

science teacher

2007

**International
Polar Year
(2007-2009)**

**Antarctic
drilling reaches
new depth**

**Conserving
Historic Huts**

**Scott Base
celebrates
50 years**

and more ...



Number 114

ISSN 0110-7801

Architect conserving Antarctic heritage

The deterioration of the huts and artefacts of the Heroic Age, and the need for a comprehensive strategy to conserve this heritage, saw the formation of the Antarctic Heritage Trust's Ross Sea Heritage Restoration Project in 2001 which brought together an international multidisciplinary team. Auckland based Adam Wild is the Trust's conservation architect and he talks about the challenges and the sheer scale of the task to be undertaken.

As a very young boy my father would read to me tales from Winnie the Pooh. I especially enjoyed the one entitled In Which Christopher Robin Leads an Expedition to the North Pole.

'....That's what an Expedition means. A long line of everybody. And we must all bring Provisions' "Oh!" said Pooh happily. ... And he stumped off.'

As a very young boy, going out always became an 'expedition' of one sort or another, and tales of those who did this sort of thing seriously filled me with awe and admiration.

I am an architect, and I design buildings and spaces. I am also a conservation architect and have skills and passion for the care of historic sites and buildings; the built and physical markers of our cultural heritage. I have noticed that in New Zealand we still seem reluctant to acknowledge our own unique and vital heritage. This cultural cringe demeans our distinctiveness, and the value of what we do and what we have achieved. I love our heritage and all those things that distinguish us from everyone else: our land, our people and our cultures. I am fascinated at the places we make for ourselves. The best ones say a lot about who we are and where we are. Our buildings may be special for a number of reasons, but it is the combination of values, the context, that really makes for the recognition of places of heritage value.

In New Zealand we don't teach building conservation. So in 1998, I went to the Centre for Advanced Architectural Studies at the University of York in England, and completed an MA in Conservation Studies (historic buildings). In bringing this experience home it has made all the more profound to me the richness, and variety of our built heritage and how much it says about us and how much we are responsible for saving it for the future.

In 2001, I was busy at work in Auckland, working as an associate in a large architectural practice, balancing roles on new projects with the development of conservation plans for the care and conservation of historic places into the future. One day we were visited by a project manager, working on behalf of the Antarctic Heritage Trust, an independent charitable trust based in Christchurch charged with the care for the heritage of the Heroic Era located in the Ross Sea region of Antarctica, on behalf of the international community.

In 2001, the Trust recognised, despite best efforts until that point, that a major conservation project was required to ensure this world heritage is protected and conserved for future generations. The project manager's brief was to find appropriately qualified conservation architects to join the project team, and, in response to his own sense of practicality, find someone 'fit enough and young enough' to pull him out of a hole in the ice and see the job through.

The excitement and anticipation of the invitation, and the

opportunity of being responsible for the conservation of not just the buildings and objects left behind by Scott and Shackleton, but in saving the spirit of what these places have come to mean and the stories they tell. That all this was to happen in that most enigmatic of continents, the Antarctic, seemed all too much a dream. I had been warned about dreams, however, "they might just come true"!

In December 2001, I found myself at the top of New Zealand House in London, at the international launch of the project. A few days later, I was consulting with the project's international peer reviewer before heading to Cambridge and the Scott Polar Research Institute.

The first Antarctic lesson became apparent on this trip and showed how an association with the Antarctic brings an immediate sense of openness and collaboration between all disciplines and was to extend beyond the confines of my immediate team. In 2002, the Ross Sea Heritage Restoration Project was launched by HRH Princess Anne in Antarctica.

