

Final Report

Collection and curation of tissue samples from protected fishes and turtles

**Prepared for the Department of Conservation, Conservation
Services Programme INT2021-04**

28 June 2024

Final Report– Collection and curation of tissue samples from protected fishes and turtles

Project Code: INT2021-04

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INT2021-04 Collection and curation of tissue samples from protected fishes and turtles

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INT2021-04 Collection and curation of tissue samples from protected fishes and turtles

Executive Summary

The Protected Species Tissue Archive (Fishes and Turtles) has been held at Tāmaki Paenga Hira Auckland War Memorial Museum since 2021. It ensures appropriate curation of tissue samples obtained from these species, improved visibility of and access to samples by researchers and mana whenua, and is used to track the fate of samples, and scientific research outputs.

A total of 699 samples from 166 individuals of protected fishes and reptiles were curated in the tissue archive during the project (December 2021 – June 2024; Figure 1; Appendix A). Only 16 samples from six individuals were collected by the fisheries observer program. The Department of Conservation is currently working to give fishers authority to collect tissue samples from deceased specimens of fishes and reptiles, for vessels where no observers are onboard, and by doing so hope to significantly increase the sampling effort over time. As a result of the low numbers of samples initially received in this project, a decision was made by the Museum and the DOC Marine Species Manager to instead focus on existing samples held by the Department of Conservation and from Massey University.

During this project two loan requests have been completed in consultation with the DOC Marine Species Manager. One of tissue samples from sharks and rays (3 subsamples) to The University of Otago and the second of leatherback turtles (4 subsamples) to the Australian Museum.

The initial 3-years of the program has been a success over all resulting in 699 tissue vials from 166 individuals. The Archive acts as a central repository for samples and their data that is managed into the long-term. The Protected Species Tissue Archive is an essential tool for ongoing protected species management in both NZ and Internationally. Museums are ideal places for tissue archives, providing greater stability in the long-term care and management of collections. The Archive holds great potential to be expanded to other species groups such as protected and threatened fauna.

Recommendations include continuing and expanding the tissue archive, consolidating all tissue samples currently held by various locations by DOC, and provide for fishers to collect tissue samples from deceased specimens of bycatch protected fishes and reptiles.

