Migration mysteries

Solving the puzzle of southern right whales' migration

An international team of scientists has joined forces to try to solve the mystery of southern right whale (*Eubalaena australis*) migration paths.

by Dr Emma Carroll, Dr Rob Harcourt, Dr Kate Sprogis, Dr Holly Raudino, Dr Kelly Waples and Dr Sahira Bell

Southern right whales (*Eubalaena australis*) were once known as the 'right whales to hunt' because they were slow, approached boats, swam close to shore and floated when harpooned, but they are now the 'right whales to study'. Southern right whales have been recovering slowly post-whaling both in south-western Australia, where they number several thousand, and in the more precarious south-eastern Australia population, which has only a few hundred. Commonwealth and State governments are joining forces and reviewing the current recovery plan actions to improve the trajectory and conservation status for the species.

One of the key gaps in knowledge remains around how southern right whales move through the Southern Ocean, in particular where they go to feed. This is fairly well known for some other whale species such as the humpback whale (*Megaptera novaeangliae*) that was also decimated by whaling but has since made a recovery more rapidly than the southern right whale. Scientists know southern right whales visit Australian shores in the wintertime to breed and calve but, come summertime, they disperse to deeper waters in the Southern Ocean. Humpback whales similarly migrate through Western Australian waters to breeding grounds along the north-west coast before migrating to Antarctic waters to feed over the summer months. However, scientists remain in the dark about where southern right whales travel to forage and the paths they use to get there. Moreover, there are populations of southern right whales that use New Zealand and its sub-Antarctic islands as calving areas, but it is not known if there is there any connection to the Australian population.

An international research team is joining forces to try to tease apart some of the mysteries of southern right whales across the Southern Ocean. The team includes Macquarie University, the University of Auckland Waipapa Taumata Rau, the University of Western Australia, the WA Department of Biodiversity, Conservation and Attractions (DBCA; Blackwood District, South Coast Region and Marine Science Program), and members of the Large Whale Disentanglement Team.

Previous page
Main Southern right whale (*Eubalaena australis*) underwater view, Nuevo Gulf, Peninsula Valdés, Argentina.

Above Southern right whale and her young calf in the shallow protected waters of the Nuevo Gulf, Peninsula Valdés, Argentina, a UNESCO World Heritage site.
Photos – wildestanimal/Adobe Stock

TOHORĀ WHALE VOYAGES

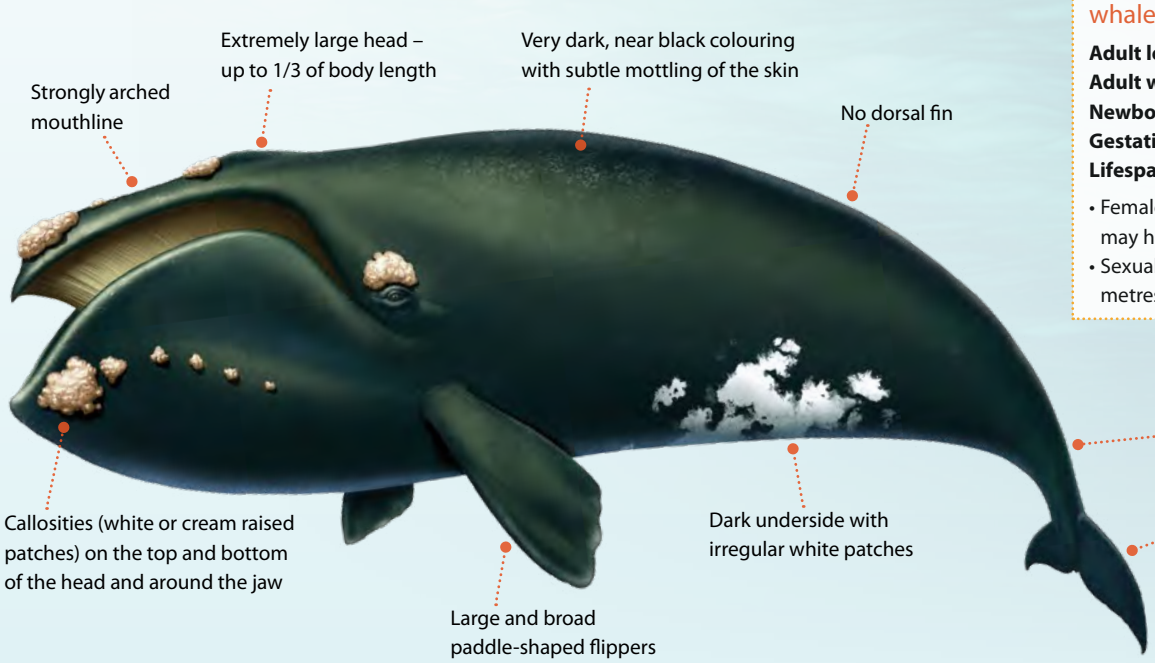
Associate Professor Emma Carroll from the University of Auckland initiated and leads the Tohorā Voyages research project that initially focused on southern right whales (tohorā is Māori for whale) in New Zealand waters. The project has so far included tagging of 25 whales with satellite transmitters in the Auckland Islands over the past three years.

