to support forensically acoustic impacts;
- report any incident related to acoustic trauma to ACCOBAMS Secretariat and to the Task Force;
- respond to live strandings and unusual mortality events;
- maintain preparedness through organizing necropsy and telenecropsy training sessions so to develop and improve remote advice for dissection and samplings.

The Task Force is jointly chaired by **Sandro Mazzariol** from Padova University and **Thierry Jauniaux** from Liege University.

The 2 co-chairs are assisted, at least, by the following experts:

- Michel André
- Cristina Casalone
- Ursula Siebert
- Antonio Fernandez

REPORT OF THE ACCOBAMS EMERGENCY TASK FORCE FOR STRANDINGS

2023-2024 events

Since the creation of the **AETFS**, three unusual mortality events occurred in the ACCOBAMS area.

1. Cyprus – February 2023 (see Annex 1 and Annex 2)

Following an atypical mass stranding of Cuvier's beaked whales *Ziphius cavirostris* whales occurred in Cyprus early February 2023, and according to NAVTEX data, it seemed that navy exercises with firing across large areas in the eastern, southern and western parts of the island had been planned prior to the strandings.

In face of this, ACCOBAMS Focal Points of Range States to the Eastern Mediterranean region were requested to provide information about any impulsive activities that have taken place in the region – prior to February 2023 - before the atypical mass stranding of beaked whales occurred in Cyprus. On February 9 23, 4 Cuvier's beaked whales stranded alive and were refloated. Two of them were found dead after. In the coming days, 6 others were found dead (different levels of decomposition). In toto, eight whales were found dead and a full post-mortem investigation was done for one. Samples for histology have been sent Veterinary School of Aristotle University of Thessaloniki, Greece (Dr. Demetra Psalla) and to University of Las Palmas, Gran Canaria, Spain (Antonio Fernandez, one of the **AETFS** experts). Conclusions of histology are: "*While the histological analysis does not describe any pathological entity or disease, the histological observations together with the strandings and the gross observations done during the necropsies can fit (partially) with the pathology observed in mass strandings of beaked whales due to acoustic related disturbance, probably associated temporally and spatially to mid-frequency sonar activities. Such acoustic disturbance from underwater activities especially at mid-frequencies, results in decompression sickness that can explain the embolism observed in the beaked whale*".

2. Morocco – January 2024

From 7 January 2024 to 22 January 2024, five unusual stranding of whales (one *Balaenoptera acutorostrata***,** two *Balaenoptera physalus* and two *Megaptera novaeangliae*) have occurred in the areas identified below, according to information received from INRH experts in Morocco (see Annex 3).

The **AETFS** was contacted and recommended the Moroccan authorities to collect, at least and when possible, samples of skin, muscles, ears and brain when necropsy was not possible for the determination of death cause(s). A telenecropsy was carried out on one of the strandings (a fin whale stranded at Kenitra) with the assistance of ACCOBAMS experts, revealing signs of gastritis, severe kidney congestion and the presence of external parasites (necropsy report Annex 4).

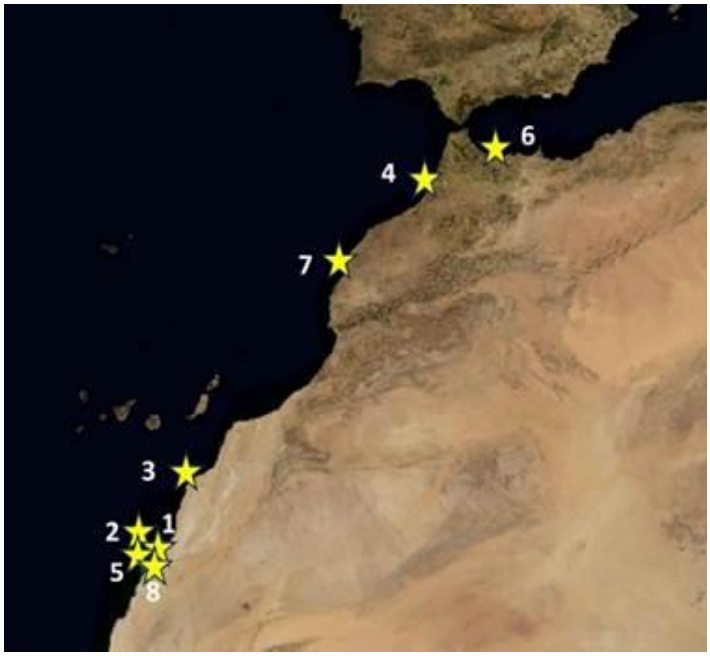


Figure 1- Unusual strandings of whales occurred between 7 and 31 January 2024 (*Balaenoptera acutorostrata* (5, 6, 7), *Balaenoptera physalus* (3, 4) and *Megaptera novaeangliae* (1, 2, 8)).

Between January 23 and 31, three other whales came ashore.
The conservation code was poor for most of animals and partial necropsy was performed only for one, other being eliminated/destroyed before the intervention of local scientists.
No conclusion could be drawn of these unusual mortality event.

3. Corsica (France) – May 2024

The ACCOBAMS Secretariat has been informed that a trilateral military exercise, called Mare Aperto 2024, with a four weeks duration, is conducted by Italy, France and Spain until 27 May 2024 in an area of the central Mediterranean, from the Ionian Sea to the French coast, encompassing Sicily, Sardinia and Corsica. On Saturday 18 May 2024, an atypical mass stranding of Cuvier's beaked whales has been reported in Corsica. This species - Ziphius cavirostris - is known for its sensitivity to ambient noise. On the basis of a preliminary report, there is evidence that human noise caused by unknown sources, and similar to the sound known to cause atypical beaked whale mass strandings, was generated in the marine area where the strandings occurred.

Focal Points from France, Italy and Spain were contacted (1) to provide more information on the atypical mass stranding of Cuvier's beaked whales and the military operations in the framework of Mare Aperto 2024 and (2) to contact the **AETFS** should they need advice on how to implement postmortem investigations to preserve and store samples of stranded animals for future analyses.

No further scientific information available on November 28, 2024.

4. Spain – November 24

While writing this report, an adult Cuvier’s beaked whale stranded alive and died on the coast of Almeria, Spain on November 26, 2024. The animal has been necropsied.
No further information available on November 28, 2024.

5. Trainings

Different workshops have been organized to maintain preparedness:

- European Cetacean Society (ECS) conference 2024:
  1. workshop: New Technologies in Health Assessment of Marine Mammals
  2. Dolfake: an anatomically realistic cetacean mannequin for training teams in stranding management has been done in April 2024 with a Dolfake interest demonstration during the ECS conference.
- Liege annual marine mammals necropsy workshop in 2023 (15 participants including 4 ACCOBAMS delegates) and in 2024 (15 participants including 3 ACCOBAMS delegates).

Additionally, some tools for continuous and standardized training on post-mortem investigations were developed for virtual and on-distance training as videos and virtual reality experience.

Conclusions and recommendations

The understanding of unusual stranding event requires rapid post-mortem examinations with complete sampling, performed by local and/or remote experts, is confirming the interest of the ACCOBAMS Emergency Task Force for Stranding events. For that, it would be relevant to:

- Be informed: information to local, regional authorities in charge of cetaceans protection and conservation politics concerning the existence of the task force;
- Be connected: information about the **AETFS** on a dedicated page of NETCCOBAMS including contact persons, necropsy protocol (Best practice on cetacean post-mortem investigation and tissue sampling);
- Be ready: locally, it is necessary to identify official stranding networks, official authorities, veterinary institutions and facilities (heavy equipment…);
- Be prepared/trained: maintain participation at necropsy and telenecropsy training sessions to develop and improve remote advice for dissection and samplings (see the ACCOBAMS/MOROCCO PROJECT: “Training in telenecropsy and standardization of cetacean stranding response methods”); new technologies for training as virtual reality and metaverse should be also put in place
- Be standardized: to allow comparison in post-mortem investigations the use of the: ”Best practice on cetacean post-mortem investigation and tissue sampling” and Resolution 7.14 for harmonizing diagnosis is essential.

ANNEX 1 –

Cuvier's Beaked Whale Mass Stranding Event

Preliminary Report

21 February 2023

Ministry of Tourism, Culture, Youth and Environment
Environmental Protection Department

Ministry of Agriculture and Natural Resources
Veterinary Department

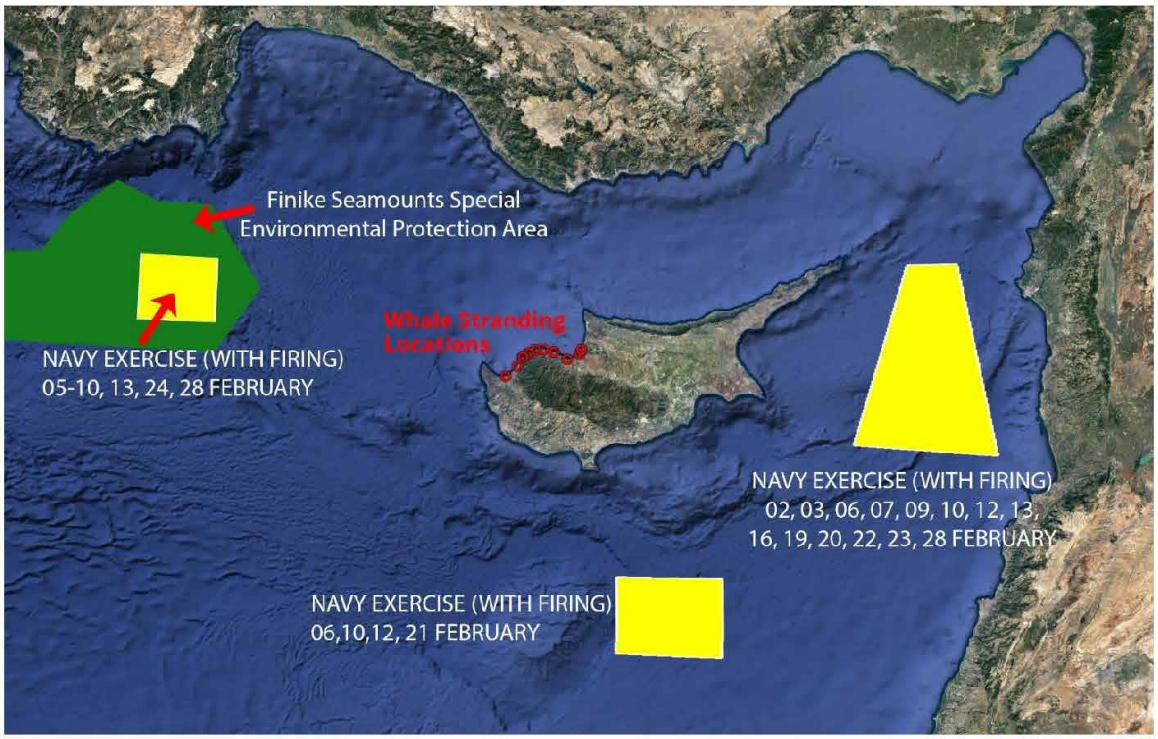
TURKISH MARINE RESEARCH FOUNDATION

CYPRUS WILDLIFE - KIBRIS YABAN HAYATI - ΑΓΡΙΑ ΘΥΣΗ ΤΗΣ ΚΥΠΡΟΥ

PRELIMINARY REPORT ON CUVIER'S BEAKED WHALE DEATHS IN CYPRUS

On February 9-13, 2023, a total of 12 beaked whales were stranded, seven in southern and five in northern part of Cyprus. Most were dead when they were found, but some were alive, however, despite all efforts, none of the stranded whales survived. According to the preliminary results of the necropsy studies, it is thought that five whales from the north had died due to gas embolism caused by acoustic trauma.

Beaked whales are known to be affected by navalexercises and seismic surveys all over the world. According to NAVTEX data, there were planned navy exercises with firing across large areas in the eastern, southern and western parts of the island on the days when whales were stranded. All countries should cease their planned/unplanned naval exercises in the eastern Mediterranean, as there are concerns about the increase in stranding events.



