New Zealand Cetacean Tissue Archive July 2021 - June 2022: Final Report

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Introduction & methods

The New Zealand Cetacean Tissue Archive (NZCeTA) is a collection of national significance and the second largest collection of its kind in the world. It is curated at the University of Auckland – Waipapa Taumata Rau (UoA) by Emma Carroll and Rochelle Constantine and holds specimens from 36 species of whale, dolphin and porpoise that have been found beach-cast around the coastline. Samples are primarily collected at the stranding location where mana whenua and the Department of Conservation – Te Papa Atawhai (DOC) agree upon sample collection that the tissue will be curated in the archive. Occasionally samples are provided by Massey University as part of their necropsy protocols.

Samples are either posted or sent via courier to the UoA where we enter a 'U-code' which signals that the sample is genetically 'unknown' i.e., we have not extracted DNA from the sample yet. The samples are typically accompanied by the DOC stranding datasheet and sometimes photographs and location maps. These are very helpful for keeping track of specimens.

The sample is labelled, then stored for curation, the data are entered into the database and the DOC stranding sheet is labelled with the same code and put into a folder for reference. When a sample is needed for genetic analysis – typically undertaken at UoA, or for other research projects by other institutes (where DOC gives permission for the project), a small piece of tissue is sub-sampled for the research with the intention that there will always be residual sampel for future work. If the sub-sample goes to another institution, we request that any material left over be returned to the archive for future use.

This report summarises the samples provided to the NZCeTA from July 2021 to June 2022. We do not undertake DNA extraction from all samples received as this is financially not possible, but we do analyse tissue samples as part of dedicated research projects, or if there is a specimen of interest to mana whenua or DOC.

Results & discussion

From July 2021 to June 2022, a total of 87 small tissue samples from 15 species of whale or dolphin (plus one yet to be determined species of baleen whale) were catalogued in the NZCeTA (Table 1). There were 36 pilot whales which included two mass-strandings; 29 animals from Farewell Spit and six animals from the Chatham Islands. There were a few unusual events with two live strandings, an Arnoux's beaked whale and a southern bottlenose whale. See attached file with summary of stranding information 'Summary of Samples Received'.

Table 1. Species of whale and dolphin and number of tissue samples per species received in the NZCeTA July 2021 to June 2022.

Species	Common name	Total number (N = 87)
Megaptera novaeangliae	Humpback whale	1
Balaenoptera acutorostrata	Minke whale	1
Balaenoptera brydei	Brydes whale	1
Balaenoptera physalus	Fin whale	1
Berardius arnuxii	Arnoux's beaked whale	1
Cephalorhynchus hectori	Hector's dolphin	9 (incl. 1 from 2019)
Delphinus delphis	Common dolphin	10
Globicephala melas	Pilot whale	36 (mass strandings 29 & 6)
Hyperoodon planifrons	Southern bottlenose whale	1
Kogia breviceps	pygmy sperm whale	9
Lagenorhynchus obscurus	Dusky dolphin	3
Mesoplodon bowdoini	Andrews' beaked whale	2
Mesoplodon grayi	Gray's beaked whale	5
Orcinus orca	Killer whale	1
Physeter macrocephalus	sperm whale	5
	Unknown baleen whale	1

Over the past 12 months we have extracted DNA from 185 samples from 12 species with species identification pending for four samples (Table 2). These samples spanned many years of the holdings in the NZCeTA. We are awaiting the final result for the sub-species identification – pygmy or Antarctic blue whale – for two samples and for four 'unknown' samples. It is difficult to determine the sub-species differences for blue whales, making this a large piece of work. Efforts have been primarily focused on the Hector's dolphin samples due to other contracts focused on updating the Hector's dolphin genetic based research and on beaked whale genetics as part of an international research programme co-led by Emma Carroll. An important output from this archive was the description of a new species of beaked whale – Ramari's beaked whale (*Mesoplodon eueu*) with the holotype held in the NZCeTA and the skeleton held at Te Papa Tongarewa (Carroll et al. 2021). See attached file with summary of stranding information 'Summary of DNA Extractions'.

Table 2. Summary of the whale and dolphin tissue samples with DNA extraction and sex identification over the past 12 months. We are awaiting clarification of the blue whale sub-species identification and four unknown specimens.

Species	Common name	Total number (N = 185)
Balaenoptera musculus	Blue whale	2 (pygmy or Antarctic)
Balaenoptera physalus	Fin whale	3
Berardius arnuxii	Arnoux's beaked whale	4
Cephalorhynchus hectori	Hector's dolphin	68
Hyperoodon planifrons	Southern bottlenose whale	1
Mesoplodon bowdoini	Andrews' beaked whale	1
Mesoplodon grayi	Gray's beaked whale	63
Mesoplodon hectori	Hector's beaked whale	1
Mesoplodon layardii	Strap-toothed beaked whale	9
Tasmacetus shepherdi	Shepherd's beaked whale	5
Tursiops truncatus	Bottlenose dolphin	1
Ziphius cavirostris	Cuvier's beaked whale	23
	Unknown	4

We will continue to prioritise the beaked whales, 'unknown' samples and others that may be highlighted by DOC or mana whenua. In addition, we are undertaking a study on the false killer whales and pygmy sperm whale population genetics aiming for completion in 2023. As we provide samples to other research groups, once approved by DOC, we are concerned that there are tissue archives being stored for similar purposes to the NZCeTA (i.e., not for pathology) and on occasion samples and stranding sheets are not coming to the archive.

Finally, we are slowly populating the archive with information about the hapū or iwi where the samples come from. As discussed with Hannah Hendriks (DOC) in some cases, the name is included on the stranding sheet, but if this could become a normal practice by the DOC rangers, this would enable more accurate information to be recorded. This will form part of an ongoing discussion about data sovereignty and to better inform mana whenua and DOC.

Acknowledgements

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References

Carroll, E. et al. (2021) Speciation in the deep: genomics and morphology reveal a new species of beaked whale *Mesoplodon eueu*. *Proceedings of the Royal Society B, 288*: 20211213