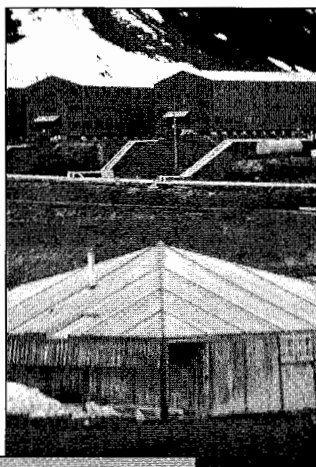
Today, I am one of an international group of conservation specialists engaged in the conservation of the Heroic Era huts. The Heroic Era describes the early period of Antarctic exploration between 1895 and 1917, and the expeditions of Carsten Borchgrevink, Robert Falcon Scott and Ernest Shackleton. Our programme of conservation has begun with Sir Ernest Shackleton's Nimrod hut at Cape Royds. Cape Royds is an ice-free area at the western extremity of Ross Island, approximately 40km south of Cape Bird and 35km north of Hut Point peninsula. The geographic location of the site is: Latitude: 77°33'10.7"S, Longitude: 166°10'6.5"E.

The buildings and the area around them are protected and designated as Antarctic Specially Protected Areas (ASPAs) within the provisions of the Antarctic Treaty system. The international conservation team working with the Antarctic Heritage Trust recognised that the buildings, and the thousands of artefacts associated with them, required major conservation efforts to be started immediately, or these sites would not survive for future generations. They also agreed that this heritage was of major international significance and that every effort to solicit assistance from the international community should be made. This view has been reinforced by The Getty Foundation (Los Angeles), which has made significant funding available for the project and by the World Monuments Fund (a New York based heritage agency) listing Shackleton's hut in their 2004 (and 2006) World Monuments Watch List of the 100 Most Endangered Sites in the World.

The stories of Scott and Shackleton are well known, but their footprints have long been obliterated by a century of biting winds and bitter cold. Although Antarctica has 80% of the earth's fresh water locked within its frozen grip, it is also the driest place on the planet. It is this paradox which has helped, until now, to slow the decay of the prefabricated huts and makeshift bases left behind by these early pioneers. This unique and remote environment presents many technical challenges including; high relative humidity, temperature change, salt damage and high ultra violet light levels and katabatic winds. Katabatic winds are composed of a thick layer of 'heavy' cold air, sliding down the polar icecap towards the coast under the influence of gravity. These winds vary depending on location but are generally worse in coastal

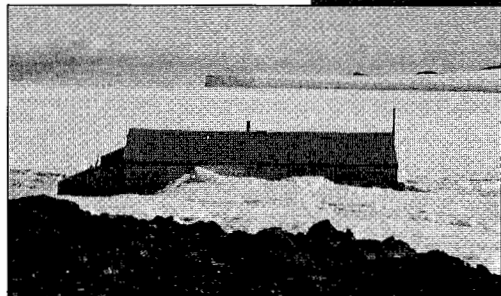
Left: Discovery Hut's other context today with the American Base of McMurdo in the background.

Photograph courtesy of Adam Wild



Below: Cape Evans Hut from which Scott departed for the Pole in 1911, never to return.

Photograph courtesy of Adam Wild



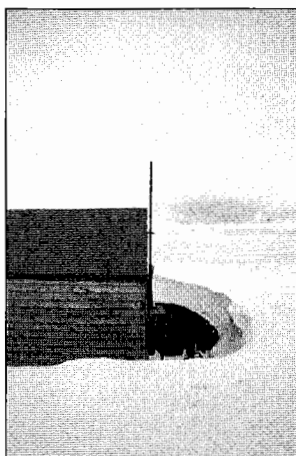
Erebus. However, the hut straddles the contours of a natural watercourse which, even in Antarctic time, channels snow, ice and melt water beneath the hut in a natural path to the sea. Proximity to the sea, even in the frozen Antarctic, has an effect on the fabric of the huts. This appears, in combination with abrasion from wind driven ice and scoria, and the effects of ultra violet light, as a chemical degradation of the fibres of the timbers. Without the cleaning effects of rainfall or washing, the timbers become saturated with salts which affect the cellular structure of the wood resulting in the defibration of the timber.



