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The Preservation and Ethnohistory of a Frozen Historic Site in the Canadian Arctic

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ABSTRACT. In 1853 a British Naval Expedition, involved in the search for the missing British Naval Northwest Passage Expedition under the command of Sir John Franklin, constructed a stone storehouse on Dealy Island off the coast of Melville Island, Northwest Territories. This storehouse was stocked with a complete inventory of supplies used in mid-19th century arctic exploration.

Excellent documentary sources pertaining to the origin and the abandonment history of this site indicate that it underwent a series of diverse alterations since its abandonment. Many of these alterations were found to be archaeologically invisible. The extant remains would have resulted in a crippling misinterpretation of the facts had written records not been available.

Because of the conservation problems posed by this extraordinarily large and rich collection of frozen material, traditional archaeological approaches were rejected. Instead, the structure and its contents were preserved *in situ* by a multidisciplinary team of archaeologists, conservators and architects. It is hoped that the underlying philosophy of this approach and some of the techniques used are applicable to other frozen sites.

Examination of the historical record and available archaeological data indicates that the Dealy Island site played an insignificant role as an agent of culture change among the historic Inuit. Several factors are considered in arriving at this conclusion, including British ethnocentrism, the logistical requirements of naval exploration and the abandonment of the High Arctic by indigenous peoples during the Neo-Boreal climatic episode.

Key words: historic archaeology, conservation, ethnohistory, frozen-site archaeology

RÉSUMÉ. En 1853, une expédition navale britannique à la recherche d'un groupe d'expédition disparu en cherchant le Passage du nord-ouest sous la direction de Sir John Franklin, érigea un magasin de provisions en pierre sur l'île Dealy, au large de la côte de l'île Melville, dans les Territoires du Nord-Ouest. Cet entrepôt renfermait un inventaire complet des provisions nécessaires pour l'exploration arctique au milieu du 19^{e} siècle.

D'excellents sources documentaires portant sur l'historique de son origine et de son abandon signalent que le bâtiment a été sujet à diverses modifications depuis son abandon. Nombre de ces modifications n'ont pu être discernées par les archélogues, de sorte que, sans l'aide de ces documents, les restes actuels n'auraient permis qu'une interprétation erronée des faits.

En raison des problèmes de conservation présentés par cette riche et imposante collection de matériel congelé, les méthodes archéologiques traditionnelles n'auraient pu suffire. La structure et son contenu ont donc été préservés *in situ* par une équipe multidisciplinaire d'archéologues, de conservateurs et d'architectes. Il est à espérer que la philosophie fondamentale de cette méthode et de certaines des techniques employées sera applicable à d'autres sites en proie au gel.

L'étude de la documentation historique et des données archéologiques a indiqué que le site de l'île Dealy a joué un rôle important à titre d'agent de changement culturel parmi les Inuit historiques. De nombreux facteurs sont entrés en jeu lors de la décision, y compris l'ethnocentrisme britannique, les exigences en logistique présentées par l'exploration navale et l'abandon de l'Arctique boréal par les indigènes pendant l'épisode climatique néo-boréal.

Mots clés: conservation, archéologie historique, ethnohistoire, archéologie de sites en proie au gel

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INTRODUCTION

The Northwest Territories of Canada poses a variety of difficult archaeological conservation and research problems because of its size, diversity and isolation. It consists of 3 376 698 km^2 of forests, lakes and tundra north of the 60th parallel (Fig. 1). The population now numbers about 46 000 Athapaskans, Metis, Inuit and Euro-Canadians, who reside in and around 62 communities and speak eight languages.

The archaeological promise of this vast region is immense, spanning thousands of years of cultural adaptation in one of the most rigorous, inhospitable regions in the world. The historical archaeology is also significant and includes the record of those who searched for a Northwest Passage between the Atlantic and Pacific oceans during the 19th century. The preservation and interpretation of one such site resulting from this search is the subject of this paper.

Dealy Island, a small island at the entrance to Bridport Inlet on the southeast coast of Melville Island, was the scene of much activity in 1852 and 1853 (Fig. 1). A British Navy relief expedition under the command of Captain Henry Kellett wintered at this location while involved in the search for the missing Sir John Franklin and his 1845 British Naval Northwest Passage Expedition.