Cuvier's Beaked Whale Mass Stranding Event - Preliminary Report

A total of 12 Cuvier's beaked whales (*Ziphius cavirostris*) washed up on the west-northwest of Cyprus island, one in Poli, one in Galia, three in Pomos, one in Pachyammos, one in Pirgos in the south and one in Gemikonağı, two in Gaziveren, one in Yeşilırmak and one in Erenköy in the north. Taşkent Nature Park (Cyprus Wildlife Research Institute – CWRI), the authorized institution for stranded whales in the north, intervened and carried out rescue efforts with the support of the Coast Guard, Lefke Municipality, Güzelyurt/Morphou Municipality, Security Forces Command, Police, fishermen in the region and volunteer citizens. Unfortunately, despite all efforts, stranded whales were either found dead or died shortly after stranding. Similar rescue efforts also failed in south, and all 7 whales stranded has also lost their lives.

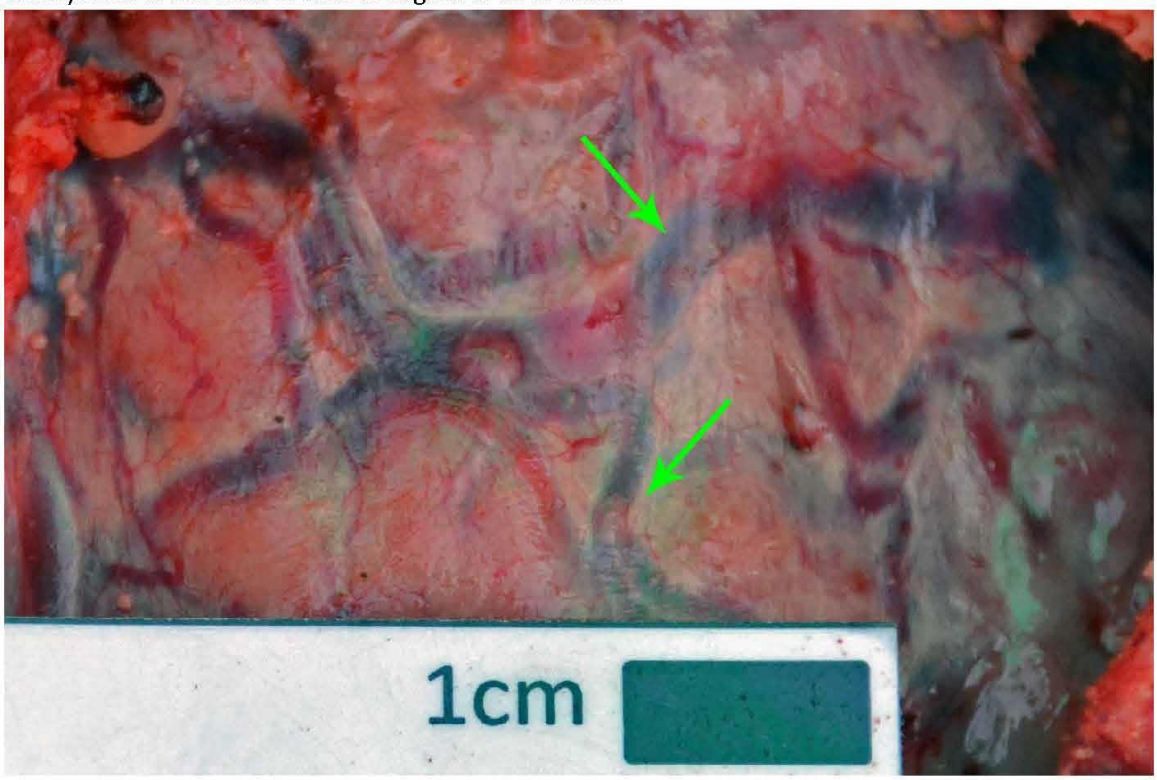
Cuvier's Beaked Whale Mass Stranding Event - Preliminary Report

While 4 whales were transported to CWRI for necropsy studies, the necropsy of the whale in Erenköy was carried out in situ. In addition to the Cyprus Wildlife Research Institute, the necropsies were carried out together with representatives from the Veterinary Department, the Environmental Protection Department, the Animal Husbandry Department, and marine mammals experts from Turkish Marine Research Foundation.

Cuvier's Beaked Whale Mass Stranding Event - Preliminary Report

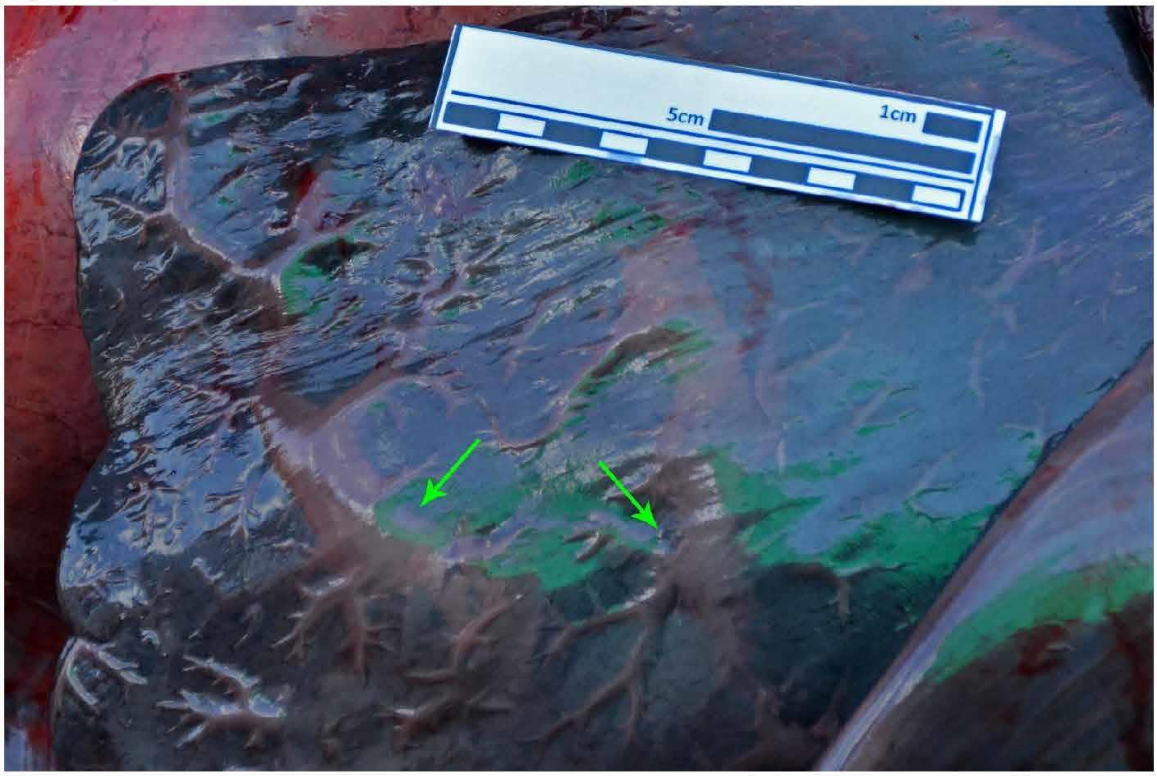
According to the preliminary results of the necropsy studies;

Five young (2 female, 3 male) whales, ranging in length from 3.9 to 4.7 meters, were in good body condition except the one found in Erenköy. During the necropsy of all 5 animals, gas bubbles were clearly seen in the veins in various organs of all of them.



Cestodes, nematodes and ascarid parasites were found in amounts that would not normally cause any ill effect from the gastrointestinal tract and all were collected for further investigations. In the individual in Erenköy, nematode infestation which covered the renal pelvis in the kidneys was observed intensely, which also spread to the ureter. All parasites were removed and stored appropriately for morphological and genetic studies.

Especially in the liver, structural changes that may be related to gas embolism were observed and samples were taken for detailed examinations and the results of all examinations will be reported separately.



According to the preliminary findings, a general hemorrhagic appearance was dominant in the organs, similarly in all five individuals. When the gas bubbles in the veins, the changes in the organs and the pathologies seen in the organs are evaluated, it is thought that gas embolism occurred due to the change in the normal diving behavior during escaping from the sound source, as in the decompression sickness. When the bleeding around the head and ear canal is evaluated, acoustic trauma is considered to be the reason for this. All of the 5 individuals were found to have full stomachs, which proves that deaths were caused by an acute event happening suddenly and not due to a long-term ill effect.

Apart from all these, a 20×16 cm disposable plastic package was found in the stomach contents of an individual. Although it has been evaluated that this plastic packaging is not directly related to the death of the animal, it is an important example in terms of the damage that single-use plastic wastes can have on animals in our seas.

Contrary to what was previously reported in the media, it is thought that the cases are not related to the major earthquakes that recently took place in Türkiye. Although it is known that earthquakes have an acoustic effect, in this particular case a connection cannot be made as these earthquakes happened on land and the time between earthquakes and strandings were 3.5 days apart. In addition to this, there are no proof of earthquakes causing death of whales anywhere in the World.

Cuvier's beaked whales are toothed whales and one of the 12 species of cetaceans found in Mediterranean, and are also known to be genetically separate from the Atlantic population. They usually feed on squid, are deep divers (usually 500-1500m), and prefers underwater canyons and complex seabed structures, however, they can also be found in abyssal plains. The Mediterranean population is estimated to be around 6000 individuals and is classified as Vulnerable (VU) on the International Union for Conservation of Nature (IUCN) Red List. Beaked whales are born around 3m, and reach reproductive maturity at the age of 7-11 years, at 5.5-6.0m in length. There is evidence from mass stranding around the world that beaked whales experience acoustic trauma from low and medium frequency sonars used in navalexercises and sound sources used in seismic surveys for oil/natural gas exploration. Apart from this, deaths resulting from illegal fishing with drift nets and ingestion of macroplastics are other threats for these animals in the Mediterranean. There have been about 20 known cases of mass stranding in the Mediterranean since 1963, the most recent one on the Greek island of Corfu in February last year and

associated with the seismic survey in the region. The Parties of the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) have resolved in 2013 (Resolution 5.13) that they must abstain from conducting naval exercises using sonar or underwater explosions around the " Areas of Special Concern for Beaked Whales".

Also, it was learned that on Wednesday, February 15, 2023, a beaked whale, approximately 4 meters in length, washed ashore alive and was rescued back to the sea on the coast of Okurcular District of Antalya, Alanya, Turkey.

According to the NAVTEX data obtained, it is known that the Russian Federation has planned navy shooting exercises in large areas in the eastern, southern and western regions of the island in February. As a precaution, and due to fears of an increase in death toll, all countries should stop all planned/unplanned naval exercises in the eastern Mediterranean and especially in the Finike (Anaximander) Seamounts Special Environmental Protection Area, a unique marine ecosystem that supports fragile habitats and vulnerable fauna and flora species.

ANNEX 2

Report of the Republic of Cyprus to ACCOBAMS, on the mass stranding of *Ziphius cavirostris* in February 2023.

October 2024

Nicosia, Cyprus

Republic of Cyprus

DEPARTMENT OF FISHERIES AND MARINE RESEARCH (DFMR)

Proposed reference: DFMR (2024). Report of the Republic of Cyprus to ACCOBAMS, on the mass stranding of *Ziphius cavirostris* in February 2023. Department of Fisheries and Marine Research, Ministry of Agriculture, Rural Development and Environment, Republic of Cyprus. 35 p.