"It's really interesting to see the two mothers that were tagged in July 2022 stayed longer around the islands than the adult other whales, which started migrating into the Southern Ocean after a couple of weeks," Dr Carroll said in September.

"Some of the whales we have tagged off New Zealand are actually going towards the south-west coast of Australia, and so perhaps are mixing with the Australian population."

It was not until late September 2022 that the team saw 'Whitu' an adult male southern right whale, that was tagged

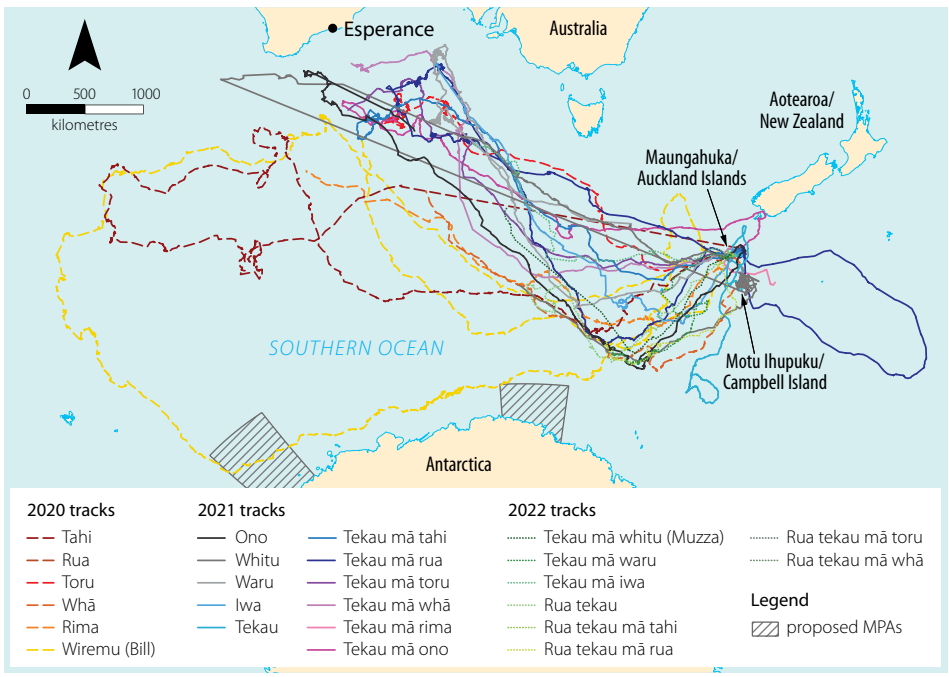
Southern right whale (*Eubalaena australis*)

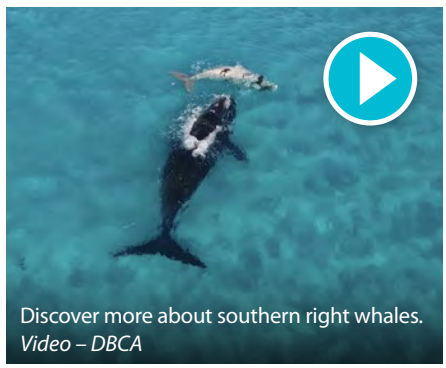


Incredible southern right whale facts

Adult length: 12–16m
Adult weight: up to 50,000kg
Newborn: 3.7–5.5m, 900–1000kg
Gestation: around 12 months
Lifespan: 50–100 years

- Females are polygamous and may have up to 7 partners.
- Sexual maturity occurs at 12 metres, or around 5–12 years.





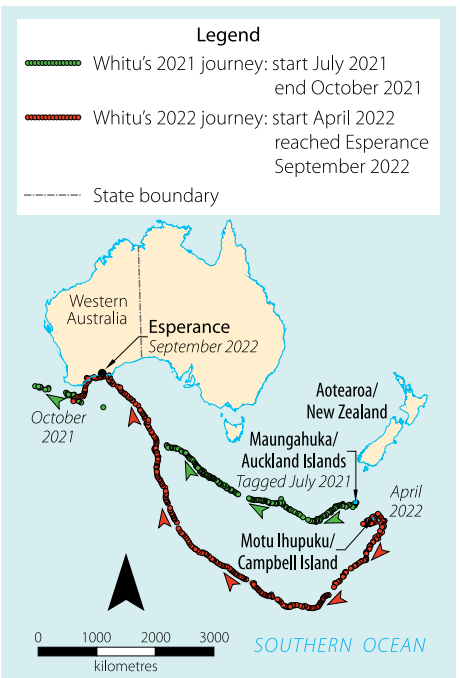
Above Tracks of southern right whales tagged at Auckland Islands (data as per 8 August 2022).

Right Kirsty Alexander (Large Whale Disentanglement Team), Tim Button (DBCA Albany), Rob Harcourt (Macquarie Uni), Nick Gales (Australia's IWC Commissioner) and Kate Sprogis (UWA Albany).