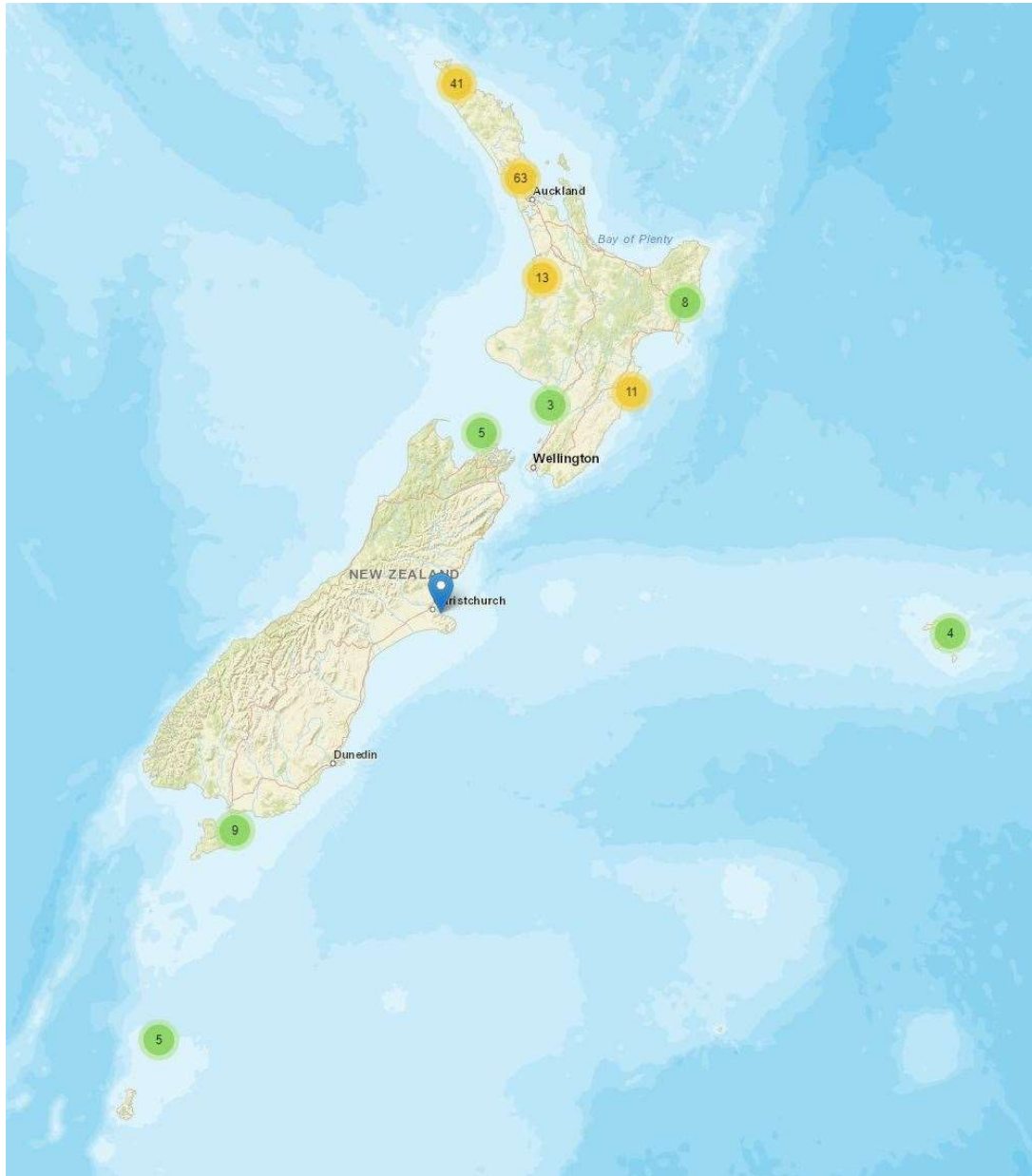


Figure 1. Summary map of collection localities for all individuals of protected turtles and fishes with samples held in the Auckland Museum Tissue Archive, as viewed in the user interface of GEOME. The location is generalised to region with the number of individuals shown in the circle. Blue location points indicate a single sample.

1. Background: Tissue Archive purpose and objectives

The Protected Species Tissue Archive (Fishes and Turtles) is currently held at Tāmaki Paenga Hira Auckland War Memorial Museum and has been running since 2021. The archive began as an extension of DOC CSP project INT2018-04 Improving the collection of data and samples from bycatch basking sharks (Francis 2019, Finucci et al. 2021) and was broadened to include all protected fishes and turtles. It ensures appropriate curation of tissue samples obtained from these species, improved visibility of and access to samples by researchers and mana whenua, and is used to track the fate of samples, and scientific research outputs. The DOC Marine Conservation Services Program provided partial funds for the development which were 100% levied on the commercial fishing industry, maintenance and use of the Tissue Archive until mid-2024 with Auckland Museum providing in-kind support through staff time for the development and reporting on the Tissue Archive. This was due to alignment with the advancement of tissue collection development at the museum and the role of Auckland Museum within Aotearoa New Zealand (NZ).

Auckland Museum, and the collections it cares for, have an active role in the research community, receiving and maintaining specimen and tissue collections, making collections digitally available online, and dispensing loans and samples.

The Museum continues to actively develop its tissue holdings alongside the Protected Species Tissue Archive to support the growing interest in biodiversity genomics and other forms of sub-organismal molecular investigation. Our procedures are continually improved to ensure they follow best practice, and our vision includes supporting the research scientists and community in transitioning toward ethical research practice that is respectful and inclusive of indigenous communities.

The core role of the Museum is to care for the taonga of NZ in a culturally appropriate way, following best practice methods. The taonga in our care are managed for current and future generations.

Tissue collections, particularly those from protected species, are an invaluable biological resource for current and ongoing scientific research. Many tissues become irreplaceable as populations and distributions continue to decline or, in the worst case, species become extinct. The spatio-temporal collection of tissues from all species, but particularly protected species, allows researchers to carry out work such as tracking declines in genetic diversity, relationships among populations, informing translocation projects or examining changes in diet.

The objectives of the Protected Species Tissue Archive were to:

- 1) Establish a physical archive for tissue samples collected from protected species that meets accepted national and international standards, maximises their scientific value and allows tracking of the samples and the outputs any research using them.

- 2) Coordinate the collection, receipt and curation of tissue samples collected for research by fisheries observers, DOC staff, and collaborating organisations and individuals.
- 3) Increase the visibility of samples to researchers.
- 4) Report on the status and uses of tissues stored in the archive.
- 5) Establish appropriate cultural controls for the storage, use and disposal of tissue samples obtained from taonga species.

2. Results

2.1 Physical archive that maximises scientific value

The Protected Species Tissue Archive at Auckland Museum has been successfully established as part of the tissue collection the museum holds. Management standards for both samples and genetic data were developed to meet international standards.