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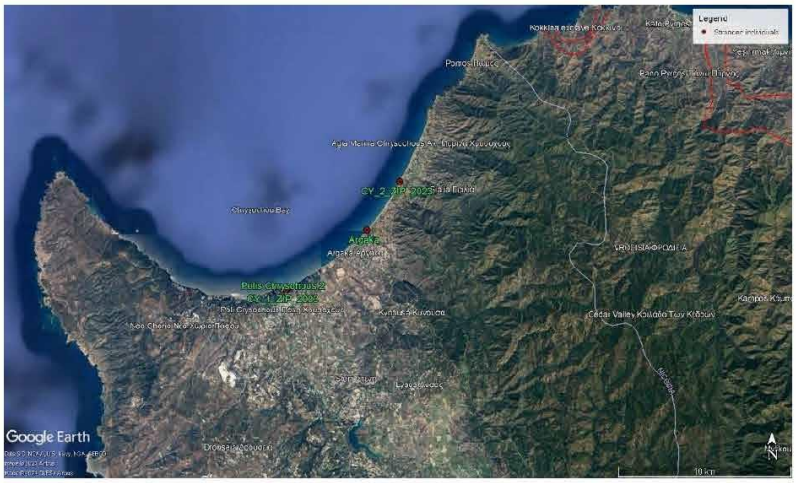
1. Description of events

The Department of Fisheries and Marine Research (DFMR), was notified on February 9, 2023 (09/02/2023) soon after 14:00 EET about the stranding of a live individual Cuvier's beaked whale (*Ziphius cavirostris*) on the beach in the area of Argaka, in Chrysochous Bay in Cyprus. A response team from DFMR immediately responded to the incident, and after efforts, successfully refloated the animal back to the sea (Photo 1).

Photo 1. Z. cavirostris individual washed ashore alive in Argaka beach on 09/02/2023 at 14:00 EET

Throughout the same day, 09/02/2023, three (3) more individuals of *Z. cavirostris* were stranded alive within the same Bay (Chrysochous bay), specifically in the beach areas of Gialia (one individual – CY_2_ZIP_2023) and Polis Chrysochous (two individuals: one full size adult - CY_1_ZIP_2023, and one smaller in size possibly young in age). All individuals were successfully refloated back to sea after the efforts of the response team and several volunteers (Map 1).



Map 1. Locations of the four (4) individuals that washed ashore alive on 09/02/2023 in Chrysochou bay in the areas of Argaka, Gialia, and Polis Chrysochous.

However, on the following day, 10/02/2023, the CY_2_ZIP_2023 individual from Gialia, and the full-size adult one from the Polis Chrysochous area (CY_1_ZIP_2023) were found dead on the beach in the respective areas (Photo 2).

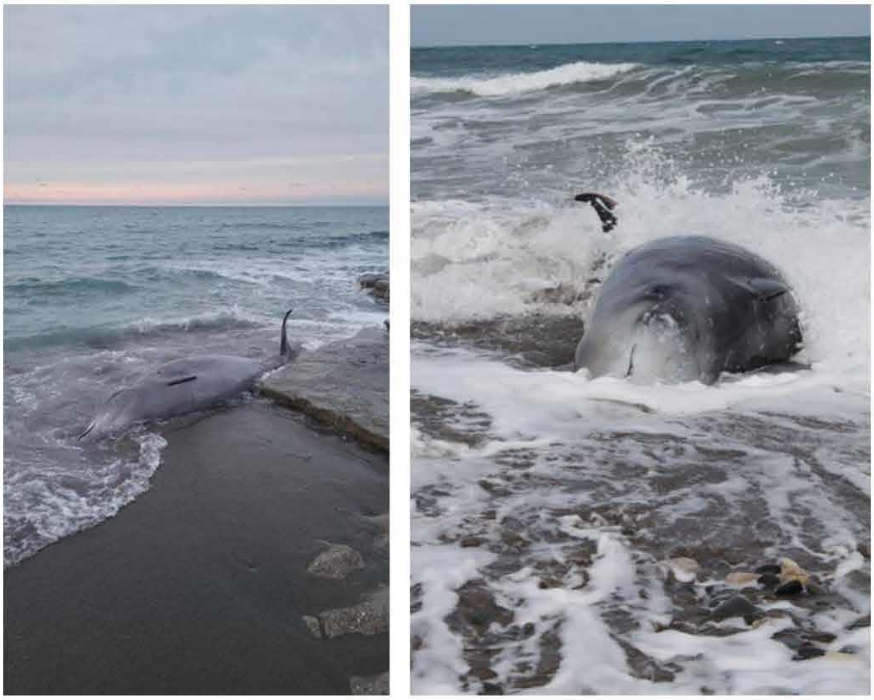


Photo 2. The individual animal on Gialia beach (CY_2_ZIP_2023) and individual CY_1_ZIP_2023 on Polis Chrysochous area that stranded dead on 10/02/2023 after being refloated the day before.

Three (3) additional individuals were found dead on 10/02/2023, on the shore in the areas of Pomos (CY_3_ZIP_2023, CY_4_ZIP_2023, CY_5_ZIP_2023) and one (1) more individual washed ashore dead in the area of Pachyammos (CY_6_ZIP_2023) (Photo 3).

Photo 3. One of the three (3) individuals that stranded dead in the Pomos area on 10/02/2023.

In the coming days, in the area of Kato Pyrgos in Morphou Bay, two (2) more individuals washed ashore dead. The first was found on 12/02/2023 in a state of decomposition (CY_7_ZIP_2023) and the second was found on 16/02/2023 in a state of severe decomposition (CY_8_ZIP_2023) (Photos 4 & 5).

Photo 4. Individual CY_7_ZIP_2023 that washed ashore decomposed on 12/02/2023 on the beach of Kato Pyrgos.

Photo 5. Individual CY_8_ZIP_2023 that washed ashore in severe decomposition on 16/02/2023 on the beach of Kato Pyrgos.

Map 2. Locations of all individuals that were observed for the first time stranded dead after 10/02/2023 in Chrysochou and Morphou bays.

All these strandings occurred along the coastline of Chrysochou and Morphou bays, that the government of the Republic of Cyprus exercises effective control (Map 3).

Map 3. Locations of all stranded individual Z. cavirostris animals along the coastline of Cyprus, where the government of the Republic of Cyprus exercises effective control.

During the same days of early February 2023, strandings of individuals of the species *Ziphius cavirostris* were also reported to have occurred in the Morphou bay area and other locations in the occupied areas of the Republic of Cyprus, where the Government of the Republic of Cyprus does not exercise effective control over. Thus, the data for these strandings, even though published in various sources, cannot officially be confirmed by DFMR and the Government of the Republic of Cyprus.

However, it can be speculated, that the two individuals of the species *Ziphius cavirostris* that had initially washed ashore alive on 09/02/2023 and had been successfully refloated back to sea in the area of Argaka and the young individual in the area of Polis Chrysochous, are two of the individuals stranded and reported dead in the occupied areas of the Republic of Cyprus.

A table with all information about each of the animals stranded in the Chrysochou and Morphou bays, in the areas where the government of the Republic of Cyprus exercises effective control, can be found in Annex I.

2. Post-mortem examinations

Out of the eight (8) total individuals that had in total stranded dead along the coast line of Chrysochou and Morphou bays, in areas under the effective control of the Republic of Cyprus, post-mortem examinations were carried out on seven (7) individuals. External examinations and morphometric measurements were carried out and collected where possible for these individuals.

No post-mortem examination was carried out for individual CY_2_ZIP_2023 due to the fact that the local municipality had already proceeded with the burial of the animal on the beach prior to the arrival of the examination team.

All morphometric measurements for the seven (7) individuals can be found in Annex II.

The post-mortem examinations were carried out by Department of Fisheries and Marine Research (DFMR) staff and veterinarian Dr. Evridiki Kontemeniotou, member of ARION Stranding Network and the Unit of Exotic and Wildlife Medicine of Aristotle University of Thessaloniki in Greece.

A full necropsy, along with external examination, morphometric measurements, and tissue and DNA sample collection was performed on individual CY_1_ZIP_2023, the full-grown female adult that stranded in Polis Chrysochous, by Dr. Kontemeniotou with the assistance of staff from DFMR as well as the Veterinary Services of Cyprus and members of local NGO Terra Cypria (Photo 6).

Photo 6. On-site post-mortem examination of the female adult (CY_1_ZIP_2023) in the area of Polis Chrysochous on 10/02/2023. This individual initially stranded alive on 09/02/2023 and was successfully refloated back to sea, but eventually re-stranded dead the following day.

On the three (3) individuals, that washed ashore dead in Pomos area, no necropsy was able to be performed, as the animals were located partly submerged in the water in a cliffside beach, where access was limited to vehicles, therefore relocation of the carcasses to shore for necropsy was impossible. The one (1) individual that stranded dead in Pachyammos was fully submerged in the coastal area and after collection of morphometric measurements was relocated by a DFMR boat to another location for burial. Lastly, for the two (2) individuals found at Kato Pyrgos on 12/02 and 16/02/2023, no necropsy was carried out due to their state of decomposition (Annex II).

2.1. On site post-mortem and necropsy

On February 10, 2023, the Department of Fisheries and Marine Research (DFMR) staff coordinated the post-mortem examination of the one adult female individual (CY_1_ZIP_2023), on the coastal area of Polis Chrysochous. The on-site post-mortem examination was carried out by the DFMR staff along with Veterinary Services of Cyprus and members of local NGO Terra Cypria. The necropsy and tissue sampling were performed under the guidance of veterinarian Dr. Evridiki Kontemeniotou, member of ARION Stranding Network and the Unit of Exotic and Wildlife Medicine of Aristotle University of Thessaloniki in Greece (Photo 6).

After the external examination of the animal, where no injuries were observed, morphometric measurements were taken (Annex II). DNA samples and interior chamber fluids were also collected. A blowhole swab was also taken. During the full necropsy, tissue and blood samples from various organs were taken along with spinal fluid.

During the necropsy, it was observed that this female individual (CY_1_ZIP_2023) was lactating, and milk samples were also collected. This individual had initially stranded alive on 09/02/2023 with another individual, much smaller in size. Both were refloated, and only the adult was recorded again to have stranded dead on 10/02/2023 in the areas under the effective control of the Republic of Cyprus. It is very likely that this female individual was the mother of the calf that beached alive with her on 09/02/2023.

Photo 7. Samples collected from the lactating female CY_1_ZIP_2023.

2.2. Histopathological findings

Various tissue and blood samples were collected from individual CY_1_ZIP_2023 during the onsite post-mortem examination in Polis Chrysochous.

The samples for histopathological analyses were preserved in formaldehyde solution.

The samples were first sent to the Veterinary School of Aristotle University of Thessaloniki in Greece for preliminary analyses at the Pathology Anatomy Laboratory by Dr. Demetra Psalla. Tissue samples were examined from seven (7) different organs that were collected during the post-mortem examination of CY_1_ZIP_2023 (Table 1). The official report from the Aristotle University of Thessaloniki can be found in Annex III.

Table 1. Findings of the preliminary analyses on tissues samples collected from individual CY_1_ZIP_2023. The analyses were performed at the Pathology Anatomy Laboratory of the Aristotle University of Thessaloniki in Greece.

Organ tissue samples	General findings per organ
Lungs	• Focal haemorrhages, hyperaemia and multifocal mild infiltration of the interalveolar spaces by lymphocytes and plasma cells. • Focally in the wall of a small number of bronchi, infiltration by neutrophils.
Heart	• Limited foci of loss of cardiac fibre alignment and homogenization of the sarcoplasm. • Coronary vessels show hyperaemia and in some of them vacuolar formations are observed in their lumen (suspected presence of bubbles).
Liver	• Multifocal hyperaemia of the centrilobular veins and generalized dilatation of the atrial capillaries (passive hyperaemia).
Pancreas	• Small foci of infiltration of the interstitial tissue by a small number of lymphocytes and plasma cells.
Stomach (gizzard)	• Hyperplasia of the wall of its vessels and degeneration of the cells of their middle layer.

Kidney	• In the lumen of the urophorous tubules, a collection of protein-rich urine is observed, often impregnated with blood pigments (evidence of haematuria). • Diffuse hyperaemia and thickening of the membranes of the vascular glomeruli. • Amyloid deposition is observed multifocally in the membranes of vascular glomeruli. • The renal pelvis shows dilatation and hyperplasia of its epithelium. • At the entrance of the pelvis, an extensive area of necrosis is found, which is replaced by cellular rickets and degenerated neutrophils and a small number of lymphocytes (purulent exudate) and is partially surrounded by a pseudocapsule of newly formed connective tissue.
Lymph node	• No significant changes were found.
Brain	• No nervous brain tissue fragments.