Far right Mottled southern right whale off Augusta.
Photos – Kate Sprogis

White or grey whales—it's all in the tone

Several 'white' southern right whale calves have been reported off the WA coast in areas like Albany, Cheyne Beach, Bremer Bay and Geographe Bay. These 'white' calves have grey colour morphism rather than being truly albino (unable to produce the pigment melanin) or leucistic (absence of cells in the skin that contain and produce melanin). The grey morph pigmentation is thought to be caused by less of these pigment-producing cells and therefore reduced pigment in the skin. The calves' skin typically darkens with age and they likely become adults with mottled or lighter black compared to other right whales. 'White' southern right whales occur near WA shores every winter, and receive a lot of attention from people trying to see them. Because of this, these 'white' whales can become harassed from jet skis and vessels. As they are considered special interest whales, to reduce disturbance it is recommended to keep a distance greater than 500 metres.



Above Aerial view, southern right whale and her rare 'white' calf in the shallow, protected waters of the Nuevo Gulf, Valdes Peninsula, Argentina.
Photo – wildestanimal/Adobe Stock

Far left Southern right whale tail.
Photo – Pablo/Adobe Stock

Left Map of the 10,000-kilometre migratory voyage of 'Whitu' the southern right whale, which was tagged in the subantarctic Auckland Islands in July 2021.

Opposite page
Above Southern right whale breaching, Nuevo Gulf, Valdes Peninsula, Argentina, a UNESCO World Heritage site.
Photo – wildestanimal/Adobe Stock

Inset Skin samples for stable isotopes and genetics.
Photo – Kate Sprogis

in July 2021, actually reach the coast of Australia. Whitu travelled to Esperance and west along the coast past Point Ann and Bremer Bay. This surprised the team as all other whales that were tagged in New Zealand remained in deeper waters in the Southern Ocean and never came to the Western Australian coast. Whitu has now completed a 10,000-kilometre journey and headed offshore again into the Southern Ocean. The name Whitu means 'seven' in the Māori language, and he was the seventh whale tagged as part of the project.

SKIN SAMPLES PROVIDE CLUES

In addition to tracking, the team are also using other tools to better understand the southern right whale population. Scientists have been collecting small skin samples from the whales in New Zealand and Australia. So far, the research team, with support from DBCA, have collected several samples from the south-west and southern coast.

Macquarie University's Honorary Professor Robert Harcourt said the samples could answer a whole raft of questions about the whales. Previously, only 17 biopsy samples had been obtained and this was one whale generation ago in the early 1990s. Gaining new and up-to-date information is crucial to understanding more about these whales.

"These tissue samples give us an amazing insight into their lives—we can tell what sex the whale is, look at genetic similarities to the south-eastern Australian and New Zealand whales, and determine whether the whales are eating similar diets," he said.

Southern right whales feed on small zooplanktonic crustaceans called copepods. They also may be feeding on krill, but to what extent is unknown.

PHOTOGRAPHING WHALES TO MATCH INDIVIDUALS

Individual whales can be identified based on the pattern of their callosities on the top of their head. Each pattern is unique, and is akin to a human's fingerprint. Callosities are thickened skin made of keratin, the same substance as human fingernails. Scientists across Australia photograph these callosity patterns from small drones or planes and add the head shots to the Australian Right Whale National Photo Database (data.marinemammals.gov.au/arwpic). Researchers can then build up sighting histories of individuals to understand their movements between areas. By using all these techniques (satellite tagging, tissue sampling and photo-identification) more of the pieces of the puzzle can be put together. Building a big picture of how southern right whales use Australian State and Commonwealth waters will contribute to aiding in the recovery and conservation efforts for the species.

For more information on southern right whales, this international research program and to see the latest tracks of southern right whales tagged please see Tohoravoyages.ac.nz

Dr Emma Carroll is an Associate Professor at Auckland University | Waipapa Taumata Rau who leads the research project Tohorā Voyages off New Zealand. Emma can be contacted at e.carroll@auckland.ac.nz

Dr Rob Harcourt is an Honorary Professor at Macquarie University in marine science. Rob is head of the Marine Predator Lab, specialising in marine conservation, marine ecosystems, animal behaviour and ecology. Rob can be contacted at robert.harcourt@mq.edu.au

Dr Kate Sprogis is a Marine Mammal Scientist whose research has focused on dolphins and whales off Western Australia. Kate is based at The University of Western Australia, Albany campus and can be contacted at kate.sprogis@uwa.edu.au

Dr Holly Raudino is a Senior Research Scientist in the DBCA Marine Science Program focusing on threatened species in WA, particularly population size and distribution and applying this research for conservation and management outcomes. She can be contacted at holly.raudino@dbca.wa.gov.au

Dr Kelly Waples is a Principal Scientist in the Marine Science Program at DBCA with a background in marine mammal behavioural ecology and conservation management. She can be contacted at kelly.waples@dbca.wa.gov.au

Dr Sahira Bell is a Research Scientist in the DBCA Marine Science Program, working on the Ngari Capes Marine Park. She can be contacted at sahira.bell@dbca.wa.gov.au