

Beyond the Furious Fifties

Dr Franz Smith describes his expedition to the Balleny Islands in the Ross Sea with a team of scientists aboard *RV Tiama* which last year gathered data to support New Zealand's proposal for a Marine Protected Area around the remote archipelago.

The impressive volcanic terrain of Sabrina Islet and the Monolith in the Balleny Islands, where the largest colony of penguins in the archipelago was located.



Courtesy of Henk Haazen

RV Tiana under sail off Rangitoto

LEAVING the southern tip of Stewart Island bound for the subantarctic islands, it seems unlikely that we will encounter a place familiar to the New Zealand most of us know. Heading into the vastness of the Southern Ocean aboard the purpose-built 15-metre expedition yacht RV *Tiana*, there is a great sense of wonder and anticipation of what lies “beyond the Roaring Forties”.

Arriving at the Auckland Islands, though, there is soon a sense of familiarity and the relationship with mainland New Zealand becomes clearer: the volcanic cliffs are clad in lichens and topped with tussocks, shags fly low over the wind-swept sea while albatrosses (toroa) and petrels (titi) swirl around us, penguins (hoiho) dart beneath the surface, bull kelp fronds flop along the tidal fringe and bellbirds (korimako) chime throughout the trees.

The cliffs – and the connections – also extend below the tide line. Over the past few years I had been researching the patterns of diversity and community structure of shallow subtidal ledges of New Zealand’s subantarctic islands with the Department of Conservation (DOC) to help better understand their ecology. These submerged cliffs are covered with a colourful variety of sponges, anemones, and seaweeds – some of which are surprisingly similar to assemblages found in areas of the South and North islands.

However, in amongst tufts of bryozoan lace corals and the iconic finger sponges characteristic of reefs around New Zealand, a few Antarctic elements begin to appear in the form of extensive yellow, pink and green loaf sponges and large sea squirts adorned with bright red siphons. A solitary trumpeter swims in the distance – similar to what one might see in parts

of Southland – but closer to the bottom a school of subantarctic ice fish hang in the water column.

During one of these subantarctic expeditions, musing over a coffee with RV *Tiana* skipper Henk Haazen, we both entertained the question of how far south these relationships extended and whether or not there would be any familiarity with rock ledges in the Ross Sea. At the time, though, the opportunity to mount an expedition to answer these questions seemed even more remote than the islands themselves. But if the opportunity were to arise, I knew that Henk would be a good choice of skipper – having almost 20 years of experience sailing in Antarctic waters, including as Logistics Coordinator on several Greenpeace expeditions to Antarctica, as well as a voyage there aboard his own ice-capable yacht RV *Tiana*.

The subject came up again in conversation with Ministry of Fisheries Scientific Officer, Ben Sharp, in relation to the collation of the survey work I have conducted on sponges, corals, and bryozoans from the Kermadec Islands to the subantarctic islands. During the conversation he mentioned that he had recently returned from a meeting of CCAMLR (the Commission for the Conservation of Antarctic Living Marine Resources) where he had presented a paper on the scientific justification for establishing a Marine Protected Area (MPA) around the Balleny Islands.

Although arguments based on “ecological first principles” support the designation of the Balleny Islands MPA, the weakest aspect of the proposal was the lack of empirical data on the biological assemblages and functional linkages within the marine ecosystem. Here, I suggested that it might be possible to mount a dedicated research voyage aboard RV *Tiana* to gather information to support the proposal, and the opportunity to sail



Franz Smith

Volcanic spires, hanging glaciers, and the incredible blues of the ice shelf at Young Island in the Balleny Islands

“beyond the Furious Fifties” was suddenly before us.

The Balleny Islands are located near the Antarctic Circle in an area where two major weather systems converge, creating unpredictable winds. The archipelago itself is often clouded over, so the ability to predict ice conditions in the vicinity has been problematic. This, combined with the fact that the islands are usually encased in ice for 11 months of the year, limits the type of vessel that can get close enough to land at the islands.