Then, the samples were sent to the University of Las Palmas de Gran Canaria (ULPGC), to be analysed further by Prof. Antonio Fernández and his team at the University Institute of Animal Health and Food Safety (IUSA) laboratory. Detailed histopathological examinations were performed on tissue samples from eight (8) different organs that were collected during the post-mortem examination of CY_1_ZIP_2023 (Table 2). Full histological report from the ULPGC can be found in Annex IV.

Table 2. Findings of the detailed analyses on tissues samples collected from individual CY_1_ZIP_2023. The analyses were performed at the University Institute of Animal Health and Food Safety of ULPGC in Gran Canaria, Spain.

Organ tissue samples	General findings per organ
Lungs	• Interstitial congestion with atelectatic areas • Alveolar haemorrhages • Intravascular gas emboli. • Emphysema and atelectasia associated with inter-alveolar congestion.
Heart	• Midsize vessels and capillary congestion. • Hyper-eosinophilic myofibers with fragmentation. • Interfibrillary edema. • Diffuse congestion, intracytoplasmic vacuoles. • Multifocal intravascular gas embolism.
Liver	• Moderate centrilobular congestion. • Intracellular (macrophages) melanosis like around the vessels and portal areas. • Moderate hyperplasia of Ito cells and evident Kupffer cells.
Pancreas	• No cyto-histological lesions observed.
Stomach (glandular)	• Moderate congestion in the submucosal vessels and eosinophilic arteritis in midsize vessels.
Kidney	• Parasitic granulomatous Nephritis by *Crassicauda sp.* • Multifocal intravascular gas embolism in the inter-renicular veins.

Lymph node	• Congestion and reabsorption of blood with presence of reabsorbed gas in the cortical lymph node area.
Brain (fibro-vascular and fibromuscular tissue)	• Adipose tissue showing some multifocal haemorrhages. • No nervous tissue sample included in the samples.

2.3. Histological conclusions

All of the tissue pieces showed mild autolytic changes. Some of the findings found have been reported in natural as well as perioperative cases of decompression sickness, however, these are not pathognomonic.

While the histological analysis does not describe any pathological entity or disease, the histological observations together with the strandings and the gross observations done during the necropsies can fit (partially) with the pathology observed in mass strandings of beaked whales due to acoustic related disturbance, probably associated temporally and spatially to mid-frequency sonar activities. Such acoustic disturbance from underwater activities especially at mid-frequencies, results in decompression sickness that can explain the embolism observed in the beaked whale.

3. Anthropogenic activities in the region

Given the findings from both of the histopathological analyses carried out by the Veterinary School of Aristotle University of Thessaloniki in Greece and the University Institute of Animal Health and Food Safety (IUSA) laboratory at the University of Las Palmas de Gran Canaria in Spain, an examination was carried out for the possible sources of underwater acoustic activity that may have led to or contributed to this mass stranding of Cuvier's beaked whales in Cyprus in early February 2023. The examination focused on the NAVTEX issued by the Republic of Cyprus, on natural seismic activity from earthquakes as well as on anthropogenic seismic survey activity from the use of sonar for geological exploration, and on testimonies for loud explosions in the area.

3.1. Issued NAVTEX by the Republic of Cyprus

NAVigational TEleX (NAVTEX) notifications are being issued by all countries to deliver navigational and meteorological warnings and forecasts, as well as urgent maritime safety information (MSI) to ships. These NAVTEX extend to the marine areas around each country.

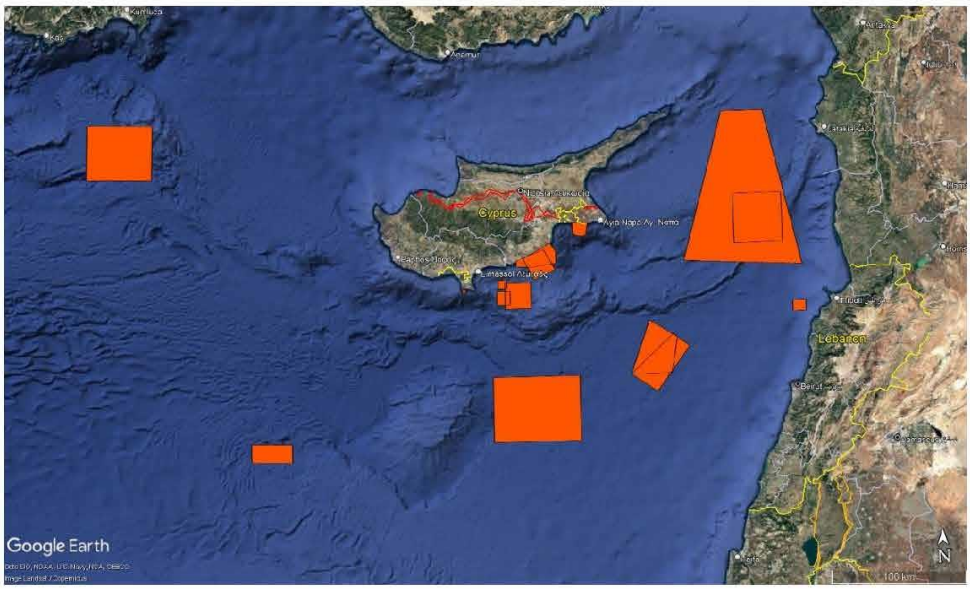
The official NAVTEX issued by the Republic of Cyprus for all military exercises and other oceanographic exploration activities were examined for the period leading up to the mass stranding of the *Z. cavirostris* individuals, starting from January 01, 2023.

For the period from 01/01/2023 and until the very last *Z. cavirostris* individual was located onshore on 16/02/2023, twenty (20) different NAVTEX were in effect in the Cyprus Navtex service area which coincides with Flight Information Region (FIR) NICOSIA, as issued by the Joint Rescue Coordination Center of the Republic of Cyprus (Annex V).

Out of the NAVTEX that were in effect as issued by the Republic of Cyprus, only two of them (No. 51 & No. 89) were in the closest proximity to the stranding locations of the *Z. cavirostris* individuals (Map 4, Annex V). Both of these NAVTEX referred to Russian Navy exercises with firing. NAVTEX #51 was held on 5 different separate days during January 2023 (Annex V). NAVTEX #89 was held between 05/02/2023 until 10/02/2023 and then on 13/02/2023 by the Russian Navy and included exercises with firing.

For the entire month of January 2023, seven (7) NAVTEX were in effect that involved firing (Annex V). Out of these, the four (4) were occurring in the open sea (No. 50-53), and all were for firing exercises by the Russian Navy (Map 5, Annex V).

During the day of the first sighting of the stranded individuals (09/02/2023), there were another five (5) different activities in the Cyprus Search & Rescue Region (SRR) – FIR NICOSIA marine region in addition to the Russian Navy Exercises with firing (NAVTEX #89). Out of these, three (3) were occurring along the southeastern territorial waters of Cyprus (NAVTEX #66, #94, #98), while the other two (2) were offshore (NAVTEX #88 & #96), to the east of Cyprus, near the coasts of Lebanon and Syria (Map 6, Annex V).



Map 4. Locations of all the NAVTEX issued by the Republic of Cyprus that were in effect during the period 01 January 2023 until 16 February 2023 around Cyprus. Red circles indicate the locations where the Z. cavirostris individuals stranded between 09 and 16 February 2023.

Map 5. Locations of all the NAVTEX issued by the Republic of Cyprus that were in effect during the month of January 2023 around Cyprus.

Map 6. Locations of all the NAVTEX issued by the Republic of Cyprus that were in effect on 09 February 2023 around Cyprus, on the day of the first strandings.

3.2. Natural Seismic Activity

A few days prior to the first *Z. cavirostris* stranding incident in Cyprus in February 2023, a strong earthquake of magnitude 7.8 occurred on the border between Turkey and Syria on 06/02/2023.

According to the Cyprus Geological Survey Department, between 08/02/2023 and 10/02/2023, there were 33 earthquakes in the wider area of Cyprus, of which 29 were

aftershocks of the very strong earthquake of February 06th (Mw=7.8) in the same epicentral area.

In the north-western area of Cyprus during this period (08-10/02/2023) only one (1) earthquake of magnitude M=2.7 was recorded. This earthquake occurred 08/02, 2023 at 11:13 EET. This particular earthquake is considered to be of very small magnitude and cannot be felt by humans nor cause any strong ground and/or other vibration (Map 7).

Map 7. Location of earthquake that occurred on 08/02/2023 at 11:13 EET off the northwestern coast of Cyprus and was sensed by different seismographs on the island. The earthquake was of magnitude 2.7.

The very strong earthquake of 06/02/2023 (Mw=7.8) that occurred between Turkey and Syria at 03:17 EET, caused on the same day a small tsunami, which was recorded on the eastern coast of Cyprus as well as on the south-eastern coast of Turkey. In particular, the Paralimni station of the PYTHEAS system of the Cyprus Department of Lands and Surveys recorded a fluctuation around 03:30 (about 20 minutes after the earthquake's origin) which stopped around 05:00. According to the Cyprus Department of Lands and Surveys, this disturbance was observed only at the station of Paralimni. There is the possibility that during the specific period of time and only for 06/02/2023 there was a corresponding propagation of sound due to the propagation of seismic waves.

3.3. Anthropogenic seismic surveys

The Seismological Network of the Cyprus Geological Survey Department recorded possible seismic surveys on 11/02/2023 between the hours of 21:30 EET and 23:45 EET. These were recorded by two coastal stations of the seismological network, the station

of Alefka Pyrgos Tyllyria, and the station of Poli Chrysochous. Between the above times, both stations picked up similar records every 10 seconds; a pattern that coincides with sonar seismic surveys (Figure 1).

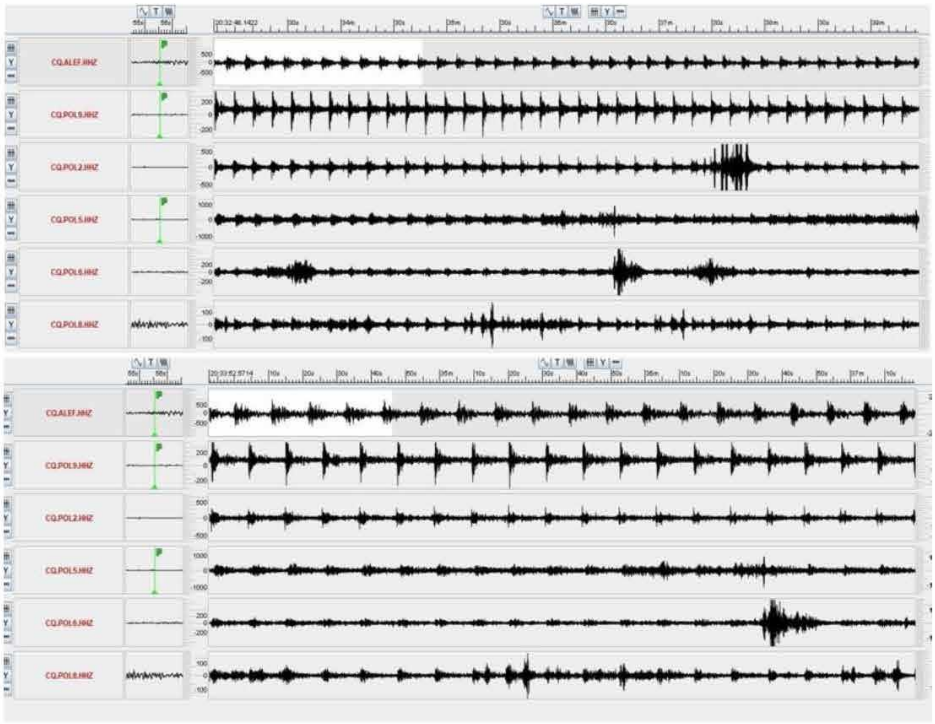
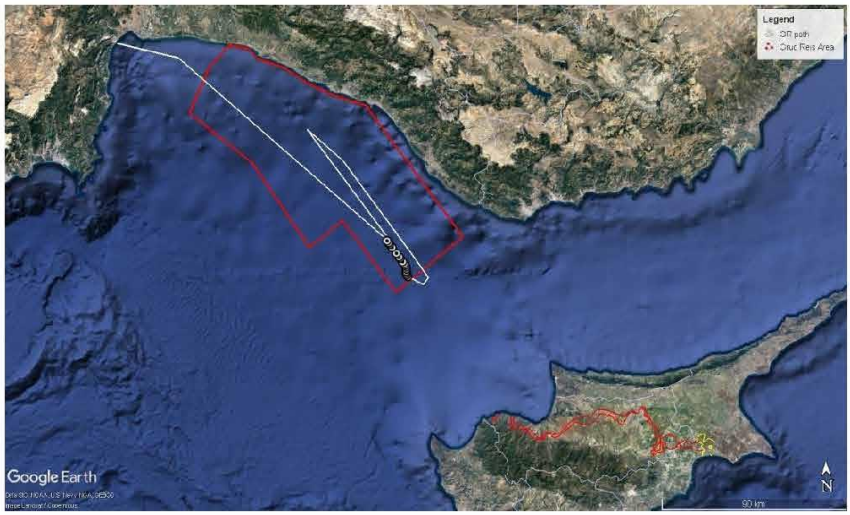


Figure 1. Geologic movement as detected on 11/02/2023 by the seismographs in Alefka Pyrgos Tyllyria, and Poli Chrysochous in Cyprus. Similar picks in intensities at random intervals of 10 seconds are indicative of sonar seismic surveys. Data provided by the Cyprus Geological Survey Department.

