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Archaeology on Ice: a Review of Historical Archaeology in Antarctica

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ABSTRACT

New Zealand has played a major role in the development of archaeology in Antarctica. The Ross Dependency (administered by New Zealand) has numerous important sites dating from the period of exploration known as the Historic Era (1895–1917). Attempts were made to clean up historic sites in the 1950s and 1960s. The 1970s saw the first true archaeological investigations; professional archaeologists became involved in the late 1980s. These developments are traced and the contributions of archaeologists and others from Australia, Argentina, Chile, the United States and the United Kingdom are noted. There is great potential for further archaeology in Antarctica; however, any future work must take place under strict controls.

Keywords: ANTARCTICA, HEROIC ERA, HISTORICAL ARCHAEOLOGY, HISTORIC SITES, HERITAGE MANAGEMENT, ICOMOS.

INTRODUCTION

In the Ross Sea region of Antarctica are numerous places of great historic and archaeological significance. These are a legacy of a significant period of exploration known as the Heroic Era (1895–1917). Within the context of global exploration, the sites are important; they include wooden and stone huts, supply depots, middens, camp sites, message posts, cairns, memorial crosses and a grave. There are also sites at Commonwealth Bay in East Antarctica, in the Trans-Antarctic Mountains, on the Antarctic Peninsula, and in the South Shetland Islands (Fig. 1). The remains of two ships, *Antarctic* and *Endurance*, lie somewhere on the bottom of the Weddell Sea. Additionally, on Deception Island and South Georgia are important whaling sites.

For over 25 years members of the New Zealand Archaeological Association have undertaken archaeological work at historic sites in the Ross Sea region.² Their pioneering contribution to historical archaeology in Antarctica has been recognised by other nations. More recently, archaeologists from several other countries have also undertaken important projects. This paper traces the development of archaeology in the Ross Sea region and elsewhere on the continent (particularly by Australia at Commonwealth Bay).

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Figure 1: Antarctica, showing places mentioned in the text. For details of the Ross Sea area see Figure 2.

