

Institute of Veterinary, Animal and Biomedical Sciences

PATHOLOGY REPORT

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TO: Department of Conservation
Golden Bay

Species: Cetacean	Sex: Female	Age: Adult	Breed: Pilot Whale
ID: Pilot Whale #4	At Risk:	Affected:	Dead:
Owner: Department of Conservation	Prev. Accn.:	Type: Post Mortem	

HISTORY

Multiple pilot whales (~8) that died sometime over night Monday/early Tuesday morning (13-14th January) were too autolysed to necropsy. These were a mixture of adult males and females.

A further 8 pilot whales were euthanased on the Thursday morning (~ 8.20am 16th January) due to restrandings, each with a gunshot wound to the head. Six of these animals were necropsied, one on the afternoon of the 16th and a further five on the morning-early afternoon of the 17th. Time restraints meant two of the eight whales could not be necropsied. The remaining pilot whales (~50) were refloated.

GROSS FINDINGS

This was an adult, pregnant female in fairly good body condition, with good skeletal muscle (hypaxial and epaxial) mass. The only external abnormality noted was a single gunshot entry wound just caudal to the blowhole.

- Body length: 4380mm
- Dorsal (axillary) blubber depth: 40mm
- Ventral (axillary) blubber depth: 33mm
- Lateral (axillary) blubber depth: 25mm

Small numbers (less than 10-15) cestode larvae (*Phyllobothrium* or *Monorygma* spp) were present in the blubber layer. No obvious anatomical distribution was noted.

No reddening or haemorrhage was observed in the extra- or intramandibular fat or in the melon.

A large amount of white foamy fluid was present in the trachea (distal to the larynx) and intrapulmonary bronchi. The parenchyma was diffusely deep red and oozed a large amount of foamy white fluid from the cut surface.

In the mucosa of the glandular portion of the stomach were two discrete areas of ulceration; the ulcerated areas were approximately 30mm in diameter and each had thick (~20-30mm), firm, raised but smooth margin. There was patchy reddening (hyperaemia) of the glandular mucosa. There was a mild nematode (likely an *Anasakis* spp.) burden in the glandular portion of the stomach; nematodes measured up to 40mm in length but were not associated with areas of ulceration. Small amounts of sand were present in both the glandular and squamous chambers of the stomach as were small numbers of squid beaks, otoliths and small fish vertebrae.

Extensive areas of the small intestinal mesentery contained petechial and ecchymotic haemorrhages.

The left uterine horn contained a foetus (190mm in length) as well as the extra-embryonic membranes and associated clear fluids. The left ovary contained a ~60mm in diameter corpus luteum and a single corpora albicans. The right ovary contained three corpora albicantiae.

No other abnormalities were noted on gross post mortem.

HISTOPATHOLOGY

- Lung: there is marked congestion and scattered intra-alveolar haemorrhage. Multiple bronchi and alveolar spaces contain variable amounts of pale eosinophilic granular material admixed with small numbers of macrophages with moderate amounts of finely vacuolated cytoplasm.
- Heart: cardiomyocytes demonstrate mild to moderate anisokaryosis.
- Liver: most hepatocytes contain small amounts granular golden brown intracytoplasmic pigment, likely iron (in the form of haemosiderin) and/or lipofuscin.
- Spleen: there is moderate congestion.
- Kidney: there is marked congestion.
- Sections of skeletal muscle and adrenal gland show no obvious abnormalities.

DIAGNOSIS

No obvious cause of stranding, cause of death- euthanasia via gunshot.

COMMENTS

This was an adult, pregnant female in good body condition.

There was a moderate gastrointestinal and mild integumentary (skin and blubber) parasite burden which is common in free-living cetaceans and is not an indication of a diseased animal (however, parasite burdens tend to increase to large numbers in individual animals with underlying disease).

Nematodes were present in the glandular portion of the stomach. Several gastric ulcers were also present in the glandular portion of the stomach. At gross post mortem, the ulcers had a thick and possibly fibrotic (scarring) margin indicating a degree of chronicity, thus these ulcers may not necessarily be related to the stranding event.

This animal and the other five pilot whales all had several ulcers in their stomachs, not all of which were associated with the presence of gastric nematodes. However, histological exam of the stomach from the pilot whale 50447 showed multiple cross sections of nematodes within the wall as well as a robust inflammatory response, indicating the presence of these parasites is causing damage (ulceration) to the stomach.

Apart from a small numbers of squid beaks, there were no other ingesta within the stomach indicating this whale had not eaten for several days.

There was severe pulmonary oedema and congestion of the lung; this is likely due to the stress of stranding and progressive shock as blood starts to pool in the lungs and the cardiovascular system starts to shut down. This results in fluid from the bloodstream (minus the red blood cells) being squeezed/forced out into the small airways of the lung. This fluid then mixes with the small amount of fluid normally present in the lung (this is called surfactant) and the result in the formation of white frothy/foamy fluid and this is termed pulmonary oedema. This will prevent proper oxygen and carbon dioxide exchange in the lung. Histology of the lung confirms the presence of proteinaceous fluid within the bronchi and alveolar spaces. The fluid is accompanied by foamy alveolar macrophages (these cells try to eliminate some of this excess fluid) indicating the fluid has likely been building up over the last 24 hours or so.

There was no obvious cause of stranding with the immediate cause of death due to humane euthanasia via gunshot.

An index of suspicion of sonar or seismic injury in cetaceans relies on examination of the brain, meninges (the thin connective tissue lining of the brain) and acoustic structures of the head (the include acoustic fat, air sinuses and the ear). Findings can be subtle, such as small haemorrhages and blood clots in the acoustic fat, brain/meninges or air-sinuses; these changes are suggestive but not conclusive proof of sonar or seismic injury.

Other findings reported in affected cetaceans include gas and fat emboli in the brain and acoustic structures. It has been suggested that following exposure to sonar or seismic activity, affected cetaceans undergo a rapid ascent from a deep dive and suffer a form of decompression sickness (the "bends"). It is thought that fat and gas are then forced into the bloodstream (called emboli) and travel down smaller branches of the bloodstream until they become trapped. Generally these emboli are very small and seldom seen with the naked eye.

Detection of these subtle changes requires a combination of special imaging (MRI, CT scanning) and detailed dissection and examination of the brain and other structures of the head as well as microscopic examination of the aforementioned. These subtle changes can also be obscured by post mortem decomposition. Cetaceans, having a thick layer of insulating blubber undergo post mortem decomposition very quickly which is accelerated in warm summer conditions.

Unfortunately, due to a combination of logistics, limited time, post mortem decomposition and damage to the brain via gunshot, a more thorough search for indicators of seismic or sonar injury could not be undertaken in this, the other five whales that were necropsied or the eight or so whales that died of their own accord.

Histological exam of multiple internal organs did not show any obvious evidence of underlying disease that may have caused or contributed to the stranding.

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