During the period of 07/02 until 12/02/2023, the Turkish seismographic vessel R/V ORUC REIS was sailing in the maritime area northwest of Cyprus. Turkey published a NAVTEX regarding the activities of R/V ORUC REIS from the Antalya Station (NW—0896/22). Since part of the area mentioned in this NAVTEX was within the Cyprus NAVTEX Service Area, but the announcement had not been coordinated with the relevant authorities of the Republic of Cyprus, an anti-NAVTEX was issued (ZCZC MA20) by Cyprus for caution.



Map 8. The area transmitted by the anti-NAVTEX of Cyprus for activities that were carried out by R/V Oruc Reis between 25/09/2022 and 14/03/2023 (in red). The white line shows the path used by the R/V Oruc Reis and the white dots, the locations of the vessel between the days of 07/02/2023 and 12/02/2023.

3.4. Explosion testimonies

Testimonies and information were received by the general public regarding a loud explosion heard at 20:40 EET from the eastern part of the island of Cyprus, on 08/02/2023. However, the Seismological Network of the Cyprus Geological Survey Department did not record any tremors especially at the seismographs stationed near Chrysochou bay and the bay of Morphou (Figure 2).

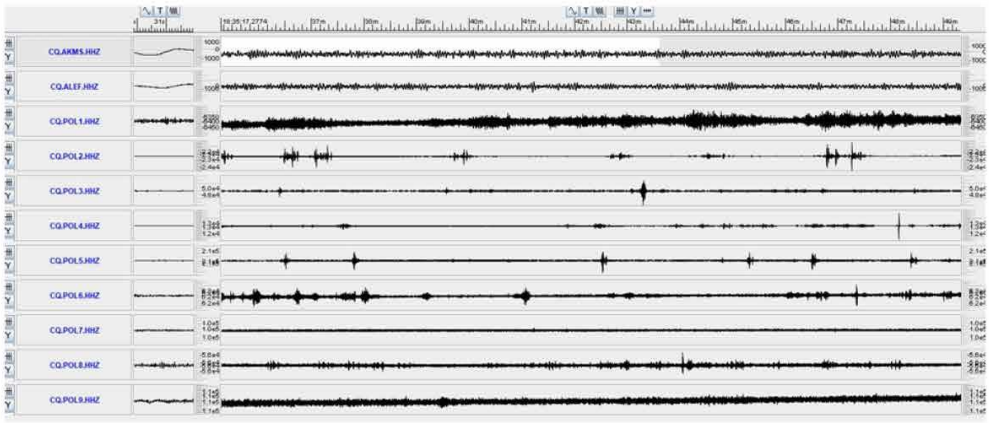


Figure 2. Geologic movement as detected on 08/02/2023 by the various seismographs in Cyprus. Data provided by the Cyprus Geological Survey Department.

Sound waves from explosions in the region, can be detected by the Seismological Network of the Cyprus Geological Survey Department, as it occurred with the large explosion in the port of Beirut on 04 August 2020.

4. Oceanographic conditions

The oceanographic conditions around the period of the mass stranding event were also examined, in order to understand the direction and intensity of the ocean currents around the island of Cyprus.

Mean daily ocean current data from 08/02/2023 until 10/02/2023 were analysed at different depth intervals (0m-surface, 100m, 500m). The data used to map ocean current intensities and directions were from the Copernicus Mediterranean Sea Physics Analysis and Forecast, at a 0.042° × 0.042° spatial resolution (https://doi.org/10.25423/CMCC/MEDSEA_ANALYSISFORECAST_PHY_006_013_EAS8).

Ocean current data were also analysed for depths between 500m to 1500m, however, the intensity of the ocean currents is decreasing to close to 0m/s below 500m depth.

Ocean currents at the surface (0m) close to the island of Cyprus are generally of low intensity, reaching speeds of maximum 0.4 m/s. Stronger currents of speeds up to ~0.7-0.8 m/s exist along the southern shores of Turkey and the western shores of Syria, Lebanon, and Israel (Annex VI). Especially in the northwestern part of Cyprus, and the two bays (Chrysochou and Morphou bay) where the stranding events of *Z. cavirostris* were recorded, surface ocean currents were of low intensity (below 0.3 m/s).

The ocean surface currents in the area of Cyprus where the mass stranding occurred were of an eastern and northern direction, forming an anticyclonic gyre especially to the waters north of Chrysochou bay (Annex VI). Weaker currents flowing westward parallel to the northern shoreline of Cyprus, change direction as they break off Cape Kormakitis, and turn southward/southwestern into the Bay of Morphou, where the last two (2) individuals were found stranded (CY_7_ZIP_2023 and CY_8_ZIP_2023). No major changes to the direction nor the intensity of the ocean currents around the island of Cyprus can be observed the day before the start of the mass stranding (08/02/2023), nor on the day the mass stranding began (09/02/2023).

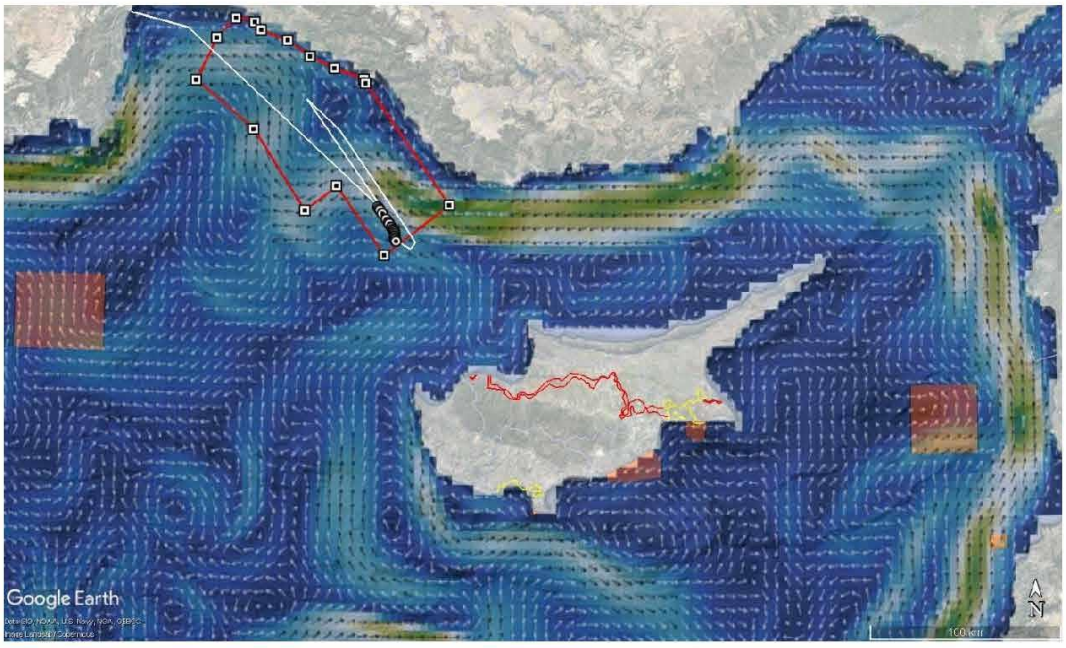
Below the surface, ocean currents maintain the same pattern as that observed at the surface, however they start to weaken in intensity. Especially by 500m depth, the ocean current velocity minimises to almost 0 m/s (Annex VI).

Given the circulation pattern and strength of ocean currents around the island of Cyprus, the generally passive movements of the animals due to the effects of decompression sickness, the scenario of an eastern/southern origin of the animals' movement prior to their stranding can probably be excluded.

5. Conclusion

The histological analyses carried out on tissue samples collected from the organs of one adult female Cuvier's beaked whale, along with the findings of the gross observations during the post-mortem examination indicate that the cause of death was gas embolism. The mass stranding of the Cuvier's beaked whales in Cyprus during early February 2023, is likely to have been caused by an acoustic related disturbance, probably associated to mid-frequency sonar activities. This acoustic disturbance forced the animals to surface rapidly from great depths, causing decompression sickness that led to gas embolism, stranding, and eventual death.

On the days leading up to the mass stranding event of *Z. cavirostris* individuals on the northwestern coastal area of Cyprus, several events occurred in the broader region of the Eastern Mediterranean which may have contributed individually or cumulative to the acoustic trauma of at least eight (8) Cuvier's beaked whales (Map 9).



Map 9. Overlay of the oceanographic conditions and anthropogenic activities around the island of Cyprus on 09/02/2023.

During the day of the first sighting of the stranded individuals (09/02/2023), three naval exercises with firing were occurring offshore (Map 6, Annex V). The only major earthquake, natural seismic activity that was recorded in the region was on 06/02/203 (Mw=7.8), and only a minor earthquake (M=2.7) occurred on 08/02/2023. Two coastal stations of the Seismological Network of the Cyprus Geological Survey Department recorded possible seismic surveys on 11/02/2023, as both stations picked up similar records every 10 seconds; a pattern that coincides with sonar seismic surveys (Figure 1). The Turkish seismographic vessel R/V ORUC REIS was sailing in the maritime area northwest of Cyprus from 07/02/2023 until 12/02/2023 (Map 8). Ocean circulation currents between 08 and 10 February 2023, were relatively weak around the island of Cyprus. Due to the location of the stranded individuals

(Chrysochou and Morphou Bays) on the northwestern part of Cyprus, it is possible that the animals were also located in the offshore area northwest of Cyprus prior to the series of events that led to their acoustic trauma and eventual stranding. This can also be indicated by the pattern of the surface currents of the region (Annex VI).

Annex I. All information about each of the *Z.cavirostris* animals stranded in the Chrysochou and Morphou bays, in the areas where the government of the Republic of Cyprus exercises effective control.

