

Why did they die? Exploring the primary cause of death and reviewing anatomy in petrel species admitted to BirdCare Aotearoa in Auckland.

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Aotearoa is a seabird hotspot having over ¼ of the world seabird species. The Hauraki Gulf adjacent to Auckland, Aotearoa's largest city, is home to ~26 different seabird species. Many seabirds have specialised sensory features such as the petrels and shearwaters which have an acute sense of smell and vision. Their sensory features are well adapted to their environment enabling them to forage, find mates and avoid predations. Sadly, seabirds are some of the most at risk group of animals. According to the IUCN, many seabirds are experiencing population declines being affected by a plethora of anthropogenic activities including fishing vessels, plastic ingestion and light pollution. Many of these threats could have a sensory aspect which affected the seabirds. For example, it is theorized that seabirds mistake city lights for bioluminescent prey or possibly the celestial bodies as a navigational aid.

Since January 2018 over 500 individual seabirds have been brought to BirdCare Aotearoa, an avian rehabilitation centre. Some of these seabirds died of unknown causes. It is crucial to understand why/how these seabirds died to try to reduce it. The present project reviewed the cause of death and anatomy of 28 individual seabirds from over 10 species includingy Cook's petrels/Tītī (*Pterodroma cookii*), Buller's shearwater/Rako (*Ardenna bulleri*), fluttering shearwaters/Pakahā (*Puffinus gavia*), grey-faced petrels/Ōi (*Pterodroma gouldi*), white-faced storm petrels/Takahikare (*Pelagodroma marina*) and fairy prions/Tītī wainui (*Pachyptila turtur*).

Necropsies of the deceased seabirds were performed from January-May 2022. We used a standard protocol involving assessing the overall body score condition, and checking for wounds, fractures and dislocations. We proceeded to dissect the seabirds, identifying sex and age group. We also checked for plastics or parasites in the gut. We also conducted morphometric measurements i.e. wing length, leg length, skull dimensions and measured their sensory feature e.g. eyeball volume and the brain's optic tectum and olfactory bulb.

Head trauma was the most common cause of death followed by internal haemorrhaging or a combination of both. This is consistent with injuries caused due to groundings or collisions with buildings. Many of the seabirds examined were fledgling Cook's petrels. Potentially, these seabirds were disorientated and grounded by light pollution, resulting fatal physical injuries.

Most of the seabirds were males resulting in a sex bias in groundings and/or survival rates. More research is required to identify if only males are flying over Auckland or if males have a difference in their sense of vision attributing to a greater chance of attraction and/or disorientation by lights compared to females. Also, micro plastic was found in the seabirds some seabirds. This is potentially from secondary ingestion in which the seabird's prey items had ingested the plastic.

We thank BirdsNZ for providing us with the grant to perform these necropsies to understand the cause of death of seabirds brought into BirdCare Aotearoa. This research helped provide much needed evidence of the potentially fatal and traumatic effects which light pollution as on our seabirds in Auckland. Additionally, it helped support the need for a change to Auckland city lights to conserve Aotearoa's vulnerable seabirds.



Image 1: Cook's petrel necropsies being performed by Agustina Dominguez (right) and Ariel-Micaiah Heswall (left).