Data fields within the Museum's collection management system (Vernon) were assessed against the Global Genome Biodiversity Network (GGBN). Data standards and tissue specific fields were developed in conjunction with a working group from the museum and research sector to ensure that the Tissue Archive meets GGBN core standards and to enhance the depth of tissue records within the Vernon database.

All deposited samples have been reboxed into cryo-vials (capable of being stored across standard and ultrafrozen temperatures) in 100% ethanol to reduce DNA degradation. Where large samples were received these were divided between up to three vials to retain a large amount of tissue for future subsampling and to minimise the amount of tissue that goes through a thaw cycle when subsampled.

2.2 Collection and curation of tissue samples collected for research by fisheries observers, DOC staff, and collaborating organisations and individuals.

Tissue Sampling Kits

Consultation with the Fisheries Observer Supervisor, Ministry for Primary Industries (MPI) at the beginning of the project revealed the existing kits developed for sampling basking sharks were not being used by fisheries observers due to the large size (7L) of the containers, which made them impractical to pack into a gear bag to take onboard the fishing vessels. Items not used in the original kits included digital cameras, as observers are provided with photography equipment by MPI.

Existing kits were refurbished to ensure they contained the correct equipment and repacked into smaller containers where necessary. Forty new kits were also made up.

Tissue sampling kits consist of (Fig. 2):

- 16 small plastic vials
- 4 large plastic vials
- 10 small snap lock bags
- 1 alcohol proof pen for labelling vials only

- 1 soft lead pencil
- 1 pair of surgical scissors
- 1 pair of forceps
- 70% alcohol wipes for cleaning scissors and forceps between samples
- Betadine for cleaning scissors and forceps between samples
- Paper labels (preservation quality) for writing unique identifier with lead pencil



Figure 2. Tissue sampling kit contents (labels also supplied)

Additional equipment supplied by MPI to observers utilised in tissue and data collection included:

- Photographic equipment
- At sea observer program datasheets
- Flexi fish mat

Replenishment of existing kits

MPI had an existing stock of 50 tissue sampling kits in circulation and storage. The cost saving arising from the creation of new kits was used to replenish all 50 existing kits. These kits were originally housed in 1L plastic containers with a slip-on lid. These lids were regularly taped on to prevent them falling off. We have supplied new, slightly larger containers with clip on lids to allow for the addition of 4 larger vials and to prevent kits falling open.

Protocols for sample collection, data checking and deposit with Auckland Museum were established in consultation with the Fisheries Observer Supervisor (MPI) and the Department of Conservation (DOC). The Fisheries Observer Supervisor would receive the tissues from the program, check the data against that recorded in the observer program database, and then dispatch the samples, data and images to Auckland Museum.

A sample submission spreadsheet and data collection protocol were provided to MPI, DOC staff and researchers to ensure the recording of all applicable information from each sample (Appendix B). These submission sheets have been successfully utilised and samples integrated into the archive.

Six tissue sampling kits were provided to the DOC Marine Species Manager for distribution. Instructions for sample/data collection were also provided to a number of DOC staff in different regions of NZ.

All tissues deposited in the archive since the project was initiated have been receipted and curated. See Section 3 below and Appendix A for further details.

2.3 Visibility of samples to researchers

Tissue archive samples and associated data are shared with generalised locations on Auckland Museum collections online. The locality has been generalised due to the threatened status of the species involved. Data has also been shared through the web-based Genomic Observatories MetaDatabase (GEOME <http://n2t.net/ark:/21547/Flz2>; Fig.3 and 4), this web-based database makes the Auckland Museum Tissue Archive queryable alongside other global collections. The data will also be shared with GBIF as part of regular Auckland Museum data uploads.

Images associated with the samples in lieu of voucher specimens (when available) are attached to the Vernon database records and maintained within the Auckland Museum servers. These images can be provided to researchers to allow for expert confirmation of species identification and accurate recording of bycatch species.

Information and images are provided to the Marine Species Manager, Department of Conservation and to researchers through direct request with permission sought from MPI to share images collected as part of the fishery observer program.