Area	Recording code	Longitude (E)	Latitude (N)	Earliest beach report (date & time)		Condition when beached	Final beach report (date & time)		Sex	Comments
Argaka	N/A	32° 28′ 45.93″	35° 04′ 31.18″	09/02/2023	14:00	Alive (pushed to sea)				Unknown fate
Polis Chrysochous	CY_1_ZIP_2023	32° 25′ 41.38″	35° 02′ 40.71″	09/02/2023	17:15	Alive (pushed to sea)	10/02/2023	04:00	F	Necropsy conducted Lactating
Polis Chrysochous	N/A	32° 25′ 41.38″	35° 02′ 40.71″	09/02/2023	17:15	Alive (pushed to sea)				Young individual (observed small in size) Unknown fate
Gialia	CY_2_ZIP_2023	32° 30′ 00.91″	35° 06′ 01.03″	09/02/2023	17:00	Alive (pushed to sea)	10/02/2023	04:00	M	Buried by the municipality prior to any measurements
Pomos	CY_3_ZIP_2023	32° 32′ 07.76″	35° 08′ 57.52″	10/02/2023	07:00	Dead			F	
Pomos	CY_4_ZIP_2023	32° 32′ 10.21″	35° 08′ 58.59″	10/02/2023	07:00	Dead			M	
Pomos	CY_5_ZIP_2023	32° 32′ 11.94″	35° 09′ 00.44″	10/02/2023	07:00	Dead			M	
Pachyammos	CY_6_ZIP_2023	32° 34′ 23.10″	35° 10′ 12.38″	10/02/2023	08:30	Dead				
Kato Pyrgos	CY_7_ZIP_2023	32° 39′ 15.60″	35° 11′ 36.26″	12/02/2023	14:00	Dead (decomposed)			F	
Kato Pyrgos	CY_8_ZIP_2023	32° 39′ 27.02″	35° 11′ 39.44″	16/02/2023	14:00	Dead (severely decomposed)			F	

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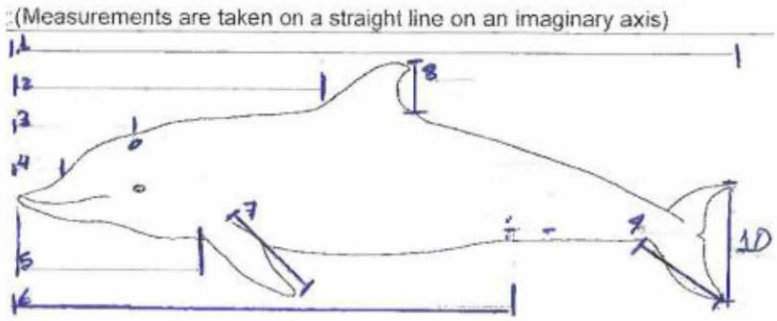
Annex II. Morphometric measurements taken on the seven (7) out of the 8 individuals of *Z. cavirostris* that washed ashore dead in Chrysochou and Morphou bays.

	Measurement by location number (cm)									
	1	2	3	4	5	6	7	8	9	10
CY_1_ZIP_2023	500	320	68	20	130	350	50	23	90	130
CY_2_ZIP_2023	/	/	/	/	/	/	/	/	/	/
CY_3_ZIP_2023	370	220	/	/	125	/	/	/	/	/
CY_4_ZIP_2023	420	315	60	26	110	260	42	32	75	120
CY_5_ZIP_2023	500	310	66	25	125	310	55	23	80	135
CY_6_ZIP_2023	470	294	56	20	106	287	44	17	67	124
CY_7_ZIP_2023	490	/	67	26	109	272	50	/	80	109
CY_8_ZIP_2023	450	173	76	/	/	/	30	22	/	147



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Annex III. Official report from the Aristotle University of Thessaloniki on the samples collected from CY_1_ZIP_2023.

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

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54124 ΘΕΣΣΑΛΟΝΙΚΗ

Διευθύντρια: **Δήμητρα Ψάλλα**, Αναπληρώτρια Καθηγήτρια
Τηλ.: 2310999931
e-mail: dpsalla@vet.auth.gr

ΑΠΟΤΕΛΕΣΜΑΤΑ ΙΣΤΟΠΑΘΟΛΟΓΙΚΗΣ ΕΞΕΤΑΣΗΣ

ΦΟΡΕΑΣ ΑΙΤΩΝ ΤΗΝ ΕΞΕΤΑΣΗ: Δ/νση Αλιείας του Υπ. Περιβάλλοντος Κύπρου
Υπεύθυνη κτηνίατρος: Κομνηνού Αναστασία

Αριθμός Βιβλίου Παθολογικής Ανατομικής: Β8578

Παραλήφθηκαν για ιστοπαθολογική εξέταση (μονιμοποιημένα σε διάλυμα φορμόλης) ιστοτεμάχια οργάνων ενός κητώδους του είδους Ziphius cavirostris

Ήπαρ: διαπιστώνεται πολυεστιακή υπεραιμία των κεντρολόβιων φλεβών και γενικευμένη διάταση των κολπωδών τριχοειδών (παθητική υπεραιμία).
Νεφροί: στον αυλό των ουροφόρων σωληναρίων παρατηρείται συλλογή πρόουρου πλούσιου σε πρωτεΐνες και συχνά εμποτισμένο από χρωστικές του αίματος (στοιχεία αιματουρίας). Διαπιστώνεται διάχυτη υπεραιμία και πάχυνση των μεμβρανών των αγγειωδών σπειραμάτων. Πολυεστιακά στις μεμβράνες των αγγειωδών σπειραμάτων παρατηρείται εναπόθεση αμυλοειδούς. Η πύελος του νεφρού παρουσιάζει διάταση και υπερπλασία του επιθηλίου της. Στην είσοδο της πυέλου διαπιστώνεται εκτεταμένη περιοχή νέκρωσης που αντικαθίσταται κυτταρικά ράκη και εκφυλισμένα ουδετερόφιλα και ολιγάριθμα λεμφοκύτταρα (πυώδες εξίδρωμα) και περιβάλλεται μερικώς από ψευδοκάψα νεοσχηματιζόμενου συνδετικού ιστού.
Πάγκρεας: διαπιστώνονται μικρές εστίες διήθησης του διάμεσου ιστού από ολιγάριθμα λεμφοκύτταρα και πλασμοκύτταρα.
Προστόμαχος: διαπιστώνεται υπερπλασία του τοιχώματος των αγγείων του και εκφύλιση κυττάρων του μέσου χιτώνα τους.
Πνεύμονες: διαπιστώνονται εστίες αιμορραγίες, υπεραιμίας και πολυεστιακή ήπιου βαθμού διήθηση των μεσοκυψελιδικών διαστημάτων από λεμφοκύτταρα και πλασμοκύτταρα. Εστιακά στο τοίχωμα μικρού αριθμού βρόγχων παρατηρείται διήθηση από ουδετερόφιλα.
Καρδιά: παρατηρούνται περιορισμένες εστίες απώλειας της γράμμωσης των καρδιακών ινών και ομογενοποίηση του σαρκοπλάσματος. Τα στεφανιαία αγγεία παρουσιάζουν υπεραιμία και σε ορισμένα από αυτά παρατηρούνται στον αυλό τους κενοτοπιώδεις σχηματισμοί (υποψία παρουσίας φυσαλίδων).

Λεμφαδένες: δεν διαπιστώθηκαν αξιοσημείωτες μεταβολές.

Εγκέφαλος: δεν βρέθηκαν ιστοτεμάχια εγκεφάλου στα δείγματα που παραλήφθηκαν.

ΣΥΜΠΕΡΑΣΜΑΤΑ

Το σύνολο των ιστοτεμαχίων παρουσιάζει ήπιες αυτολυτικές αλλοιώσεις. Ορισμένα από τα ευρήματα που διαπιστώθηκαν έχουν αναφερθεί σε φυσικά αλλά και περιραματικά περιστατικά της νόσου αποσυμπίεσης, ωστόσο καθώς αυτά δεν είναι παθογνωμονικά, για την συνολική εκτίμηση του περιστατικού τα ιστοπαθολογικά ευρήματα πρέπει να αξιολογηθούν σε συνδυασμό με τα μακροσκοπικά ευρήματα και το ιστορικό εκβρασμού του ζιφιού.

Η διενεργήσασα την ιστοπαθολογική εξέταση

Δήμητρα Ψάλλα

Annex IV. Official report from the University of Las Palmas de Gran Canaria on the samples collected from CY_1_ZIP_2023.

Prof. Antonio Fernández, DVM, PhD, ECVP_EFVP, ECZM
University Las Palmas de Gran Canaria

Inform to whom it may concern that:

Dr. Anastasia Komnenou sent samples from one stranded Beaked Whale.
The information of that animal regarding stranding and necropsy is provided by Dr. Komnenou in a different document. Our laboratory (IUSA_ULPGC) received the following tissue samples fixed in formalin. They were included in paraffin and cut in sections which were stained routinely to be microscopically studied.
We have to inform that from the **following table**, brain was not supplied. The rest of samples were PRESENT and processed as it is indicated here below.

Table of samples taken during the necropsy:

Ln. preescapular	☐ PRESENT
Trachea	
Tracheal tonsil	
Lungs	☐ PRESENT
Ln. diaphragmatic	
Heart	☐ PRESENT
Liver	☐ PRESENT
Spleen	
Pancreas	☐ PRESENT
Fore Stomach 1	
Main Stomach 2	☐ PRESENT
Pyloric Stomach 3	
Intestino	
Ln. mesenteric	
Adrenal	
Kidney	☐ PRESENT
Bladder	
Ovaries	
Uterus	
Mammary Gland	
Testis	
Thyroid	
Brain *(not Good sample)*	☐ NOT PRESENT

1

Histological findings (Beaked whale) Cyprus

From those samples, we received the following fixed tissues which were submitted for histological analysis with the following results:

1 or 2 histological samples were prepared from the tissue fixed samples provided from Greece by Dr. Anastasia Komnenou.

Heart:
Sample 1) and Sample 2): Midsize vessels and capillary congestion. Hiper-eosinophilc miofibers with fragmentation. Interfibrillary edema.

Lung:

Sample 1) Diffuse interstitial congestion with atelectatic areas and alveolar hemorrhages and likely intravascular ("gas or fat emboli"). Subcapsular emphysema as well as emphymatous pulmonary areas.
Sample 2) Idem, plus subepitelial emphysema and lymphatic dilatation consistent with a interstitial emphysema. And intravascular gas emboli. Alveolar edema.

Kidney:
Sample 1) Parasitic granulomatous Nephritis by *Crassicauda sp.* Interstitial and tubular degeneration in medullar areas of some reniculi.

Liver:
Sample 1) Moderate centrilobular congestion. Intracelular (macrophages) melanosis like around the vesses and portal areas (seen in old animals). Moderate hiperplasia of Ito cells and evident kupffer cells.

Pancreas:
Sample 1) No cyto-histological lesions observed in a well preserved exo and endocrine pancreas.

Stomach (glandular stomach):
Sample 1) Moderate congestion in the submucosal vessels and eosinophilic arteritis in midsize vessels.

Lymph node:
Sample 1) Congestion and reabsorption of blood with presence of reabsorbed gas in the cortical lymph node area. Fat embolism should be ruled out histochemically.

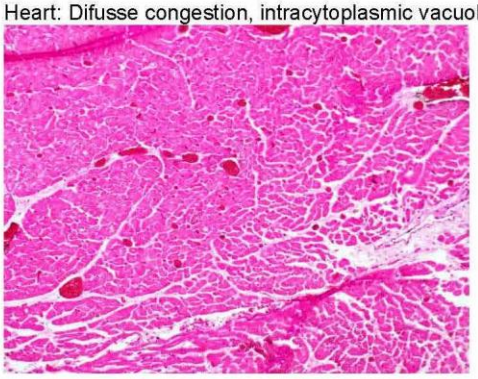
Three other tissue samples were submitted as brain, **but they were not nervous tissue,** but fibro-vascular and fibromuscular with adipose tissue showing some multifocal hemorrhages.
MISSED important organs: Brain would be of great help to approach a diagnosis and a better complete view of stranding and death. Also, more samples of lung, and also additional tissues like spleen, abdominal lymph nodes, aorta,

mesenteric arteries, urinary bladder and reproductive tract would have been necessary for a better histological study.

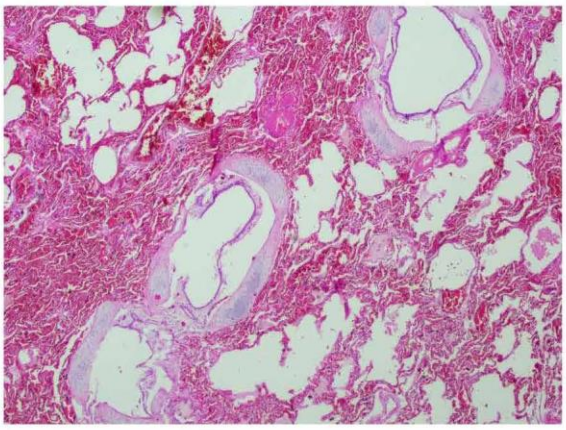
The histological observations described here are not specifically any concrete pathological entity or disease, however, these **histological observations** together with the **strandings**, the **gross observations done during the necropsies** (in necropsy report) can fit (partially), (as histologically not all tissues were analyzed) with the pathology observed in beaked whales stranded temporally and spatially related to acoustic (Mid-frequency antisubmarine sonar) activities (see corresponding literature in the references).