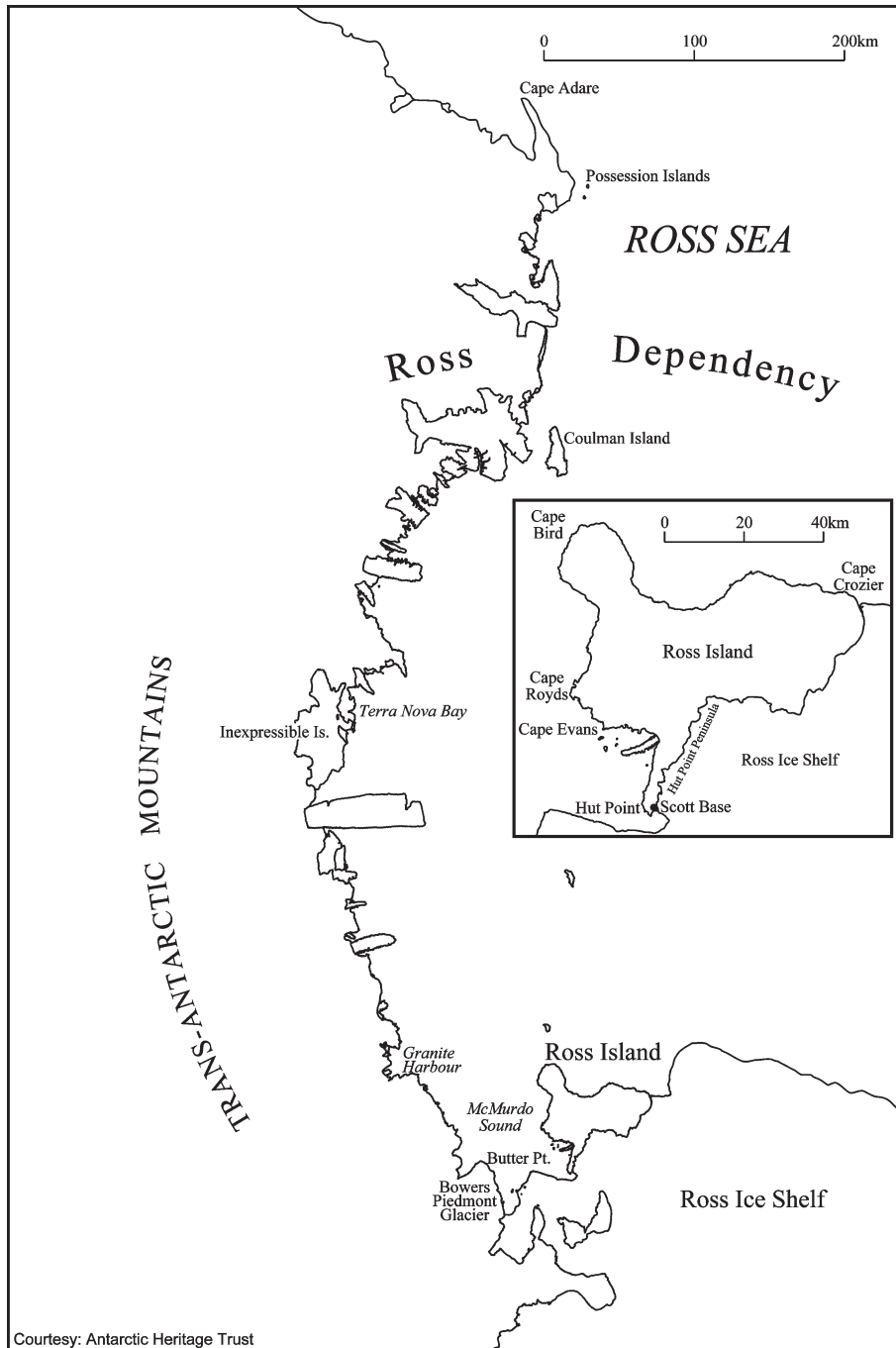


Figure 2: The Ross Dependency, showing the location of historic huts and other sites mentioned in the text.

THE ROSS SEA REGION

Scattered over the vast area known as the Ross Dependency, which is administered by New Zealand, are perhaps more historic sites than elsewhere on the continent (Harrowfield 1995). They are remarkable links with a time when field parties in the quest for national glory and geographical and scientific knowledge ranged over wide expanses. Many sites, such as the supply depots placed on the Ross Ice Shelf by expeditions in 1902–12 and finally by E.H. Shackleton's Ross Sea Party in 1915–16, have not been seen since they were deposited.

Of special importance are five wooden huts and the remnants of another (Fig. 2). Huts were built at Cape Adare in 1899 by Borchgrevink (British Antarctic Expedition 1898–1900) and in 1911 by Campbell's Northern Party (Scott's British Antarctic Expedition 1910–13). On Ross Island, 650 km south of Cape Adare, huts were built at three locations: at Hut Point by Scott in 1902 (National Antarctic Expedition 1901–04), at Cape Royds by Shackleton in 1908 (British Antarctic Expedition 1907–09), and at Cape Evans (Fig. 3) by Scott in 1911 (British Antarctic Expedition 1910–13). The last was also occupied by the Ross Sea Party of Shackleton's Imperial Trans-Antarctic Expedition 1914–17 (Headland 1989).

REMOVAL OF THE ICE

The first 'conservation/preservation' work at the Ross Island huts was undertaken by sailors from HMNZS *Endeavour* and personnel from New Zealand's Scott Base in 1957–58. Essential repairs were made and some snow was removed from within the huts at Cape Evans and Cape Royds. The New Zealand sailors at the two sites also collected and burned 'rubbish' and, probably unknowingly, destroyed important evidence of occupation in the process. Already many artefacts had been removed since the huts were first revisited by US Navy personnel in the late 1940s.

Ice almost filled the seldom visited and remote Borchgrevink expedition 'living hut' at Cape Adare, and on Ross Island the only hut free of ice was Shackleton's hut at Cape Royds. In contrast, the two huts further south at Cape Evans and Hut Point were almost filled with ice. This was considered by New Zealand authorities as detrimental to the structures, hindering maintenance required within reason by the Antarctic Treaty 1959, and was preventing access by visitors. Because the huts were of great historic interest, the decision was made to remove the ice.

In 1960, historian Leslie Quartermain, Information Officer Antarctic Division (DSIR), had sought northern hemisphere advice on the best means of extracting artefacts from ice, but when ice was removed at Cape Evans in 1961, no detailed measurements or sketch plans were made of where the hundreds of artefacts excavated were located and only a brief photographic record was compiled. According to Quartermain, "it soon became apparent that the ice concealed a great quantity of material of potential interest and value; a surprising quantity in fact..." (Quartermain 1961).

Ice removal was done with picks and shovels (Fig. 4), the only practical method of tackling the problem considered at the time, and some damage occurred which is only now more apparent. To an extent this was unavoidable as "many shelves had collapsed under the weight of snow [and] what had been on them, was generally in a jumbled mass on the floor and now embedded in solid ice" (ibid). Artefacts often revealed by a stain in



Figure 3: Scott's hut at Cape Evans, the largest Heroic Era site in Antarctica, 1970–71 (Antarctica New Zealand collection).

the ice were extracted, then left outside, with the ice allowed to sublimate to the air. No member of Quatermain's party had experience in archaeology; stratigraphy, which could possibly have identified stages of infiltrating snow, subsequent ice formation and annual freeze-thaw cycles, was not recorded.

At Cape Adare, following destruction of the science party tents in a storm in January 1961, ice was removed from Borchgrevink's 6.35 x 6.15m 'living hut' for emergency accommodation. In the process, numerous artefacts from Borchgrevink's party (1899) and Campbell's Northern Party (1911) were uncovered. On this occasion, since the party included an observant and dedicated scientist, a general sketch plan was made of the interior, and comments concerning snow accumulation and stratigraphy were recorded. Because of the dark confined nature of the interior, no photographic record was made (Reid 1961, 2001; Bailey 1961).