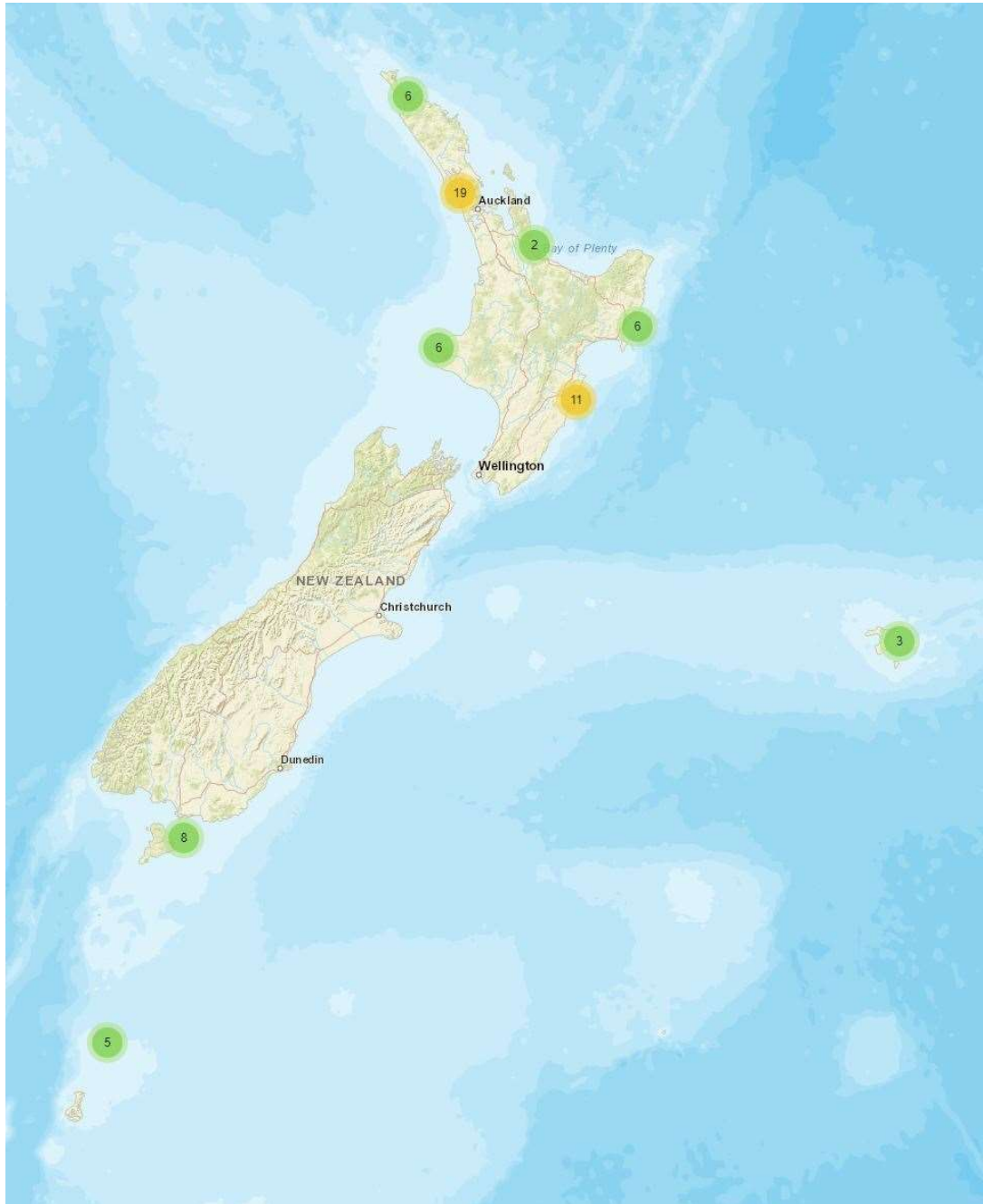


Figure 3. Map of protected fish individuals with samples held in the Auckland Museum Tissue Archive, as viewed in the user interface of GEOME. The location is generalised to region with the number of individuals shown in the circle.



Figure 4. Map of protected turtle individuals with samples held in the Auckland Museum Tissue Archive, as viewed in the user interface of GEOME. The location is generalised to region with the number of individuals shown in the circle. Blue location points indicate a single sample.

2.4 Status and uses of tissues stored in the archive.

All tissues received have been housed in cryo-vials and are stored in absolute ethanol in a -20° Celsius freezer.

During this project two loan requests have been completed in consultation with the DOC Marine Species Manager. One of tissue samples from sharks and rays (3 subsamples) to The University of Otago and the second of leatherback turtles (4 subsamples) to the Australian Museum.

It is anticipated that loan requests will increase both over time and as the Tissue Archive grows with support from DOC. The intention of the archive is that tissues be available for use many decades into the future and not just to support currently known projects.

2.5 Cultural protocols and controls.

In the first two years of the project Dr Libby Liggins and Rebecca Bray engaged with the co-founders of Local Contexts (Prof. Maui Hudson and Prof. Jane Hudson; <https://localcontexts.org/>) and the scientific community both in NZ and internationally to set up a Technical Working Group with the purpose of guiding fit-for-purpose use of the Local Contexts system (Anderson and Christen, 2019) in biodiversity collections, including defining standard fields, and rules for field use, for Traditional Knowledge (TK) and Biocultural (BC) Labels (Anderson and Hudson, 2020) and Notices (Liggins et al. 2021).