Histological Pictures:

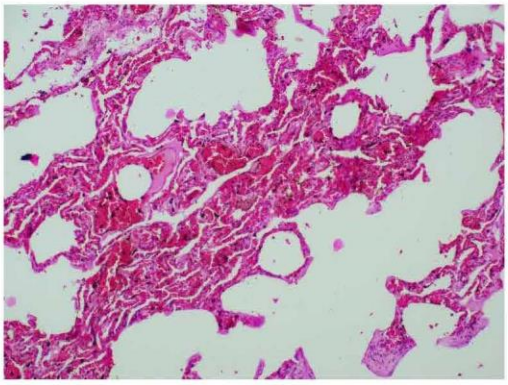
Heart: Difusse congestion, intracytoplasmic vacuoles.



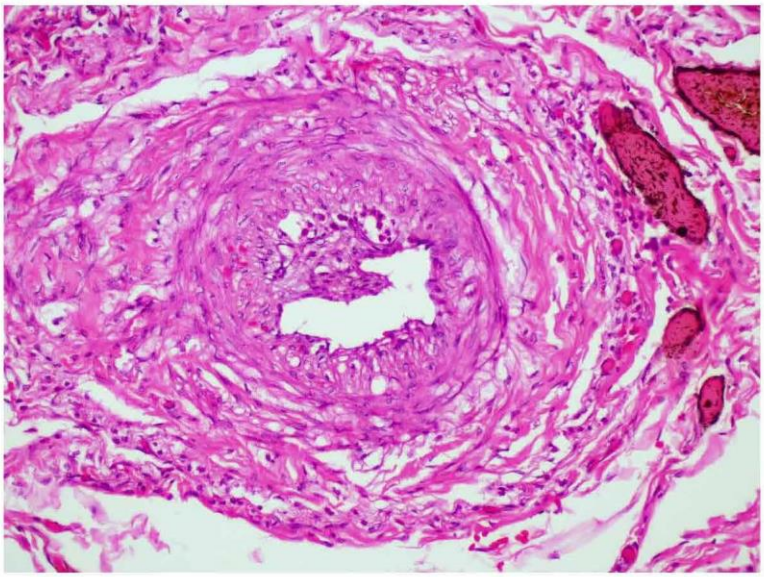
Lung: Emphysematous subepithelial in bronchii, emphysemoatous areas and atelectatic areas, alveolar proteinaceus edema.



Lung: intravascular “gas bubbles”. Emphysema and atelectasia associated with inter-alveolar congestion.

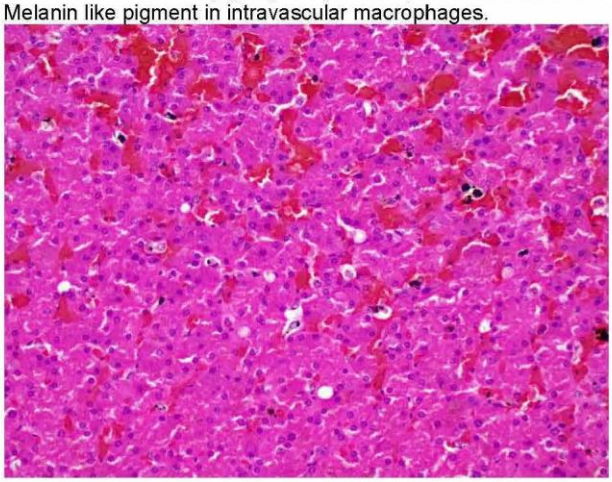


Stomach: Midsize artery in the stomach wall (eosinophilic endoarteritis).

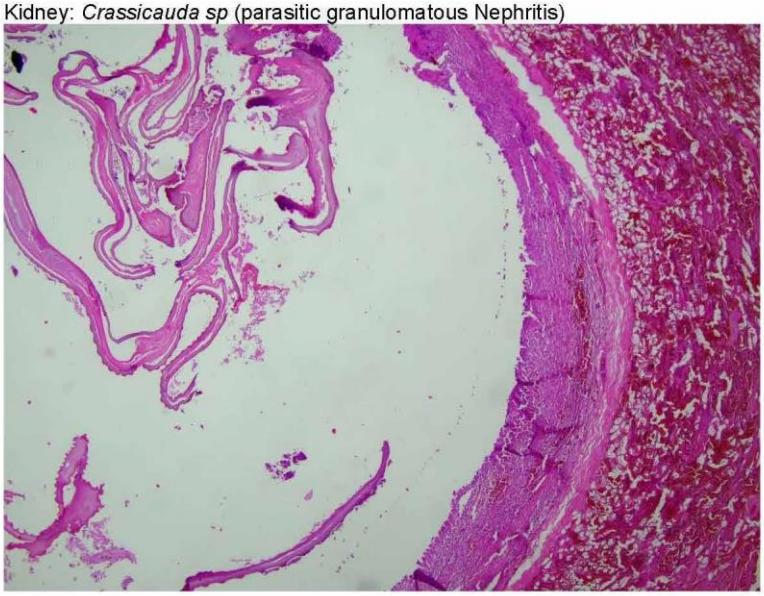


4

Liver: Visible Ito cells (hyperplasia) and Kupffer cells and sinusoidal congestion. Melanin like pigment in intravascular macrophages.



Kidney: *Crassicauda sp* (parasitic granulomatous Nephritis)



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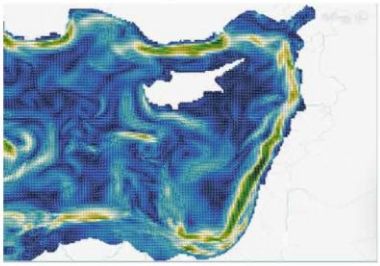
Annex V. NAVigational TEleX (NAVTEX) issued by the Republic of Cyprus, that were in effect for the period 01/01/2023 until 31/01/2023 and from 01/02/2023 until 16/02/2023 in the Cyprus Navtex service area.
(All NAVTEX available from: https://jrcc-cyprus.mod.gov.cy/mod/cjrcc.nsf/page44_en/page44_en?OpenDocument)

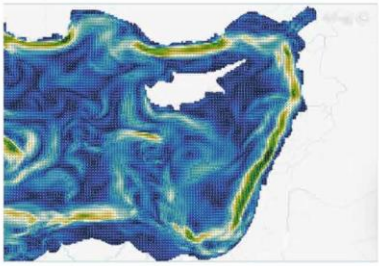
JANUARY 2023																														
NAVTEX no & Activity		01/01	02/01	03/01	04/01	05/01	06/01	07/01	08/01	09/01	10/01	11/01	12/01	13/01	14/01	15/01	16/01	17/01	18/01	19/01	20/01	21/01	22/01	23/01	24/01	25/01	26/01	27/01	28/01	29/01	30/01	31/01
47	Navy gun firing																									X						
50	Russian navy exercise (with firing)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
51					X					X				X											X							X
52			X	X			X	X			X		X	X			X			X	X				X	X					X	X
53							X											X				X										X
58	Akrotiri Firing practice									X	X		X	X																		
94																															X	

FEBRUARY 2023																		
NAVTEX no & Activity		01/02	02/02	03/02	04/02	05/02	06/02	07/02	08/02	09/02	10/02	11/02	12/02	13/02	14/02	15/02	16/02
66	Gun firing							X	X	X							
66														X	X	X	
79	Navy gun firing			X													
80											X						
82			X	X	X	X											
88	Russian navy exercise (with firing)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
89						X	X	X	X	X	X			X			
94	Akrotiri Firing practice	X	X	X			X	X	X	X	X		X				
96	Lebanese navy exercise (with firing)									X	X	X	X	X	X	X	X
98	Cape Pyla Firing practice								X	X	X						
01															X	X	X
02	Akrotiri Firing practice													X	X	X	X
03	Multinational exercise													X			
06	Environmental survey S/V VOS PURPOSE															X	X

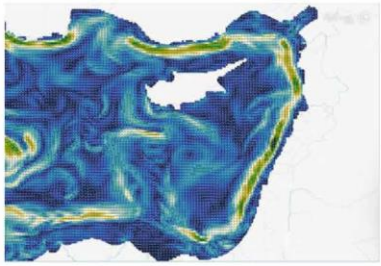
Annex VI. Daily mean ocean currents at the surface (0m), 100m, and 500m depth around Cyprus between 08 and 10 February 2023. Data from the Copernicus Mediterranean Sea Physics Analysis and Forecast.



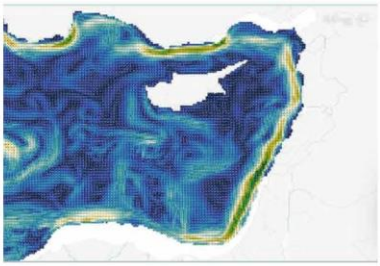
Daily mean ocean currents at surface (0m) on 2023-02-08



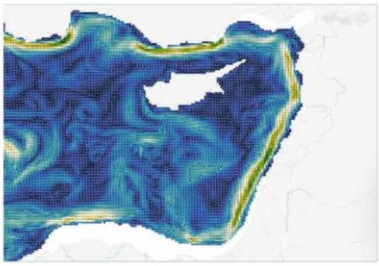
Daily mean ocean currents at surface (0m) on 2023-02-09



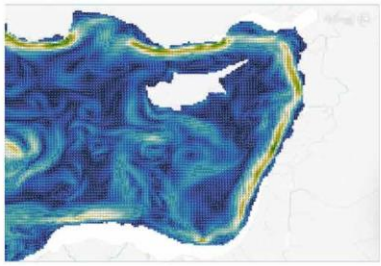
Daily mean ocean currents at surface (0m) on 2023-02-10



Daily mean ocean currents at 100m on 2023-02-08



Daily mean ocean currents at 100m on 2023-02-09



Daily mean ocean currents at 100m on 2023-02-10

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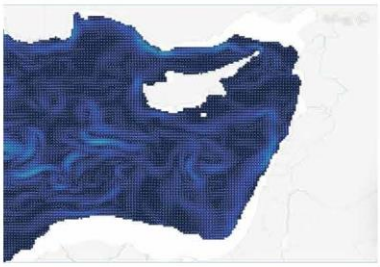
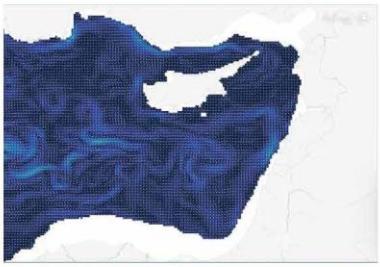
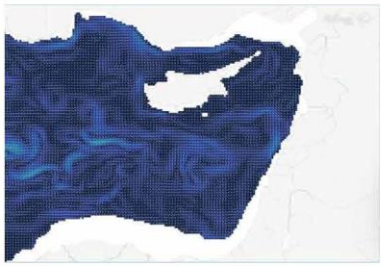


Daily mean ocean currents at 500m on 2023-02-08



Daily mean ocean currents at 500m on 2023-02-09



Daily mean ocean currents at 500m on 2023-02-10

35

ANNEX 3

UNUSUAL STRANDING EVENTS COMMUNICATED BY MOROCCO IN JANUARY 2024

From 7 January 2024 to 22 January 2024, five unusual stranding of whales have occurred in the areas identified below, according to information received from INRH experts in Morocco:

- one *Balaenoptera acutorostrata* **(1)**
- two *Balaenoptera physalus* **(2 & 3)**
- two *Megaptera novaeangliae* **(4 & 5)**