There have been fewer than 30 documented landings on the islands themselves and most landings from boats involving rough sea conditions and steep beaches. Accounts from one of the only yacht voyages to the archipelago – by David Lewis some 25 years ago – conjured up harrowing images of what it might take to get ashore at the Ballenys. From my experience working with Henk Haazen at

RV *Tiana* sails past abrupt headlands, hanging glaciers and broad ice tongues typical of the Balleny Islands’ coastline, where few shore landings are possible and anchorages are difficult to find.



Franz Smith



Documenting the location of Weddell seals and penguins during a shore landing at Borradaile Island in the Balleny Islands.

and videographer – having hundreds of hours working in heavy surge around the country. Rebecca McLeod, a PhD student from the University of Otago, was an obvious choice for her expertise in soft-sediment assemblages and tissue sampling for diet analyses. I had also made several trips with her throughout Fiordland and was sure she had the stamina to undertake the voyage. Next in line would be Clinton Andrews, a geologist, avid mountaineer, and surveyor, who was ideal to help on the shore landings and logistic aspects of the penguin colony surveys. To complete the expedition team, we were joined by first and second mates Mike Delamore and Steve Parsons.

We sailed out of Bluff on a beautiful afternoon in February 2006, bound for the Auckland Islands. The intention was to stage here while waiting for the ice to clear and a window of weather to make the seven day journey from the Auckland Islands to the Ballenys. Once there we received a message from an Antarctic tour operator en route to the Ross Sea, informing us that the Balleny Islands were ice-free.

We embarked the next morning, and four days later we were crossing belts of towering icebergs encountered in the early 60s. Our journey to the Balleny Islands continued through mist and solemn seas before we encountered our first snow petrels and Antarctic species of fulmar, petrel and prion. Early on the morning of 14 February I could just make out the glaciers atop the darkened cliffs of Young Island, hovering above the clouds on the horizon.

Within 20 minutes of arriving at the north tip of Young Island, Cape Ellsworth, we encountered a group of humpback whales. As this might have been our only opportunity to get some identification material from them, *RV Tiama* remained in the vicinity as we photographed tail flukes and attempted to get biopsy samples. Afterwards, we progressed on our journey to Borradaile Island (our destination to look for an anchorage). However, after another 20 minutes, we were upon another group of humpbacks – so we stopped for another opportunity to obtain photos and biopsy samples.

This encounter was followed by another group of whales, and another. It seemed as if we would never make it to Borradaile in amongst all of the whales! This opportunity to obtain information that could recognise individual whales was an important part of our brief – as was being able to establish a link between the whales that occur around the Balleny Islands with individuals that occur in New Zealand waters and migrate to the tropics. Such a link would highlight the importance of the



The expedition found more than 300 chinstrap penguins at Sabrina Islet in 2006, which represented a significant increase in the number recorded there by the previous survey in 2000.

the Bounty and Antipodes islands getting people and equipment off raging intertidal platforms, I had confidence that we could handle the rough conditions and the landings.

We had two months to establish a team and prepare for the voyage after agreeing a project plan with the Ministry of Fisheries. Our brief not only included shore landings to establish the population status of the penguins and other seabird species, but also to obtain samples for chemical analyses of diet composition. We also planned diving surveys using a variety of methods for different habitat types such as steep ledges and soft-sediment habitats and deeper stations using a drop camera. DOC gave us training and equipment for biopsy sampling marine mammals, in the event that we were able to get close enough to get any tissue samples for genetic analyses.

Because of the varied nature of the sampling and the limited space available on *RV Tiama* I needed a research team with a complimentary mix of skills. I had made several research trips with Dr Nick Shears, formerly of the Leigh Marine Laboratory, and knew him to be an accomplished diver

Adelie penguins breed in association with chinstrap penguins at the Balleny Islands



Balleny Islands region for the population.

Arriving at Borradaile, we organised ourselves and RV *Tiama* for the shore landings, diving, drop camera work and fish sampling ahead of us.