Defibration of wood

Photograph courtesy of Adam Wild

The biological decay of the timber has been slow, but the huts are not free of this form of deterioration. The key factors that influence the rate of biological decay are temperature and relative humidity. Specific research undertaken jointly by the Universities of Minnesota and Waikato, show average relative humidity levels in the hut in the summer months to be high (72-82%) and that they can climb above 90%. In association with temperatures as high as +5°C, such levels of humidity can create an environment well within the limits for fungal growth, and active fungal growths (including some unique to the Antarctic) have been observed. The hut also presents its long southern face to the prevailing wind, and over time this has presented a barrier to the wind driven snow, which has built up against this wall as a kind of aerofoil, only the aerodynamics of the wind and the hut managing to mitigate the forces of the wind against the hut unobstructed. Scott's attempts at insulating the Cape Evans hut were inventive and experimental. The timber frame was lined with some six layers of material. On the inside face of the framing there are two layers of vertical tongue-and-groove



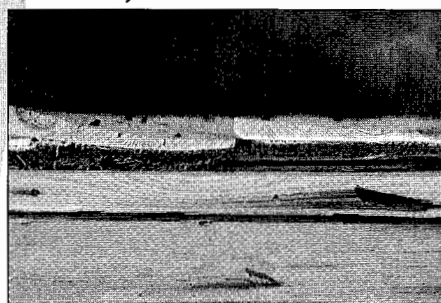
Cape Evans Hut showing the snow build up and wind scoop
Photograph courtesy of Adam Wild

boarding with insulation between, while on the outside face there is one layer of tongue-and-groove boarding then insulation then finally weatherboards. The insulation consists of layers of shredded seaweed sandwiched between linings of hessian, known as Gibson Quilting.

When rediscovered in 1947, it was noted that the hut appeared somewhat disorderly after the buffeting of 35 winters. The frozen carcass of a dog stood on four legs as if it were alive. Seal carcasses, from which fresh steaks might have been cut, lay about. Scattered about the cabin were cartons of provisions, still good to eat. The extent and survival of artefacts adds to the evocative richness of the Cape Evans hut. From the stove and the iconic mess deck-table, to the most fragile of the scientific equipment, there is the sense that having just 'gone out and maybe return sometime' with that 'sometime' meaning they could return at any minute.

Cape Evans Hut showing Scott's unique insulation – Gibson Quilting

Photograph courtesy of Adam Wild



Left: Cape Evans Hut interior, eerily as if its occupants are due to return any time soon

Photograph courtesy of Adam Wild



Below: Frozen carcass of dog, 'having a nap', in Cape Royds Hut

Photograph courtesy of Adam Wild

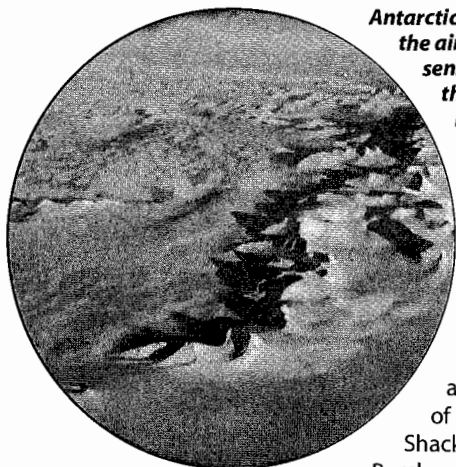
The dog is still there, but like any dog, it has got tired of standing and has laid down for a quiet nap.



It is profound that this year marks the 50th anniversary of the first International Geophysical Year and of the 50th anniversary of the establishment of Scott Base by Sir Edmund Hillary. The International Geophysical Year (IGY) of 1957-58 involved expeditions from 12 nations co-operating on agreed research programmes. The IGY was much more than a set of vaguely co-ordinated projects. Precise details of the timing of observations, and of instruments to be used, were agreed at a series of international conferences before 1957. In terms of scientific results, it was an unparalleled success. It was also a success in political terms. The IGY led to the establishment of a treaty negotiated by all 12 participating states: the Antarctic Treaty of 1959 – guaranteeing free access to any part of Antarctica for peaceful purposes. That the distance, in time, between Hillary's A hut at Scott Base, and those of the Heroic Era, becomes increasingly relative and it seems to me, irrelevant, and certainly equally Heroic.

regions. Wind speeds of up to 150km/hr with gusts up to 200km/hr are not uncommon. In these conditions it is risky to venture too far from the safety of a hut or tent. In combination these factors present some unique challenges to the conservation of the huts, their structures, their building fabric, their respective artefact collections and their environmental context.