In January 1964, a New Zealand field party, again using picks and shovels, removed the ice and snow that almost filled 'Discovery Hut' (after Scott's ship SY Discovery) at Hut Point. Only brief records, including one floor plan by architect Rodney Smith and a few photographs, documented the work (Gibbs and Smith 1964). Unfortunately, at this time the remains of two small huts a few metres away, used in 1902–03 for magnetic observations, were cleared one night by a US Navy bulldozer operator. A midden outside a window, attributed to the Ross Sea Party which occupied the hut for various periods in 1915 and 1916, was also removed. Over the previous decade, dog kennels and numerous



Figure 4: Leslie Quartermain excavating ice from within Cape Evans hut, 1960–61, photo Jack McKay-Sandman (David Harrowfield collection).

other artefacts around the hut were removed or ‘souvenired’ and others were taken to institutions and museums in Britain, the United States and New Zealand.

At this crucial time in the 1960s, when much detailed information could have supplemented the early published and archival record, only one person, Baden Norris, a member of the Canterbury Museum Archaeological Society (formed in about 1958) and a member of the Hut Point party, had some archaeological experience. However in those early days, systematic archaeology was not even thought about, let alone considered necessary. Furthermore, field parties had limited time to complete the work and were under pressure to get the job done. At the time, the only work involving systematic excavation of ice on historic sites was confined to a few sites in the Arctic, and most have been examined scientifically only since the 1970s (Harrowfield 1996).

The emphasis in the 1960s was on ‘hut restoration’ and making the structures snow-proof and accessible to visitors. With the benefit of hindsight, and given the importance of the sites and the uncertainty about what might be exposed during the early work, detailed records should have been maintained, even if it required completion of the work over one or more further seasons.

In 1971, ten years after the ice was removed from within Cape Evans hut, considerable further information was unfortunately lost when a large midden associated with the Ross Sea party was cleared from outside the main entrance. Everything from sledging, scientific and photographic equipment to clothing and empty cans had been tossed out the door. The environs of the hut, which Quartermain said were mostly concealed by snow in 1961, had not been cleared up by his party and doubtless had been picked over since the mid 1950s (the site, abandoned in 1917, was first revisited in February 1947). The midden

had the potential to provide valuable information on the privations and activities of the marooned men, but the field party had their 'directive' to clean up the area. Although some photographs were taken and over 100 artefacts collected, no further recording was done apart from listing the finds and placing some of them in Scott's hut (McElrea and Burson 1972). Artefacts dumped down tide-cracks in the sea ice at Cape Evans in 1912 are known to be on the sea floor, while further offshore is a Wolseley motor tractor lost through the ice in 1911.

According to Michael Pearson:

... the rubbish can have major historical and research significance. It contains clues about the more prosaic and mundane aspects of survival in the polar environment, the things that do not always make their way into the official lists and records of the expeditions... obviously, not all the rubbish around an old site will have the same potential to provide historical evidence or clues about the life of those occupying the site, but uncontrolled clean-up of sites invariably destroys any potential that might have existed to study and, if appropriate, conserve this sort of evidence. (Pearson 2004)

THE ADVENT OF ARCHAEOLOGY

In December 1977, David Harrowfield, who had received training in archaeology from Michael Trotter in North Otago in the 1950s and was now Antarctic Curator at Canterbury Museum, considered the problem of how to extract artefacts from frozen ground. Contact was made with Dr A.F. Treshnikov, Director Arctic and Antarctic Research Institute, Leningrad. At Cape Royds, a sheet of heavy black polythene was used outside to try and absorb heat and thereby increase the rate of melt underneath. Temperatures were recorded using a micro-thermistor calibrated -20°C to +20°C and bridge amplifier, and compared to the ambient air temperature (+4°C). At the time of observation, there was little variation in temperature ($\pm 1^\circ\text{C}$). Progress in thawing the ground surface was very slow.

At Cape Evans a few days later, when warmer temperatures were encountered, a test excavation was undertaken outside Scott's hut along the north side to establish the extent of artefacts and other material still in the scoria. Many objects were visible on, or protruding from, the surface. With assistance from Chris Buckley, an area of 2.5 m² was excavated between the ice-filled stables and ice-filled latrine. Polythene was again used in an attempt to thaw surface deposits, this time with better effect. Here the surface between the stables and latrine had frozen to a depth of 5 cm as a result of snow accumulation, followed by percolating summer melt through the scoria and above the permafrost at 20 cm depth. Scoria interspersed with straw and other debris had formed a matrix, which was gradually thawed with the polythene. The surface was then removed using a trowel, hearth shovel and brushes.

A plan indicating the position and depth of each item was compiled and a surprising number of artefacts recovered. Because of the shallow depth and loose nature of the scoria over the permafrost, no recognisable stratigraphy was encountered (Harrowfield 1978a, 1978b, n.d.).