We found that one of the most astounding aspects of the shallow region around the Balleny Islands is the abundance and variety of seaweeds. One species here, *Himantothallus grandifolius*, can grow up to 15 metres (m) long and 70 centimetres across. It forms dense underwater forests along the shallow reefs below 15m of depth and has been recorded down to 80 m – possibly due to the clarity of Antarctic waters.

In other regions of Antarctica, fragments of this species have been found at greater depths and may represent an important link between production in shallow-water with that of deeper regions without light. Given that the Balleny Islands sit in close proximity to thousands of metres of water, this type of linkage may distinguish the ecology of the Balleny Islands from other areas in the Ross Sea region. Not only is the sheer biomass of the seaweeds outstanding, but the number of species that were collected here on the expedition equalled the total number of species for the Ross Sea present in the herbarium at Museum of New Zealand Te Papa Tongarewa.

We also collected a terrestrial alga found free-living on snow in proximity to the penguin colonies. This alga (of the genus *Prasiola*) complements material collected in the subantarctic islands and other locations in New Zealand. Research underway by Wendy Nelson of National Institute of Water and Atmospheric Research (NIWA) could provide a better understanding of the degree of isolation of the Balleny Islands in a New Zealand context.

We were able to dive on steep ledges around the three main islands, including a ledge close to Row Island, Buckle Island (near Scott's Cone), and the south end of Sturge Island (Cape Smyth). Underneath the seaweed forests here, these areas were covered with impressive sponges and bryozoan lace corals and very little vacant space. The analysis of these samples is currently underway and will help develop our understanding of the shallow-water ledges at the Balleny Islands.

In our circumnavigation of the archipelago, we were able to visit the previously documented penguin colonies to determine whether or not they were still active. Most of the capes, headlands and cliffs which are the only ice-free areas are dotted with the nests of various seabirds, including cape pigeons, snow petrels, and both of the skua species present here. Several penguin colonies have been documented at the islands, predominantly



Gordon Cessford / DOC

Weddell seal with pup – the world's most southerly species of seal.

Adélie and chinstrap penguins. The chinstrap penguin being of particular interest, as it has only been known to breed in very small numbers. A survey conducted on Sabrina Islet in December 2000 documented fewer than 15 breeding pairs.

To our surprise and delight, landing at the south-east promontory of Buckle Island (Cape McNab) we found 26 adult chinstraps with 18 chicks. Our survey of Sabrina Islet — revealed more than 300 birds consisting of 202 adults and 109 chicks. This indicates an order of magnitude increase in the number of chinstrap penguins at the Balleny Islands.

This species is not regarded as a "true" Antarctic penguin because it only breeds on ice-free areas, so this level of increase may have something to do with climate change. In other regions of Antarctica, documented increases in the number of chinstrap penguins have been associated with changes in regional climate. Finding more of these penguins here than expected shows that their populations in the Balleny Islands are more dynamic than previously thought, which in turn suggests that measures to protect the breeding population in the region should consider

whole-archipelago processes, rather than just the individual islands.

Research conducted by NIWA, using bathymetric surveys and biological sampling aboard RV *Tangaroa*, has also contributed greatly towards understanding the Balleny Islands ecosystem. Although the samples and data collected during our 10-day research expedition aboard RV *Tiama* are still being processed, the linkages between the Balleny Islands and the wider New Zealand bioregion already seem apparent.

By advancing our understanding of how the Balleny Islands ecosystem functions in the context of the Ross Sea – as well as the subantarctic islands and mainland New Zealand – our obligations to ensure that this ecosystem is managed to ensure its longevity will only become more apparent.

Dr Franz Smith is a Wellington-based research ecologist. The expedition to the Balleny Islands aboard RV *Tiama* was supported by Ministry of Fisheries through administered funds of the Biodiversity Strategy. For more information see www.fish.govt.nz or www.tiama.com

Humpback whales were frequently seen off the Balleny Islands.



Franz Smith