In this project we have elected to use the Engagement Notice, “Open to Collaborate”, that affirms that we are committed to the development of new modes of collaboration, engagement, and partnership with Māori for the care and stewardship of past and future collections. We have also applied the Disclosure Notices (“Attribution Incomplete” and “Biocultural Notice”) to acknowledge that the tissue archive currently has incomplete, inaccurate, or missing attribution, and in recognition of the rights of Māori to define the use of these tissues associated with their rohe.

In the Local Contexts Hub, we have created a Project, [Protected Species Tissue Archive – Auckland Museum](#) that holds these Notices, and will record when/if a Māori community places a Label on any part of the collection. This Local Contexts Project interoperates with the project and data in GEOME ensuring that that the Disclosure Notices are visible within GEOME. Record of Notices and Labels can also be applied within the Vernon database using the four Permit fields in GGBN Data Standards. These fields are in a table and allow for the addition of permits and permissions applied directly by iwi in addition to those applied through the Local Contexts system of Notices and Labels.

The data use and loans process for the Threatened Species Tissue Archive involves an ongoing working relationship between the Marine Species Manager (DOC), Auckland Museum staff and the relevant iwi/whanau/hapu. These permissions around samples and data use can be communicated through the cultural permissions process and/or via Traditional Knowledge (TK)

and Biocultural (BC) Labels associated with samples. The latter will be automated in the future through the [Local Contexts Hub](#).

Access to archived samples will be moderated by the Marine Species Manager (DOC), and any identifying iwi/whānau/hapū. Auckland Museum will therefore:

- i) Record rights and permissions where applicable in the Vernon database (including those that hold the relevant Local Contexts project identifier and associated Notices and Labels).
- ii) Liaise with and/or direct researchers to the Marine Species Manager (DOC) and relevant iwi/whānau/hapū regarding requests to loan research material.
- iii) Define conditions of loan (if not stipulated by TK or BC Labels), and researcher reporting requirements (i.e. provision and sharing of data, retention and reporting of Notices/Labels alongside data, metadata, and publications).

Intended future use of the Notices and Labels

As the museum further consults with iwi on the use of cultural permissions and TK/BC Notices and Labels the following process (or adaptation of) will be put in place.

i) tissue samples within a geographic sampling point (scale yet to be determined) will be provided a unique TK Notice and BC Notice generated by the Local Contexts Hub. These Notices signal the indigenous provenance of samples, and the rights of indigenous communities to define the future use of samples and derived benefits. Through the Hub, Notices invite Māori communities to use Labels to define community expectations about appropriate use of biocultural collections and data (see [Local Contexts](#)).

ii) Applied Notices and Labels will be linked to physical samples using the Museum's Vernon database and form part of the metadata updates shared on GEOME.

iii) Annual reports will be provided to DOC on the application TK and BC Notices and Labels, and the Māori communities that have rights and interests in the samples housed in the Protected Species Tissue Archive.

3. Summary of samples

A total of 699 samples from 166 individuals of protected fishes and reptiles were curated in the tissue archive during the project (December 2021 – June 2024; Table 1). Amongst the total include samples collected as part of the POP2021-05 project (Finucci & Maolagáin 2022) provided by NIWA and tissues from 85 turtle individuals donated by Massey University. Only 16 samples from six individuals were collected by the fisheries observer program.

A summary of samples currently held in the Tissue Archive is provided in Appendix A. Detailed locality information has not been included due to the protected status of the species concerned

but can be provided on request. Full data for the samples currently held in the Tissue Archive has been submitted to the DOC Marine Species Manager.

Table 1. Number of individuals for each species deposited in the Protected Species Tissue Archive during the INT2021-04 project. Source of the samples: MPI = Ministry of Primary Industries Observer Program, DOC = Department of Conservation Marine Species Manager, Other = Basking shark tissue from National Institute of Water & Atmospheric Research and Olive Ridley tissue from Auckland Zoo, MU = Massey University.

	Common Name	MPI	DOC	Other	MU	Total
Fishes						
<i>Carcharodon carcharias</i>	White pointer shark	0	60	0	0	60
<i>Cetorhinus maximus</i>	Basking shark	3	0	1	0	4
<i>Mobula birostris</i>	Giant oceanic manta ray	0	2	0	0	2
Total fish individuals						66
Turtles						
<i>Chelonia mydas</i>	Green sea turtle	0	4	0	50	54
<i>Dermochelys coriacea</i>	Leatherback sea turtle	1	1	0	2	4
<i>Eretmochelys imbricata</i>	Hawksbill sea turtle	0	1	0	14	15
<i>Lepidochelys olivacea</i>	Olive Ridley sea turtle	2	4	2	19	27
Total turtle individuals						100
Total individuals		6	72	3	85	166

Turtle Samples – Massey University

Due to the closure of the School of Natural Sciences at Massey University, samples from a large number of turtles collected between (2003 and 2018) were at risk. With the low numbers of tissues received from the observer program a decision was made by the Museum to prioritise accessioning and curating the samples into the Tissue Archive.