In the summer of 1853 Captain Kellett built a storehouse on Dealy Island and stocked it with provisions and supplies (Fig. 2). Until recently the remoteness of the Arctic ensured that this site remained largely undisturbed. All has changed now as the last two decades have seen an unprecedented explosion in non-renewable resource explo-

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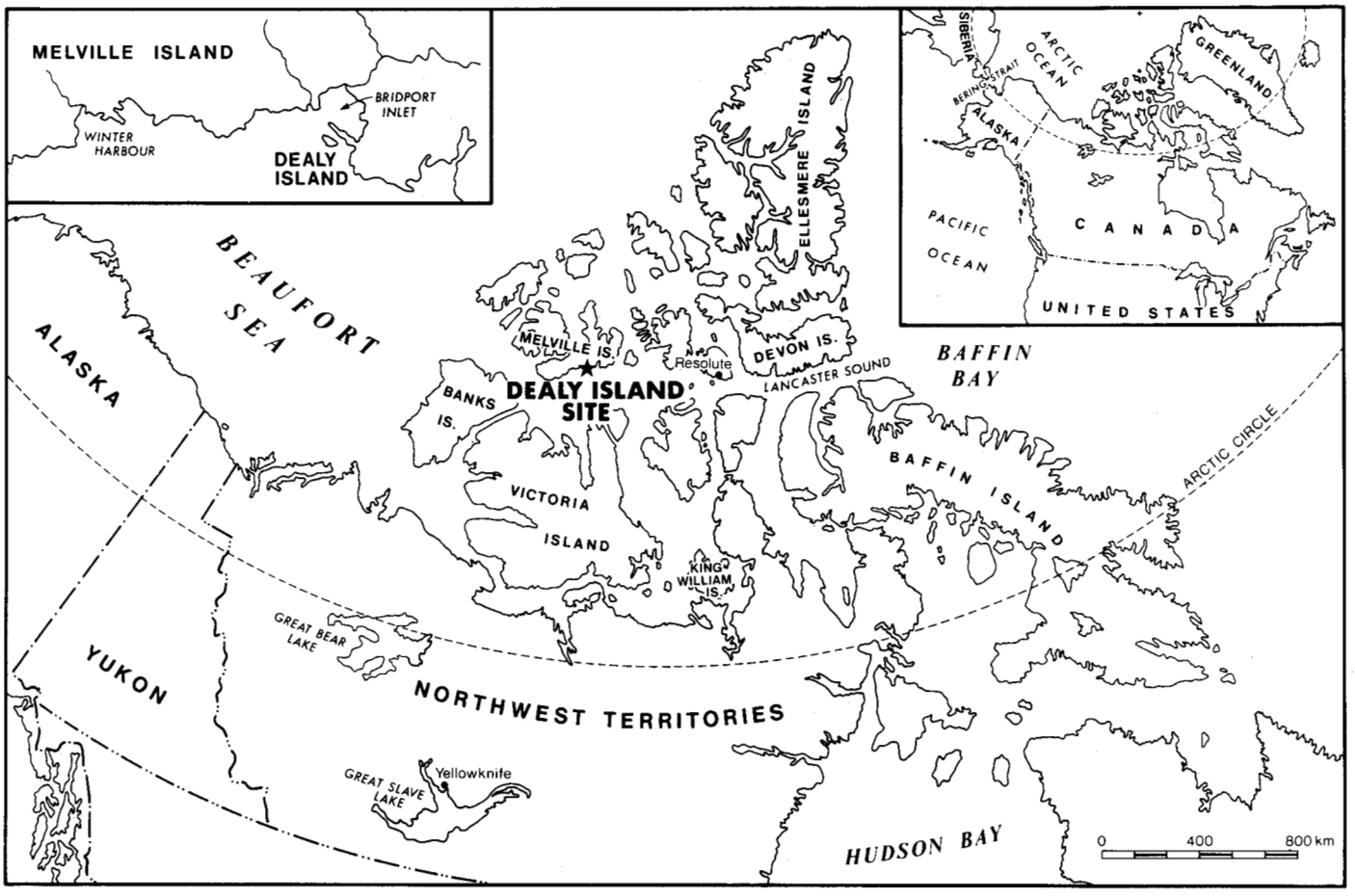


FIG. 1. Map showing the location of Dealy Island.