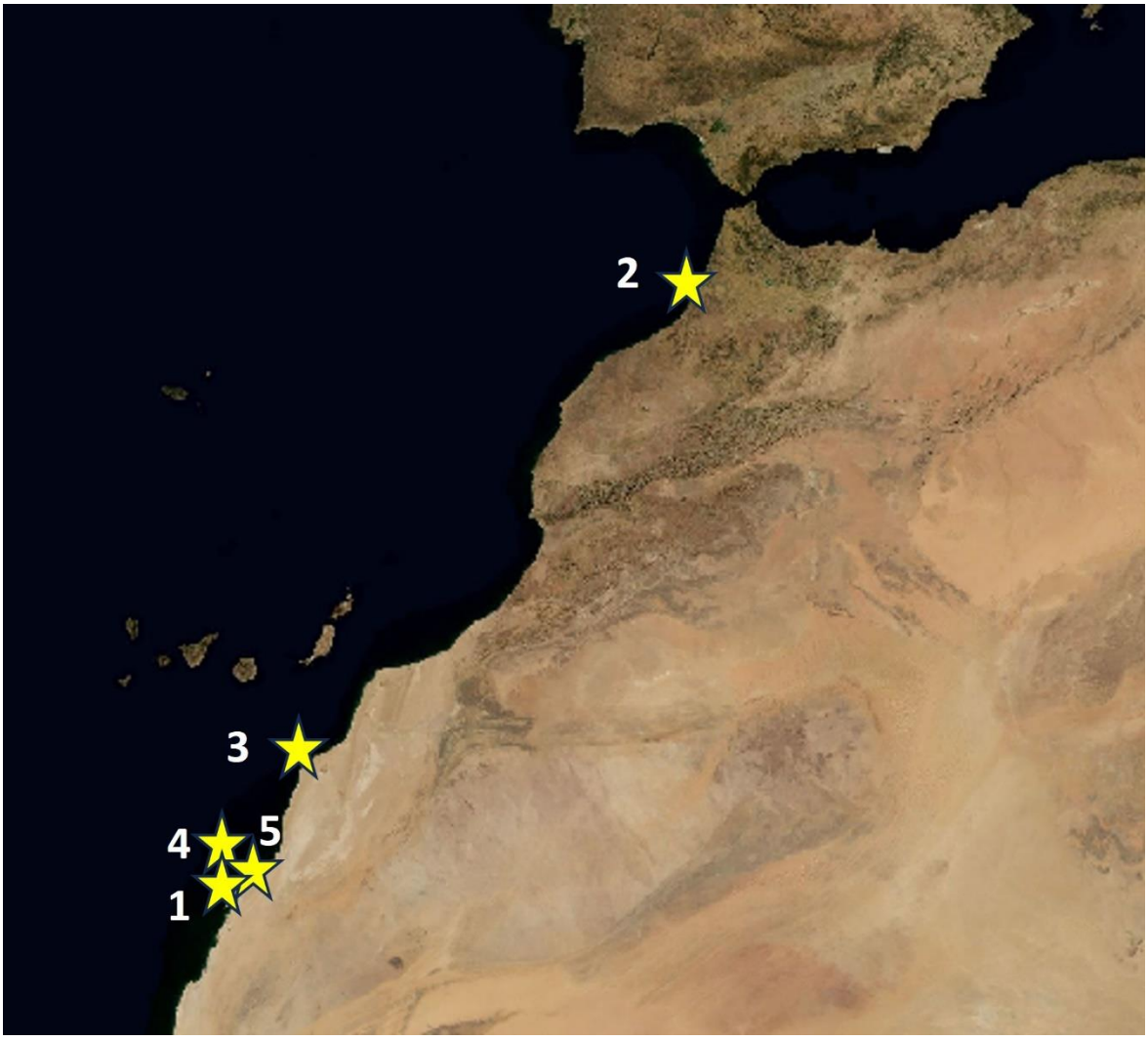


Figure 1- Unusual strandings of whales occurred between 7 January 2024 to 22 January 2024

The information in this document was provided to the ACCOBAMS Secretariat by INRH experts in Morocco and should not be disseminated without their previous consent.

1/ Stranding of *Balaenoptera acutorostrata*

Location

23°55'20.3"N 15°48'15.9"W

Pointe de l'Or

https://goo.gl/maps/QJoTuPMQ8nC8uKbS6

Dakhla area

Date

22 January 2024 – 15h30

Photos

2/ Stranding of *Balaenoptera physalus - 17,60 meters*

Location

34°15'59.1"N 6°40'27.2"W

Chlihat beach in Kenitra

https://www.google.com/maps/place/34%C2%B015'59.1%22N+6%C2%B040'27.2%22W/@34.2664185,-6.6767826,17z/data=!3m1!4b1!4m4!3m3!8m2!3d34.2664185!4d-6.6742077?hl=fr&entry=ttu

Date

21 January 2024

Photos

Comments :

Telenecropsy proceeded on 21 & 22 January by INRH experts with the assistance of Thierry Jauniaux & Etienne Levy

3/ Stranding of *Balaenoptera physalus – Length: 23 meters*

Location

Boujdour near Laayoune

Date

19 January 2024

Photos

Comments :

INRH experts were not able to collect samples. Carcass was destroyed by national authorities.

4/ Stranding of *Megaptera novaeangliae* – Length: 8 meters

Location
22 33 12N- 016 22 43W
South of the Bay of Cientra

Date
16 January 2024

Photos

Comments : INRH experts were not able to collect samples. Carcass was destroyed by national authorities.

5/ Stranding of *Megaptera novaeangliae* – 4,5 meters

Location

23°45'49.6"N 15°55'18.2"W

https://www.google.com/maps/place/23%C2%B045'49.6%22N+15%C2%B055'18.2%22W/@23.7637768,-15.9242906,17z/data=!3m1!4b1!4m4!3m3!8m2!3d23.7637768!4d-15.9217157?hl=fr&entry=ttu

Oum Labouir beach in Dakhla

Date

7 January 2024

Photos

ANNEX 4

I N R H المعهد الوطني للبحث في الصيد البحري Institut National de Recherche Halieutique	**INSTITUT NATIONAL DE RECHERCHE HALIEUTIQUE**	**Réf :** C20240120

Translation of the initial report in French

Necropsy report

General information:

First report of the stranding: January 20, 2024

First constatation by local stranding coordinator: January 21, 17.30

Necropsy : January, 22 2024, 16 h

Location : Chlihat/ Kenitra, 34°15'59.1"N 6°40'27.2"W

Reported by : Brigade de la Gendarmerie Royale de l'environnement de Kenitra

Species: fin whale (*Balaenoptera physalus*)

Gender: Female

Total length: 17,60 m

Historic :

On January 20 (17.30), a fin whale was observed stranded on Chlihat beach (Kenitra area, Morrocco, figure 1). On January 21, a team of scientists of the l'*Institut National de Recherche Halieutique* (INRH) of Casablanca initiated the first steps of the intervention. The procedure was postponed up to January 22 for tidal and technical reasons. The intervention was reinforced by the presence of scientists including veterinarians of INRH of the aquatic animals pathology center of Tangier, allowing a partial necropsy of the whale.

The *Gendarmerie Royale* and local authorities were responsible for security. For tidal and light reasons, the necropsy occurred between 16.00 and 18.00 (Figure 2). Remote distance necropsy (telenecropsy) was organized with experts of ACCOBAMS (ACCOBAMS telenecropsy project).

Figure 1 : Stranding place on the Moroccan Atlantic coast.

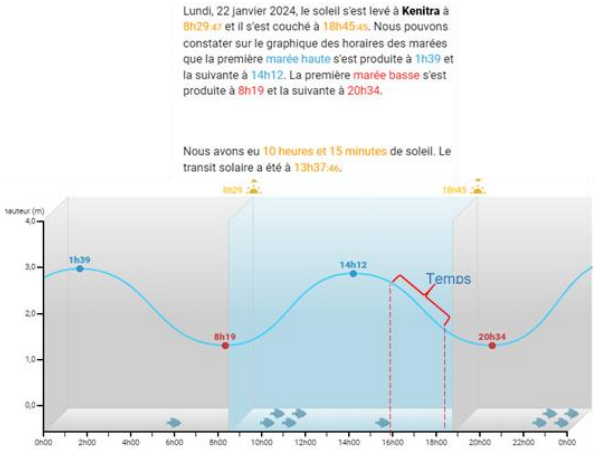


Figure 2 : Local tidal and light condition.

On site observations:

The DCC was 3 with moderate bloating and skin peeling.

The animal was emaciated with extended skin parasite infestation (picture 1).

Cutaneous lacerations dorsally, laterally and on the caudal fluke.

Presence of hematoma on the animal left side and on caudal fluke.

Gastro-intestinal tract was empty of alimentary content with evidence of gastritis and enteritis.

Kidney severely congested.

The necropsy was limited for light and tidal reasons. Another reason was technical with limited availability of the heavy equipment. Those reasons and the post-mortem putrefaction process impaired the examination of the other organs.

Sampling

Samples	Conservation	Analyse envisagée
Parasite	Ethanol 70°	
Skin	Aluminium	-
Intestine	Formol 10%	Histology
Stomach	Formol 10%	Histology
Kidney	Formol 10%	Histology/Microbiology
Heart	Formol 10%	HistologyFrozen
Intestinal content	Frozen	-

First resultats:

- Kidney : Suspicion of *Vibrio harveyi* presence, should be confirmed.

- Histology : under process.

- Skin parasite *Pennella* pressumaly *P. balaenopterae* (photo 3).

Acknowledgments :

- Local authorities ;
- *Brigade de la Gendarmerie Royale de l'environnement* of Kénitra,
- ACCOBAMS Secretariat and experts
- Local scientists (INRH, Casablanca, INRH-CSPAA,Tanger)

Casablanca INRH	Imane Tai : Biologist
	Ahmed EL Asri : Technician
	Rachid Errouagui : Technician
Tanger INRH, Center for Aquatic Animals Pathology	Abderrahim Chiaar : Veterinarian in charge of pathology
	Jamila Khribch : Veterinarian
	ChErkaoui Rachid : Microbiologist
	Jalila Lioubi : PhD student
	Chaimaa Rhattas : PhD student
ACCOBAMS experts	Thierry Jauniaux Etienne Levy

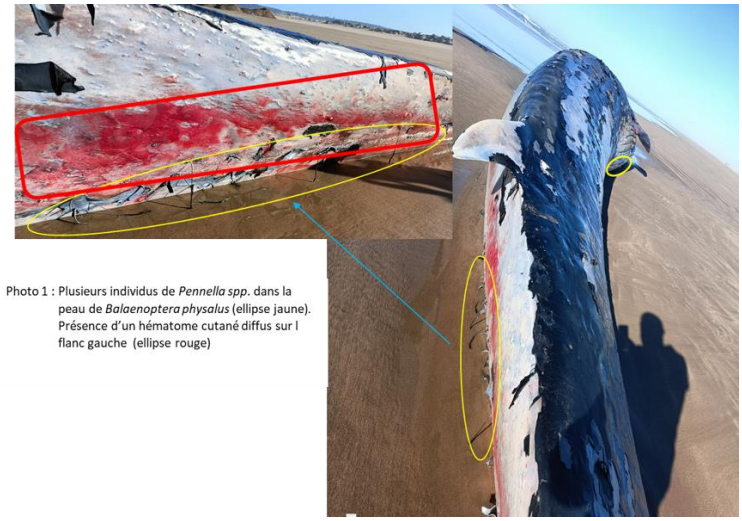
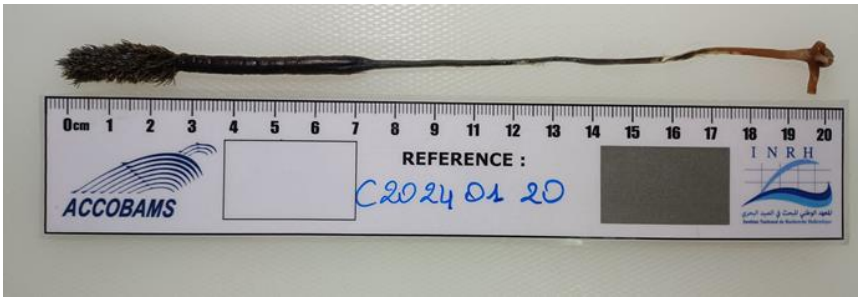


Photo 1 : Plusieurs individus de *Pennella spp*. dans la peau de *Balaenoptera physalus* (ellipse jaune). Présence d'un hématome cutané diffus sur l flanc gauche (ellipse rouge)

Picture 2 : green color of subcutaneous tissue and muscle



Picture 3 : *Pennella balaenopterae* of the skin