Following checks of tissue quality and minimum data standards, samples were retained from 85 turtle individuals and added to the Threatened Species Tissue Archive. For the majority of individuals, samples from multiple tissue types were available (liver, heart, muscle, spleen). Up to three vials from each tissue type was retained to support future research opportunities. Turtle material for some specimens also included humeri, head or in limited cases whole specimens. Where possible these have also been retained and accessioned into the Auckland Museum collections.

4. Future recommendations

- 1) Continue the Protected Species Tissue Archive.** The initial 3-years of the program has been a success over all resulting in 699 tissue vials from 166 individuals. The Archive acts as a central repository for samples and their data that is managed into the long-term. The Protected Species Tissue Archive is an essential tool for ongoing

protected species management in both NZ and Internationally. Museums are ideal places for tissue archives, providing greater stability in the long-term care and management of collections.

2) Consolidate and submit tissue samples currently held by DOC to the Tissue Archive.

From personal communication with DOC staff, there are samples and specimens currently that exist in various DOC offices throughout the country. A dedicated approach from the DOC is required to collate these samples and submit for accessioning into the archive. This will better ensure the longevity of the samples, the curation of the collection data and broader awareness that the samples exist. This may also include specimens that could be offered to the museum

3) Enhance the collection of protected species biological samples by fishers and fisheries observers.

The limited number of tissue samples (six individuals) collected by fishery observers represents a missed opportunity. Tissue samples from deceased bycatch species allow for ongoing genetic monitoring of populations, including estimation of population size, stock structure, inter- and intra-group relatedness, movements and connectivity of populations and identification of source populations (e.g. Pardini et al. 2001; Hoelzel et al. 2006; Gubili et al. 2012; Francis & Ritchie 2016; Corrigan et al. 2018; Hillary et al. 2018; Lieber et al. 2020; Jensen et al. 2022).

4) Expand the Protected Species Tissue Archive (Marine Fauna). With the establishment of the Protected Species tissue archive, storage data standards, and cultural controls, this project could be formally expanded to other marine species groups such as corals.

5. Acknowledgements

We would like to thank all those involved with the establishment and success of this project and the Protected Species Tissue Archive at Auckland Museum including Ricky-Lee Erickson (AM), Clinton Duffy (AM), Tom Trnski (AM), Libby Liggins (University of Auckland), Logan Gibb (MPI) and Karen Middlemiss (DOC). We would also like to thank those researchers, observers, fishers and DOC staff who contributed samples to the archive.

6. References

- Anderson, J., & Christen, K. 2019. Traditional knowledge (TK) Labels. Retrieved from <https://localcontexts.org/tk-labels/>
- Anderson, J., & Hudson, M. 2020. The Biocultural Labels Initiative: Supporting Indigenous rights in data derived from genetic resources. *Biodiversity Information Science and Standards*, 4, e59230. <https://doi.org/10.3897/biss.4.59230>
- Corrigan, S., Lowther, A.D., Beheregaray, L.B., Bruce, B.D., Cliff, G., Duffy, C.A., Foulis, A., Francis, M.P., Goldsworthy, S.D., Hyde, J.R., Jabado, R.W., Kacev, D., Marshall, L., Mucientes, G.R., Naylor, G.P., Pepperell, J.G., Queiroz, N., White, W.T., Wintner, S.P., Rogers, P.J. 2018. Population connectivity of the highly migratory shortfin mako (*Isurus oxyrinchus* Rafinesque 1810) and implications for management in the Southern Hemisphere. *Frontiers in Ecology and Evolution*, 6:187. doi: 10.3389/fevo.2018.00187.
- Finucci, B., Ó Maolagáin, C. 2022. Preliminary age estimation of New Zealand white shark (*Carcharodon carcharias*). POP2021-05 final report by NIWA for Department of Conservation. 50 p.
- Finucci, B.; Pinkerton, M.H.; Sutton, P. 2021. INTP2018-04: Improving the collection of biological data and samples from basking sharks taken as bycatch by commercial fishing vessels. NIWA Client Report 2021110WN. 15 p.
- Francis (2019) Improving the collection of biological data and samples from basking sharks taken as bycatch by commercial fishing vessels. NIWA Client Report 2019345WN.
- Francis M. & Ritchie, P. 2016. Genetic studies of New Zealand's protected fish species 2015/16. Report prepared by NIWA and Victoria University of Wellington for the New Zealand Department of Conservation, Wellington. 33p.
- Gubili, C., Duffy, C.A.J., Cliff, G., Wintner, S.P., Shivji, M., Chapman, D., Bruce, B.D., Martin, A.P., Sims, D.W., Jones, C.S., Noble, L.R. 2012. Application of Molecular Genetics for Conservation of the White Shark, *Carcharodon carcharias*, L. 1758. In Domeier M. L. ed., *Global Perspectives on the Biology and the Life History of the White Shark*. CRC Press, Boca Raton, pp 357-380.
- Hillary, R.M., Bravington, M.V., Patterson, T.A., Grewe, P., Bradford, R., Feutry, P., Gunasekera, R., Peddemors, V., Werry, J., Francis, M.P., Duffy, C.A.J., Bruce, B.D. 2018. Genetic relatedness reveals total population size of white sharks in eastern Australia and New Zealand. *Scientific Reports* 8: 2661. DOI:10.1038/s41598-018-20593-w.
- Hoelzel, A.R., Shivji, M.S., Magnussen, J., Francis, M.P. 2006. Low worldwide genetic diversity in the basking shark (*Cetorhinus maximus*). *Biology Letters*, 2(4): 639–642.