FIG. 2. Kellett's storehouse as it appeared in July 1978.

ration and exploitation, governmental activities and military presence. No place in the Northwest Territories is remote any longer.

By the early 1960s the storehouse was becoming an increasingly attractive stop for a wide variety of arctic visitors. The problems of site looting, disturbance and the continued deterioration of the storehouse were brought to my attention in 1977. As Director of the institution responsible for the care and protection of archaeological sites in the Northwest Territories, I undertook a reconnaissance of this site the same year with the purpose of assessing the structure, its contents and the extent of disturbance. This led to the preservation of the site in 1978, also under my direction. This report is most importantly a study in conservation archaeology in a part of the world where such terms are relatively new. Although several reports and papers have been prepared concerning various aspects of Kellett's storehouse, I attempt to present an overview of all the archaeological and conservation work done to date.

Because of the expensive logistics involved in any field operation in the Arctic, the decision to stabilize Kellett's storehouse was not made lightly. Apparently archaeologists are ceasing to excavate sites simply because they are there (McGimsey, 1981:32). The newly emerging conservation ethic must also carry with it sufficient justification for engaging in site preservation, however, as there will always be sites of more or less significance. One criterion of significance must always be the potential of a site to contribute to our knowledge of the past.

Of scholarly significance is the potential of the Dealy Island site to enhance our understanding of British exploration in the Arctic throughout the 19th century. Kellett's storehouse contains what appears to be the most complete collection of British Navy material culture yet to be found in the Arctic. Assuming that the Royal Navy brought with it a basic set of attitudes, values and associated artifacts, the Dealy Island material should provide insight into certain aspects of British exploration such as the self-sufficiency of the British logistical system, the nature of British exploration policies in the far north and the effects of Royal Navy expeditions as agents of culture change among the indigenous peoples (South, 1977). The Dealy Island site, with its exceptional collection and excellent historical documentation, is well suited for questions of broader historical and theoretical significance.

The historical context of Kellett's storehouse is outlined below, followed by a detailed discussion of the stabilization and restoration of the site. Comments on the unique requirements of frozen-site archaeology are offered in conclusion, along with observations on the anthropology of historic British exploration activities in northern Canada.

THE HISTORICAL CONTEXT

The construction of Kellett's storehouse on Dealy Island was but one tiny episode in the search for the Northwest Passage, which began centuries before Sir John Franklin became involved. The search was a consequence of the vision of Columbus, who, in seeking a short route to the Indies by sailing west, found his way blocked by America (Neatby, 1970:17). For a variety of reasons, including both scientific and commercial ones, explorers continued to search for a passage from England to the Bering Strait around or through the North American continent. Their searches brought them to the higher latitudes.

The year 1497 saw the first Northwest Passage expedition under the command of a British explorer, John Cabot. This was the beginning of an exploration epoch wherein eight countries sponsored nearly 70 expeditions in an attempt to travel across the extreme north of North America (Cooke and Holland, 1978:537). Roald Amundsen of Norway was in the end the first to complete the entire Northwest Passage by sea in 1903-06.

Kellett's storehouse is an indirect result of one of these voyages of discovery — the last British Naval Northwest Passage Expedition under the command of Sir John Franklin.

Leaving London in the spring of 1845, this expedition was last seen by two whaling vessels two months later in northern Baffin Bay, heading for Lancaster Sound (Fig. 1). After that, the members of the expedition were never again seen by white men. The fate of the expedition has now been pieced together and can be summarized as follows (Cooke and Holland, 1978:174-175). The two expedition ships were trapped in the ice to the north of King William Island from the fall of 1846 to the spring of 1848, during which time Franklin died. The ships were then abandoned and the survivors (105 men of the original 129) set out southward towards the mainland, on foot and drawing heavy sledges. The entire expedition perished before reaching safety, succumbing en route to scurvy, starvation, exposure and perhaps other causes that may never be known to us.