The particular and often severe effects of the Antarctic environment are exacerbated by the unique aspects of each of the huts and their construction systems. After the experience of the Australian outback hut erected at Hut Point, which proved too cold to occupy for more than short periods during the Discovery Expedition, attempts to insulate the subsequent huts were made. At Cape Royds, Shackleton used granulated cork within the interstices of the wall. Over the years as the wind has blown, the cork has been shaken out like grains of salt in a salt shaker. At Cape Evans, Scott employed another, very different material. To understand all these factors clearly, and in context, conservation plans and detailed cost plans and work programmes have been developed for each of the four sites. Compiled by an international team, these comprehensive plans provide the proposed conservation work at each of the sites. The reports are complemented by Implementation Plans which detail the physical works required for each hut.



Antarctica as seen from the air. The first real sense of the scale of the place.

Photograph courtesy of Adam Wild

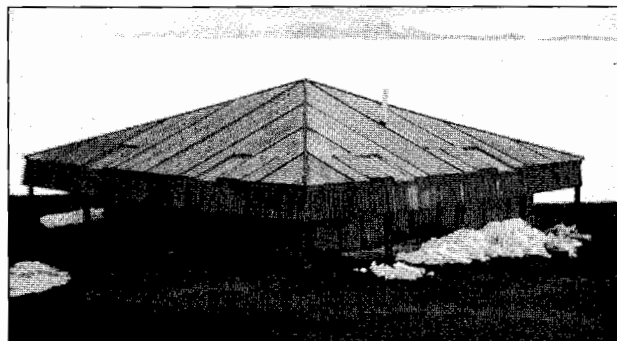
I have had two trips ('events' rather than 'expeditions') to the Antarctic, and to the huts of Scott and Shackleton, to date.

Borchgrevink's hut at Cape Adare (the windiest

place at sea level in the world) is more remote and awaits a visit another day (perhaps). The two huts of Scott and one of Shackleton all lay at sea level on the toes of Mt Erebus. Shackleton's Nimrod hut at Cape Royds, being the most remote of the three from Scott Base, (Shackleton, Nimrod, 1907-1909) and that at Cape Evans (Scott, Terra Nova, 1910-1913) requires working 'in the field' (camping) and sleeping under canvas, in tents similar in form to those used by Scott in his last expedition. Generally, there is more comfort to be had in these tents today than Scott would have experienced ... until the wind blows, then you are forced to stop and things start to break.

Each of the huts has particular and distinctive contexts.

Discovery Hut (1901-1903) stands at the edge of every journey from the Ross Island Heroic Era huts across the Ross



Discovery Hut

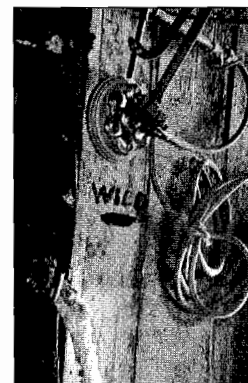
Photograph courtesy of Adam Wild

Ice Shelf to and from the Trans Antarctic Mountains and the glaciers that lead to the polar plateau and the Pole. It is a beginning and an end to each 'push' south and, 'home' to each returning party. It tells a haunting story of desperate survival and stands as testament to all but Borchgrevink's Heroic Era expeditions and the spirit of Antarctic science and exploration. Today, it shares a modern landscape with the neighbouring American Base of McMurdo, which seems incongruous to the silence of its Heroic legacy.