Jensen, M.P., Abreu-Grobois, F.A., Shamblin, B.M., Stewart, K.R., LaCasella, E.L., FitzSimmons, N.N., Dutton, P.H. 2022. Genetic tools for sea turtle conservation. SWOT Report, 17: 17-21.
<https://www.seaturtlestatus.org/articles/genetic-tools-for-sea-turtle-conservation>

Lieber, L., Hall, G., Hall, J., Berrow, S., Johnston, E., Gubili, C., Sarginson, J., Francis, M., Duffy, C., Wintner, S.P., Doherty, P.D., Godley, B.J., Hawkes, L.A., Witt, M.J., Henderson, S.M., Sabata, E., Shivji, M.S., Dawson, D.A., Sims, D.W., Jones, C.S., Noble, L.R. 2020. Spatio-temporal genetic tagging of a cosmopolitan planktivorous shark provides insight to gene flow, temporal variation and site-specific re-encounters. *Scientific Reports*, (2020) 10:1661.
<https://doi.org/10.1038/s41598-020-58086-4>

Liggins, L., Hudson, M., & Anderson J. (2021). Creating space for Indigenous perspectives on access and benefit-sharing: Encouraging researcher use of the Local Contexts Notices. *Molecular Ecology*. 2021;00:1–6. <https://doi.org/10.1111/mec.15918>

Pardini, A.T., Jones, C.S., Noble, L.R., Kreiser, B., Malcolm, H., Bruce, B.D., Stevens, J.D., Cliff, G., Scholl, M.C., Francis, M., Duffy, C.A.J., Martin, A.P. 2001. Sex-biased dispersal of great white sharks. *Nature* 412: 139-140.

Tracey, D., Mills S., Macpherson, D., Thomas, H. (2017). Identification and storage of cold-water coral bycatch specimens. Final Report prepared by NIWA for the Conservation Services Programme, Department of Conservation. INT2015-03. NIWA Client Report 2017349WN. 38 p.