The need to involve specialists at historic sites and to elevate the summer programme beyond one of often ad hoc activity was long recognised in New Zealand. Surveyor and planner Gerry Turner, secretary of the Historic Sites Management Committee (Ross Dependency Research Committee) formed in 1980, saw the need for work at the huts to be

better managed. The first management plan for the historic sites, compiled by Turner and Harrowfield, addressed the need for an implementation plan concerning the archaeological recovery of artefacts with the objective to “progressively excavate snow and ice during favourable seasons, using specialist historic archaeology techniques [and to] record their location and nature and undertake the necessary conservation” (Turner 1978; Turner and Harrowfield 1984). In 1981, Turner and the first professional conservator, Jack Fry from the National Museum (now the Museum of New Zealand Te Papa Tongarewa), visited the Ross Island huts. This marked the beginning of a new approach.

In 1982 Canterbury Museum mounted the first expedition since 1961 to work at Cape Adare. Work focused on documentation of the site, which is located on a 73 ha cusped foreland. In addition to detailed drawings and other records of the three huts, physical geographer Mark Mabin and Harrowfield compiled a survey plan of the site, noting caches of supplies and scattered artefacts. These records were used to complete the first inventory. Because of the steady accumulation of guano from Adelié penguins, the survey was considered essential. It would enable a better understanding of Borchgrevink’s and Campbell’s expeditions and provide a useful record for the future. The cross on Nicolai Hanson’s grave, the first known grave in Antarctica, was restored. Other observations were made relating to salt deposition and the effects of wind on the huts and surrounding ground surface. These led to the first use of a wind tunnel for Antarctic historic huts. The laboratory work was undertaken at the Department of Mechanical Engineering, University of Canterbury, in a 1.22 m square section x 12.2 m long wind tunnel, with the aim of confirming field observations (Harrowfield 1982, 1984).

ANTARCTIC HERITAGE TRUST

After completion of the first five-year management plan for the Ross Sea region sites and the formation in 1987 of the Antarctic Heritage Trust (superseding the Historic Sites Management Committee), a new Heritage Management Plan (Cochran 1990) was developed in which guidelines specified how to recover ‘icebound artefacts’. The Trust recommended that no archaeological work should be undertaken without prior approval and then only by persons with appropriate knowledge and experience; that adequate planning must be done and that excavation or removal must be in accordance with the Antarctic Treaty 1959 and the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) 1991.

PROFESSIONAL ARCHAEOLOGISTS IN THE ROSS SEA REGION

In 1987, the year New Zealand’s Antarctic Heritage Trust was formed, the first professional archaeologists from New Zealand, Neville Ritchie (Department of Conservation) and Alexy Simmons, visited Ross Island and assessed work at Cape Evans. Although they had consulted literature resulting from projects in the High Arctic, they soon discovered the deficiencies in archaeological techniques involving the extraction of artefacts from ice and frozen ground (Ritchie and Simmons 1987).

The following summer Ritchie and Nelson Cross, also Department of Conservation, excavated the collapsed stores annex built in 1911, which contained boxes of provisions put there by H.R. Bowers, a member of Scott’s 1910–13 expedition (Fig. 5). This was a challenging operation, not only because of the cold working conditions but because,

according to Ritchie, “the box wood had in effect freeze-dried and become so brittle that it was extremely difficult to remove the boxes without breaking them. In the end we had to resort to taking many of the boxes apart board by board and reassembling them” (Ritchie 1988: 5, 1990a).



Figure 5: Neville Ritchie (front) and Nelson Cross excavating Bower’s stores annex at Cape Evans, 1988–89, photo Chris Rudge (Antarctica New Zealand collection).

Butter Point on the Bowers Piedmont Glacier was first used as a depot site in October 1902 when Scott left one tin of butter for each of the three sledging parties. The locality was used again in 1908, 1911 and by the Ross Sea Party of the Commonwealth Trans-Antarctic Expedition in 1955–58. In October 1985, ablating ice revealed supplies placed in 1911, and in January 1988 Ritchie and Cross recovered the remaining artefacts, which were documented and placed in storage pending conservation. A notable feature was the

presence of some provisions no longer represented at the Cape Evans hut. Today nothing remains of the site (Ritchie 1988).

The following season Ritchie and Cross, assisted by Harrowfield, turned their attention to the ice-filled stables at Cape Evans, which had been partially excavated in 1961 and examined by New Zealand Antarctic Society 'hut caretakers' in the 1970s. Both projects involved the testing of new ice excavation techniques, including electrically-powered percussion tools, equipment producing heat and hot air, and a small electric chain saw (Ritchie 1989a, 1989b, 1990b). As before, the numerous artefacts found were plotted in relation to structures and detailed plans were compiled. Archaeologist Roger Fyfe completed the work on the stables during the following summer (Fyfe 1990).

In January 1990, Harrowfield was instructed to excavate a natural deposit within the deteriorating unroofed Borchgrevink's stores hut at Cape Adare and to return any artefacts to New Zealand for conservation. This was necessary in order that an assessment could be made of the condition of the structure. The only known work on a similar structure, a rock-walled, unroofed stores hut, was at Dealy Island in the Canadian Arctic (Janes 1982). Using available and improvised equipment, the system adopted was that used by Ritchie on Bower's stores annex at Cape Evans.