With the majority of work currently being carried out on Shackleton's Hut at Cape Royds, we are expecting to complete the securing of the hut structure and building fabric this season (2006/07) and have completed environmental clean-up around the exterior of the hut. The focus continues on the extensive artefact collection associated with the site. With conservators in Antarctica working on the collection year-round, this portion of the project is scheduled for completion in 2009.

The Shackleton's hut project is tracking so well that the Antarctic Heritage Trust hopes to be able to deregister the site from the World Monuments Fund List of 100 Most Endangered Sites in the World next year.

This work has engaged a range of disciplines and, through them, acknowledges the range of layers of significance that make this place of particular value. At Cape Royds, even the graffiti has been respected. For me its relevance reveals the story of the first book ever published in the Antarctic (Aurora Australis) and a connection between Frank Wild, Shackleton's second in command and one of the most experienced Antarctic explorers, and my family [a link still waiting to be better explored].

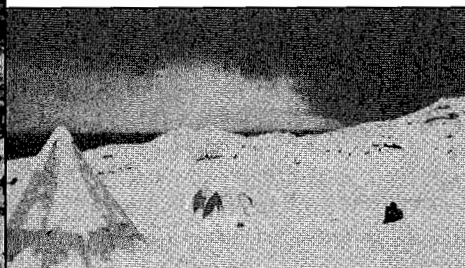
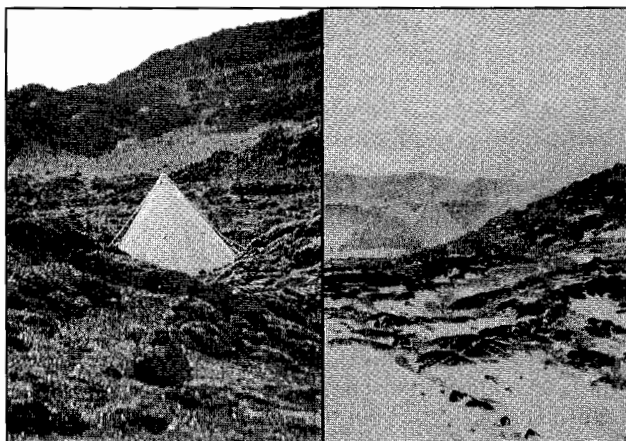


Cape Royds 'Wild' graffiti

Photograph courtesy of Adam Wild

With the Shackleton portion of the project well in hand, and funded, the Trust's concern is now turning to Scott's iconic hut at Cape Evans. The hut from which he and his four companions left on his race to the Pole in 1912... never to return.

In a more temperate climate, the strengths and the weaknesses of the Cape Evans hut would be more apparent. Sited majestically on the foreshore it commands views to sea, punctuated by the terminal 'tongue' end of the Barne Glacier as it makes its way off the flanks of the smoking Mt



Camping at Cape Royds
Photograph courtesy of Adam Wild

I am often drawn to two favourite passages from RF Scott's *The Voyage of the Discovery* which capture for me much of the spirit of these places, and the significance and resonance then for those first Antarcticans and for me today. The first describes a sense of the majesty and scale of the Antarctic and, at the same time, the insignificance of our presence there. The second passage provides a deliciously scathing commentary on just how that insignificant presence revealed itself then, and how these traces of occupation represent today such vital evidence and markers of humanity:

The Voyage of the Discovery, July 1902

'...for one brief moment the eternal solitude is broken by a hive of human insects; for one brief moment they settle, eat, sleep, trample, and gaze, then they must be gone, and all must be surrendered again to the desolation of the ages.'

And,

The Voyage of the Discovery, August 1902

'...but now the traces of man are all too obvious: here is



a little heap of dirty rubbish, there is an empty tin with a gaudy label, and everywhere the soil of traffic staining the purity of the snow. It is all a little too much like a Bank-holiday picnic.'

The letter box in front of the entry to Hillary's A building at Scott Base
Photograph courtesy of Adam Wild

Antarctica New Zealand and science

Antarctica New Zealand's role in science is to establish themes and priorities for New Zealand Antarctic science; encourage and facilitate the implementation of science projects that deliver on them; and present the outcomes and benefits of and advocate for Antarctic science. A science support bidding round is held annually for those wishing to undertake research in Antarctica with research divided into three main areas: Physical Environment, Southern Ocean and Antarctic Ecosystems.