Accession No	Field Coll Date	Taxonomic Classification	Long Name species level	Specimen Category	Storage Method	Other Id	Acquisition Source	Count	Parent/Duplicate
TA000265	25 August 1998	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_18	NIWA	1	parent
TA000266	1 May 1999	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_19	NIWA	1	parent
TA000248	21 February 1993	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_2	NIWA	1	parent
TA000267	1 May 1999	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_20	NIWA	1	duplicate sample
TA000268	16 November 2015	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_21	NIWA	1	parent
TA000269	22 July 2019	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_22	NIWA	1	parent
TA000270	1 August 2005	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_23	NIWA	1	parent
TA000271	18 August 2014	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_24	NIWA	1	parent
TA000272	28 May 2021	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_25	NIWA	1	parent
TA000273	6 July 2020	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_26	NIWA	1	parent
TA000274	29 December 2008	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_27	NIWA	1	parent
TA000275	29 January 2006	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_28	NIWA	1	parent
TA000276	5 February 2006	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_29	NIWA	1	parent
TA000249	23 February 1993	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_3	NIWA	1	parent
TA000277	3 October 1997	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_30	NIWA	1	parent
TA000278	20 December 1999	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_31	NIWA	1	parent
TA000279	9 February 2007	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_32	NIWA	1	parent
TA000280	25 November 2021	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_33	NIWA	1	parent
TA000287	25 November 2021	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_33	NIWA	1	duplicate sample
TA000281	3 October 2000	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_34	NIWA	1	parent
TA000286	3 October 2000	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_34	NIWA	1	duplicate sample
TA000282	2 January 2020	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_35	NIWA	1	parent
TA000283	3 March 2000	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_36	NIWA	1	parent
TA000284	28 September 2004	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_37	NIWA	1	parent
TA000285	28 September 2004	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_37	NIWA	1	duplicate sample
TA000250	8 October 1995	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_4	NIWA	1	parent
TA000251	3 March 2000	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_5	NIWA	1	parent
TA000252	18 September 2005	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_6	NIWA	1	parent
TA000253	20 March 2008	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_7	NIWA	1	parent
TA000254	19 August 1997	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_8	NIWA	1	parent
TA000255	19 October 2006	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen	ururoa_9	NIWA	1	parent
TA000108	19 October 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	parent
TA000384	21 November 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	parent
TA000573	7 March 2020	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	parent
TA001997	15 March 2024	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	parent
TA000109	19 October 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000110	19 October 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000111	19 October 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000112	19 October 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000113	19 October 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000385	21 November 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000386	21 November 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000387	21 November 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000388	21 November 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000389	21 November 2022	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000574	7 March 2020	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000575	7 March 2020	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000576	7 March 2020	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000578	18 December 2017	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000579	18 December 2017	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA001998	15 March 2024	<i>Carcharodon carcharias</i>	White Shark; Mangō Tuatini	tissue	cryovial 1.5mL/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000503	17 October 2022	<i>Cetorhinus maximus</i>	Basking Shark; Reremai	tissue	cryovial 1.5mL/-20° celcius/frozen	6262, 6686/24, 9859	NIWA	1	parent
TA000504	17 October 2022	<i>Cetorhinus maximus</i>	Basking Shark; Reremai	tissue	cryovial 1.5mL/-20° celcius/frozen	6262, 6686/24, 9859	NIWA	1	duplicate sample
TA000505	17 October 2022	<i>Cetorhinus maximus</i>	Basking Shark; Reremai	tissue	cryovial 1.5mL/-20° celcius/frozen	6262, 6686/24, 9859	NIWA	1	duplicate sample
TA000506	17 October 2022	<i>Cetorhinus maximus</i>	Basking Shark; Reremai	tissue	cryovial 1.5mL/-20° celcius/frozen	6262, 6686/24, 9859	NIWA	1	duplicate sample
TA000507	17 October 2022	<i>Cetorhinus maximus</i>	Basking Shark; Reremai	tissue	cryovial 1.5mL/-20° celcius/frozen	6262, 6686/24, 9859	NIWA	1	duplicate sample
TA000508	17 October 2022	<i>Cetorhinus maximus</i>	Basking Shark; Reremai	tissue	cryovial 1.5mL/-20° celcius/frozen	6262, 6686/24, 9859	NIWA	1	duplicate sample
TA000516	8 February 2023	<i>Cetorhinus maximus</i>	Basking Shark; Reremai	tissue	cryovial 1.5mL/-20° celcius/frozen	6756/7, KOSB	Ministry for Primary Industries	1	parent

Accession No	Field Coll Date	Taxonomic Classification	Long Name species level	Specimen Category	Storage Method	Other Id	Acquisition Source	Count	Parent/Duplicate
TA000611	16 August 2023	<i>Lepidochelys olivacea</i>	Olive ridley sea turtle; Pacific ridley sea turtle	tissue	cryovial 1.5ml/-20° celcius/frozen		Department of Conservation	1	parent
TA000612	16 August 2023	<i>Lepidochelys olivacea</i>	Olive ridley sea turtle; Pacific ridley sea turtle	tissue	cryovial 1.5ml/-20° celcius/frozen		Department of Conservation	1	duplicate sample
TA000044	6 March 2019	<i>Mobula birostris</i>	Giant oceanic manta ray	tissue	cryovial 1.5ml/-20° celcius/frozen	Tissue 12	Department of Conservation	1	parent
TA000210	13 November 2019	<i>Mobula birostris</i>	Giant oceanic manta ray	tissue	cryovial 1.5ml/-20° celcius/frozen		Department of Conservation	1	parent
TA000241	13 November 2019	<i>Mobula birostris</i>	Giant oceanic manta ray	tissue	cryovial 1.5ml/-20° celcius/frozen		Department of Conservation	1	duplicate sample