Once a measured floor plan of visible artefacts had been compiled, the method was to work down through the estimated 6m³ of ice, with lenses of wind-blown beach gravel and guano, and to record stratigraphy and the position of artefacts located. Internal structures around two walls were located, including sleeping platforms placed in 1911. The numerous artefacts included a rifle scabbard, cutlery, sledge meters and an ice melter associated with Borchgrevink's expedition and the Northern Party. The stratigraphy represented a record of snow, ice and sediment accumulation from major storm events since abandonment of the site in 1912 (Harrowfield 1991). A second ground survey of the site (Harrowfield 1990) and a further inventory of artefacts were also completed. The most recent visit to this remote site was in January–February 2003 when a detailed artefact inventory, architectural and engineering surveys were completed by Harrowfield, Nigel Watson (Executive Director Antarctic Heritage Trust), engineer and project manager Aaron Smail (Arrow International Ltd) and conservation architect Michael Morrison (Purcell, Miller, Tritton UK). Many artefacts mapped about the site in 1982 and 1990 were now buried by guano and beach gravel or had blown away.

Fyfe returned to Ross Island in 1992 and was able to undertake the first survey of the stone hut built in mid-winter of 1911 at Cape Crozier, during the now famous 'worst journey in the world' undertaken on Scott's 1910–13 expedition. The hut, with its collapsed rock walls, had been rediscovered by Sir Edmund Hillary and others in March 1957, when a large number of artefacts were salvaged and returned to museums in New Zealand. Fyfe, who compiled sketches and a photographic record, recommended that a "proper archaeological survey be done" (Fyfe 1992). However, time at Cape Crozier is always limited and there is no way of establishing in advance whether the site is filled with ice and snow. Harrowfield made the next Antarctic Heritage Trust visit to Cape Crozier in February 2002, when measured sketches were compiled and photographs taken. Harrowfield, together with Watson, revisited the site in January 2003, and undertook further documentation, although on this occasion the structure was largely filled with ice and snow.

Also in 2002 and 2003, visits were made to another rock structure at Granite Harbour on the western side of McMurdo Sound. Here, in November 1911, a 'kitchen' roofed with a sledge and seal skins had been constructed by the Second Western Party on Scott's 1910–13 expedition. As at the shelter at Cape Crozier, the sledge and other artefacts were left behind. 'Granite House' was next seen by US geologists in November 1959 and although

many visitors had since been to the site and compiled a useful photographic record, no measurements or other details had been documented. In December 1981, Turner and Fry assessed the site; however, it was not until 2002 that Harrowfield was able to compile sketches and measurements and the following summer, with Watson, uplift the remains of the sledge. These were by now scattered among large granite boulders 45 m north-west of the site (Harrowfield 2003).

Ritchie and Fyfe worked on Ross Island in December 1994, when their work included an assessment of historic caches at Cape Royds. They also took the opportunity to visit Inexpressible Island, north of Terra Nova Bay, to uplift a cache of provisions and equipment placed as an emergency depot in 1913. Using the helicopter GPS the site was quickly located. The cache was documented and the artefacts (some of which were frozen in situ), were recorded, then carefully extracted using hand tools, wrapped in bubble plastic sheeting, and transported back to Scott Base (Ritchie and Fyfe 1995). An extensive clean-up was also made of historic rubbish on the ground at Cape Evans during this season.

No archaeological excavation has been conducted at any of the Ross Sea region sites since 1994, although over the last ten years Harrowfield and archaeologist Sheridan Easdale have assessed deposits at Cape Royds and Cape Evans for the Antarctic Heritage Trust. In 1999, Canterbury Museum archaeologist Chris Jacomb and Oivind Ruud from UNAVCO (University NAVSTAR Consortium) assisted by Harrowfield, used real-time kinematic GPS and a plane table telescopic alidade to map and describe deposits and artefact scatters about Scott's hut at Cape Evans (Fig. 6). However, Jacomb noted that there is a need for greater emphasis in the Antarctic Heritage Trust's Heritage Management Plan on the importance of archaeological deposits and that "issues to consider, include the integrity of spatial relationships and possibilities of sub-surface remains" (Jacomb 1999).

COMMONWEALTH BAY

In January 1978, soon after the advent of archaeology in the Ross Sea region, a party led by Rod Ledingham from Australian Antarctic Division, using chain saws, ice axes and an electric percussion hammer, began excavations at Mawson's huts (Australasian Antarctic Expedition 1911–14) on Cape Denison at Commonwealth Bay and found almost half the interior ice free. No archaeologist was in the party; however, artefacts were carefully documented and replaced in their original positions and the work was recorded on plans and with cine and still film. Some books and magazines were returned to Australia for conservation (Ledingham *et al.* 1978; Ledingham 1979).