Physical Environment

Global change and climate change are at the heart of this research theme. A better understanding of the Antarctic environment and its evolution is needed to recognise the drivers and effects of climate change on the Earth. Antarctica and the Southern Ocean are significant components in the global atmospheric, oceanic and mantle convection systems. In addition, the region offers many unique opportunities to study other processes that have global relevance.

Approximately half of Antarctica's ice-free ground and soil-forming areas occur within the Ross Sea region, including the largest continuous expanse of ice-free ground, the McMurdo Dry Valleys. In the Ross Sea region, cold desert soils are characterised by low soil temperatures and low soil moisture content. Researchers over the past decades have begun to understand the soils of the Antarctic, but further work is needed in the characterisation of these soils.

Cryospheric research encompasses sea-ice, ice shelf and ice sheet studies. The Antarctic sea-ice zone remains among the least understood areas of the Earth. It forms a seasonal interface between the ocean and lower atmosphere affecting heat exchange and forming a surface for micro-organisms, ice algae, seals and penguins to inhabit. Some smaller ice shelves appear to be sensitive indicators of climate change. They have a limit of thermal viability that, when exceeded, leads to their collapse. Greater understanding of ice shelf behaviour is required before ice shelf response to external forcing can be accurately interpreted.

The present day Antarctic atmospheric conditions will continue to be studied to better understand the Antarctic atmospheric processes and how they contribute to the global atmospheric system. A predictive knowledge of atmospheric processes is the goal of these studies to help New Zealand contribute to international debates on ozone depletion, climate change and greenhouse gas emission and mitigation.

Southern Ocean

The Southern Ocean surrounds the continent of Antarctica and links the three major global oceans - Pacific, Atlantic and Indian Oceans.

The Antarctic Circumpolar Current thermally isolates the continent creating a profound affect on sea level history and the evolution and make-up of Antarctic biota. The Southern Ocean is the most uncontaminated ocean in the world. In particular, the Ross Sea is virtually untouched by humans making environmental management, conservation and protection in the area paramount for New Zealand as a conscientious environmental steward.

Proper management and protection from environmental damage of the Ross Sea marine area requires an understanding of oceanography of the Southern Ocean, Ross Sea marine biodiversity, structuring of Ross Sea marine ecosystems and external pressures on the area. There is a reasonable amount of data for the Southern Ocean, however comparatively little of it has been collected in the marine environment of the Ross Sea region.

Antarctic Ecosystems

The presence of liquid water is essential for life and away from the coast this is scarce. Few life forms exist in the high altitude polar ice caps where liquid water is absent and mean annual temperatures are less than -30°C. However, at the margins of the continent and over the surrounding seas mean annual temperatures fall in the range -10 to +5°C. Within this temperature range dramatic changes occur to the properties of water as it shifts back and forth from the solid to the liquid state, often in association with marked changes in salinity. The shift in the properties of water from the solid to the liquid state occurs over a very small temperature range and yet has enormous implications for natural ecosystems.

In the sea, with its constant temperature of -1.8°C, biological communities are geared to the annual cycle of sea-ice formation and melt with its attendant fluctuations in light penetration, brine formation and the physical barrier it imposes on wind mixing of the underlying water. In contrast the structure of terrestrial and shallow water inland communities is geared to survival in conditions of extreme cold and of marked fluctuation in the state of hydration and of salinity. Limited biodiversity induced by extreme environmental conditions inland provides an opportunity to study whole ecosystem processes in a way not possible in complex ecosystems at lower latitudes.

In addition, understanding of Antarctic biological processes such as freezing, or desiccation resistance will also provide a vital stimulus to diverse biotechnology industries.

This article has been adapted from the following website, where further information can be obtained about scientific research supported by Antarctica NZ. www.antarcticanz.govt.nz/science