After a break of seven years, Australian 'expeditioners' returned to Mawson's huts at Commonwealth Bay in 1984–85, when a privately-sponsored expedition named 'Project Blizzard' undertook the first of two consecutive seasons' work. With shovels and ice axes, a tunnel was driven into the almost completely snow-filled interior. The site was surveyed, archaeological features, including individual items and clusters of artefacts, were catalogued by William Blunt and archaeologist Estelle Lazer, observations were made of salt levels and experimental coatings were applied to metals and wood. For recording within the hut, string lines and a tape were used to note the location of artefacts and other features — a relatively simple process, which could have been undertaken at Hut Point and Cape Evans. The survey showed that cultural material extended over the entire extent of Cape Denison (Lazer 1985a, 1985b; Chester 1986; Blunt 1991).

The following summer (1985–86), archaeologist Angela McGowan was assisted by materials conservator Janet Hughes. This was the first occasion when an archaeologist and



Figure 6: Chris Jacomb plotting the position of artefacts in a 1911 rock shelter with historic rubbish dump at Cape Evans, 1998–99 (David Harrowfield collection).

a conservator worked together at sites in Antarctica. A materials conservation survey was undertaken and previously identified problems were confirmed. Hughes recommended that guidelines be established on the handling of artefacts exposed during excavation (Hughes 1986). Inside Mawson's huts where support posts for the inner ceiling had to be installed, McGowan excavated four trenches, but without reference to an overall grid. The depths of artefacts were measured, their distribution was described and sections were drawn relative to datum lines. These excavations, although limited, were carefully done and clear stratigraphic units within snow and ice over the floor were documented and identified (Chester 1986; McGowan 1986, 1987, 1988).

Both Lazer and McGowan identified a range of specific problems associated with the site and recommended that "if archaeology is to be undertaken on the place for its own purpose, as distinct from that associated with conservation work, salvage or recovery of artefacts, then that work must be preceded by the formulation of an archaeological research design" (Hughes 1986; Blunt 1991 Vol. 2: 35).

'Project Blizzard' should be proud of its achievement. Not only did the two expeditions stimulate increased efforts for conservation of the site, but also their work nurtured co-operative efforts between the public and private sector and created awareness of the need for the conservation of Mawson's huts (Godden, Mackay, Logan 2001). This work led to a visit in 1986 by conservation architect Michael Pearson, from the Australian Heritage Commission (Pearson 1986), and formation of an Antarctic Historic Sites and Monuments Advisory Committee the same year. It also led, in 1991, after a visit to Cape Denison by a tourist vessel, *MV Frontier Spirit*, when funds were raised by passengers, to the formation

of a Mawson's Huts Technical Committee, ably chaired by Sir Peter Derham, with Malcolm Currey as secretary. The objectives of the committee were to develop a conservation plan for Mawson's huts and to seek sponsorship for the work. As a member of the committee, Harrowfield advised on strategies for work at sites in the Ross Sea region. Although the committee was unable to enlist the major sponsorship required, much useful work was achieved, including a conservation plan (Pearson 1993).

With the establishment of the AAP (Australian Associated Press) Mawson's Huts Foundation in 1996 chaired by David Jensen, and with support from the Australian Antarctic Division and Australian Heritage Commission, the conservation programme took a significant step forward. The first expedition to Commonwealth Bay since 1985–86 took place in the 1997–98 season (Fig. 7). Major work accomplished by volunteers included stabilising the living hut from which ice was removed using an electric chainsaw and variable speed grinder for working around structural elements and artefacts. In architect Geoff Ashley's words, "the removal of ice and snow revealed a magnificent space which underscored the design qualities and inherent functional value of the hut as a great piece of architecture. These values should not be obscured again by further ice build-up" (Ashley 1998: 5; Ashley and Mackay 2004).

Archaeologist Lazer, who accompanied the party, advised on ice removal, meticulously recorded a large number of artefacts in the hut and about the site, and supervised the collection of horizontal and vertical ice cores. A forensic examination was made of a dog carcass from Mawson's expedition (Fig. 8), found on the Polar Plateau (Australian Associated Press 1998; Godden Mackay 1998; Lazer 1998a, 1998b). A Mawson's Huts Foundation Seminar then followed, at which progress was reviewed and plans discussed for the future.

Following publication of the Mawson's Huts Conservation Management Plan by heritage consultants Godden, Mackay, Logan (2001), the most recent programme undertaken by the AAP Mawson's Huts Foundation was in 2002–03. Some ice and snow, estimated to fill sixty percent of the space in the main hut (Easther 2001), was removed from the interior of the main hut and the adjoining workshop, and Lazer's archaeological programme included a further survey, documentation, cataloguing and photographic record of artefacts around the main hut and the environs. Unlike other sites in Antarctica, much of this site remains untouched and a number of new artefacts were located along with a cache of seal carcasses. As was done for the Ross Sea region sites, Australia has proposed that the whole of Cape Denison be identified as an Antarctic Specially Managed Area (ASMA). Australia has also recommended a higher level of protection as an Antarctic Specially Protected Area (ASPA) to apply to the 'Visual Protection Zone' that is, Mawson's Huts visual catchment.

THE ANTARCTIC PENINSULA REGION

The diverse historic sites on the Antarctic Peninsula and adjacent islands have attracted the attention of archaeologists and others from a number of countries.

On the Byers Peninsula on the western half of Livingston Island, north of Snow Hill Island in the South Shetland Islands, British Antarctic Survey scientists have examined numerous sealers' refuges from the 1800s. The first comprehensive archaeological survey was undertaken between December 1957 and March 1958, when many sites including ship timbers, remains of stone and wood huts, occupied rock shelters, caves and walls were described. During a later visit in 1981, Ron Lewis-Smith and H. Simpson noted



Figure 7: Geoff Ashley and Ted Bugg using a Spire corer to determine snow accumulation within the workroom roof at Mawson's huts, 1997–98 (courtesy of Alasdair McGregor, Australia).

that while many vessels are known to have foundered along the rock coasts of the South Shetland Islands, there are no known sealers' graves, and although there has been undoubted souveniring, many artefacts are still present at the sites (Lewis-Smith and Simpson 1987).

Archaeologists in Argentina have long been interested in Heroic Era sites located on the Antarctic Peninsula. These include a wooden hut on Snow Hill Island and two rock huts at Hope Bay and on Paulet Island, associated with Otto Nordenskjöld's Swedish South Polar Expedition 1901–04. In 1979–80 and 1980–81, archaeologist Santiago Commerci excavated a variety of artefacts from frozen ground. Items including clothing, footwear, tools and utensils were extracted and wrapped in polythene to protect them from solar radiation (Commerci 1981, 1983; Capdevila and Commerci 1986). At this time, Nordenskjöld's hut contained ice ranging in depth from 1.8 to 0.3 m (Goldberg *et*



Figure 8: Estelle Lazer examining the carcass of a sled dog at Mawson's huts, 1997–98 (courtesy of Alasdair McGregor, Australia).

al. 2001). Although numerous artefacts including utensils were recovered, no plan of their positions was compiled. Since 1981 Ricardo Capdevila has worked every year except two on Snow Hill Island; a truly remarkable record.

Since 1983 Chilean archaeologists from the Museo Nacional de Historia Natural have been interested in sites on beaches of the Fildes Peninsula, King George V Island (Stehberg 1983).

In the 1988–89 and 1989–90 seasons, archaeologists from Argentina again visited Nordenskjöld expedition sites, where Capdevila and others undertook surveys, carried out general maintenance of Nordenskjöld's hut on Snow Hill Island, and retrieved artefacts for conservation from Paulet Island (Capdevila 1990). Further work was undertaken between 1992 and 1998 by Capdevila at Nordenskjöld's stone hut at Hope Bay on Snow Hill Island, and at the stone hut on Paulet Island. The latter site, located like Borchgrevink's huts at Cape Adare in an Adelié penguin rookery, now has a large metal fence erected around the hut (Headland to Harrowfield pers. comm. 2004) and a similar tactic may have to be instituted at Cape Adare.

Restoration of Nordenskjöld's hut on Snow Hill Island was commenced in 1981 by Dirección Nacional del Antártico. At the time, the interior contained ice up to 1.8 m deep. During excavation numerous artefacts were found. These included a Husqvarna No.6 cooking stove, enamel plates, casseroles, a coffee pot, coffee grinder and cutlery. Walls and ceilings were cleaned and benches and bunks were repaired. On the exterior, 3 mm tarred felt identical to the original was attached to the walls, window frames were repaired and hemp tie-downs were attached. Because the 3–7 m high knoll on which the hut was



Figure 9: The restored Nordenskjöld hut on Snow Hill Island, 2000–01 (courtesy of Fred Goldberg, Sweden).



Figure 10: Fred Goldberg documents the roof of Nordenskjöld's hut on Snow Hill Island, 2000–01 (courtesy of Fred Goldberg, Sweden).

located was unstable, vertical aluminium panels were installed in the ground (Goldberg *et al.* 2001) (Figs 9, 10).

In the summer of 1989–90, Dag Nævestad and Bjørn Basberg made a detailed industrial archaeological survey of two whaling stations, Husvik and Stromness, on the island of South Georgia. The objective was to collect basic information on what was left at the stations and a detailed photogrammetric survey was completed (Nævestad *et al.* 1996).

The following year, Louwrens Hacquebord from the Department of Archaeology at the University of Groningen conducted a survey of what was left of the 1906 whaling station at Whalers' Bay on Deception Island, also the site of Base B — the meteorological station established by the British naval expedition (Operation Tabarin 1) 1943–44 (Hacquebord 1992).

On Stonington Island, off the west coast of the Antarctic Peninsula, are remains of East Base in Marguerite Bay, built in 1940 and closed down in 1948. The base was the site of two expeditions — the United States Antarctic Service Expedition 1939–41 led by Richard Black and the private (albeit government-supported) Ronne Antarctic Research Expedition 1947–48 led by Finn Ronne. East Base represented the United States' first permanent presence in Antarctica and was also the location where women, Edith "Jackie" Ronne and Jennie Darlington, first wintered. The base was then abandoned, although the main building was used by later British parties to store seals, for sled repair and rope storage and became incorporated into the British operation.

In February–March 1991, United States National Park Service personnel, Catherine and Robert Spude, visited the site, prepared a site plan and assessed the cultural resources of East Base, which was now protected under the Antarctic Treaty. They documented and sampled a substantial amount of equipment including a tank, tractor, spare aircraft engine, equipment, coal and food caches and other supplies present. Preservation of organic materials was noted to be very good, although metals had suffered considerably, with most iron-based objects severely corroded. It was recommended that rubbish dumps, which "have the potential to yield important information of interest to scientists studying human disposal patterns or the degradation of materials (medicines, organics) over time", be given a layer of light gravel to protect them for future archaeological investigation (Spude and Spude 1993). The following summer a field party led by archaeologist Noel Broadbent of the US National Science Foundation Division of Polar Programs removed snow, carried out repairs and collected and catalogued artefacts (Parfit and Kenrick 1993).

Following a conservation survey in 1994 by British Antarctic Survey, work was undertaken at Base A (Operation Tabarin 1), established at Port Lockroy on Goudier Island and Wiencke Island in February 1944 and occupied continuously until 1962. In 1996, New Zealand conservation architect Chris Cochran completed a conservation report for the British Antarctic Survey and UK Antarctic Heritage Trust (Cochran 1996). A stores building resembling a 'Nissen hut' was, like Borchgrevink's stores hut at Cape Adare, occupied by nesting penguins and, in Cochran's words, "was a complete shambles". The remains were 'excavated', a floor plan and photographic record was compiled and the numerous artefacts discovered were listed (Burkitt 1996; Cochran to Harrowfield pers. comm. 2003). Although it has been suggested that archaeologists should undertake work at the site, this has not eventuated (Ian Collinge to Harrowfield pers. comm. 2004).

Further investigations and site surveys on beaches of the Fildes peninsula in the South Shetland Islands have been carried out since 2000 using GPS and mapping. Here sites are at risk from human factors and Stehberg points out there is an urgent need for a conservation and management plan for the sites (Stehberg *et al.* 2002; Stehberg 2004).

DISCUSSION AND CONCLUSIONS

Most historical archaeology in Antarctica has been carried out by archaeologists from New Zealand, Australia, Argentina and Chile, with lesser work by the United States. No controlled site excavations have been undertaken by British archaeologists.

In contrast to fieldwork done at temperate latitudes, fieldwork in Antarctica is restricted to a few weeks each summer and is reliant on fine weather. With the Heroic Era huts now mostly clear of ice and with improved methodology and equipment, there is much that can still be achieved about the huts.

Sites such as Cape Evans, Commonwealth Bay, East Base and the former US (1957–59)/Australian (1959–60) base, Wilkes Station, offer great potential for historical archaeology. However strict controls are now in place for any work through national programmes, such as that of Antarctica New Zealand, and all work at the historic sites, whatever it may be, must be weighed against the relevant Conservation Plans and formally sanctioned. Furthermore, all work must be undertaken according to accepted scientific and international standards. It is vitally important that any archaeological work, particularly excavation, takes into consideration the ICOMOS (1990) Charter for The Protection and Management of the Archaeological Heritage, in which Clause 1 states:

The “archaeological heritage” is that part of the material heritage in respect of which archaeological methods provide primary information. It comprises all vestiges of human existence and consists of places relating to all manifestations of human activity, abandoned structures and remains of all kinds (including subterranean and underwater sites), together with the portable cultural material associated with them.

In comparison with historical archaeology undertaken over several decades in the Arctic, for example, at locations such as the seventeenth century whaling stations in Svalbard (Hacquebord 1980), the site of Willem Barentz house (1594) and other remains on Novaya Zemlya (Boyarsky 1990; Hacquebord 1995), and at Kellett’s storehouse on Dealy Island (Janes 1982), such research in Antarctica is still very much in its infancy. However, the work already undertaken there has considerably enhanced our knowledge of Heroic Era sites in particular.

Such investigations have also led to a better understanding of the sites already well documented in books, pictorial collections, diaries and other manuscripts, including ship cargo manifests, and in museum collections of artefacts. While there is undoubtedly a great future for historical archaeology in Antarctica, it can be argued that this may always remain second to such records. Ritchie notes (Ritchie pers. comm. to Janet Davidson 2004), “there still remains an incredibly rich and valuable, historical and unique scientific resource in Antarctica and there is much to be learned from it yet by the application of professional archaeological techniques, including curatorial and conservation skills.”

While the Antarctic Heritage Trust has, for some years, included professional conservators from Australia and New Zealand in work parties, as demonstrated by Australia in 1985–86 and with some projects in the High Arctic, a conservator should be present when archaeological excavations are undertaken. This was stressed by Turner (1978) and Ritchie (1989a), while Jacomb (1999) recommends appropriate amendments to the Antarctic Heritage Trust’s Heritage Management Plan.

Antarctica offers great potential for multi-disciplinary research. A study by scientists at the Universities of Waikato and Minnesota (Twin Cities) has recently demonstrated

how multi-disciplinary research can be applied to the study of the Ross Island huts and artefacts, with important new results on biodiversity and on non-biological and biological deterioration (Farrell *et al.* 2004).

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