Francis Leopold McClintock, whose search expedition retrieved the only two written records of the Franklin expedition ever found, noted the following in 1859 upon finding a large boat which had been dragged by Franklin's men as they struggled toward the mainland:

> Amongst an amazing quantity of clothing there were seven or eight pairs of boots of various kinds — cloth winter boots, sea boots, heavy ankle boots, and strong shoes. I noted that there were silk handerkerchiefs — black, white, and figured — towels, soap, sponge, tooth-brush, and hair combs; mackintosh gun-cover, marked outside with paint A12, and lined with black cloth. Besides these articles we found twine, nails, saws, files, bristles, wax-ends, sailmakers' palms, powder, bullets, shot cartridges, wads, leather cartridge-case, knives-clasp and dinner ones — needle and thread cases, slow-match, several bayonet-scabbards cut down into knife-sheaths, two rolls of sheet-lead, and, in short, a quantity of articles of one description and another truly astonishing in variety, and such as, for the most part, modern sledge-travellers in these regions would consider a mere accumulation of dead weight, but slightly useful, and very likely to break down the strength of the sledge-crews. (McClintock, 1972: 266-67).

His observations are a grim revelation.

The main facts regarding the demise of the Franklin expedition, presented so summarily above, were obtained at very great cost. The search for the missing Franklin began in 1847 and continued until 1880, involving 24 government and private expeditions (Pullen, 1979:13-14). The search expeditions, no less than the missing Franklin party, were subjected to the same dangers and privations. They, too, sometimes required assistance. The British Naval Franklin Search Expedition, under the general command of Sir Edward Belcher, was sent out by the British Admiralty in 1852 to continue the search for Franklin and to carry provisions to Melville Island to assist another British naval searching expedition that had not been heard from since its departure in 1850.

Captain Henry Kellett was in command of the two ships charged with sailing to Melville Island. Parting from the rest of the fleet in 1852, he headed westward with the aim of finding the lost rescuers. His destination was Winter Harbour on the south coast of Melville Island (Fig. 1), but he did not make it that far. By September of the same year the ships were frozen in the ice less than a kilometre east of Dealy Island (Kellett, 1854:86). Forced to spend the winter in this location, Kellett ordered the construction of the storehouse on Dealy Island.

Although Kellett failed to find any trace of the missing Franklin expedition, he did encounter the lost search party led by Robert McClure on Banks Island, and is credited with averting yet another arctic disaster. The other missing ship, under the command of Richard Collinson, was apparently the main reason for the construction of the depot house (Kellett, 1854:87). With Collinson's whereabouts thought to be somewhere in the western Arctic, Kellett was under orders to deposit provision caches for this and future expeditions in dire circumstances. As it turned out, Collinson returned safely to England in 1855 (Cooke and Holland, 1978:187-188).

THE CONSTRUCTION AND PROVISIONING OF THE STOREHOUSE

The story of the western division of Belcher's search expedition has been recorded in a detailed and graphic account by the sailing master of Kellett's ship, George F. McDougall (1857). His narrative, along with the official dispatches of Captain Kellett, contains information on the construction of the storehouse. Together these accounts provide the context for a study in text-aided archaeology.

Advance work began in September of 1852, when a boat and a portion of the wooden casks containing the provisions were landed on Dealy Island. This task was completed in February of the next year and the foundation for the building was laid in May of 1853 (McDougall, 1857:245). Kellett, differing slightly from McDougall with respect to the beginning of construction, described the project in a later memorandum to the British Admiralty (Kellett, 1855:79):

> This is a house which I have named the "Sailors Home," under the especial patronage of my Lords Commissioners of the Admiralty.

Here, royal sailors and marines are fed, clothed, and receive double pay for inhabiting it. The first stone was laid on the 1st June 1853; the building completed and ready for occupation on 23d July 1853, under the able direction of Mr. Dean, carpenter of H.M. Ship "Resolute". Dimensions, 40x14 feet: the walls are four feet thick, the east wall nine feet high, the western seven; it has taken about one hundred tons of stone to build it. The roof is supported by pillars in the centre, is covered, first with new canvass tarred, then a covering of coal bags, and lastly with new canvass painted white. The accompanying plan shows how the provisions are stowed, and where the drains are dug (Fig. 3).

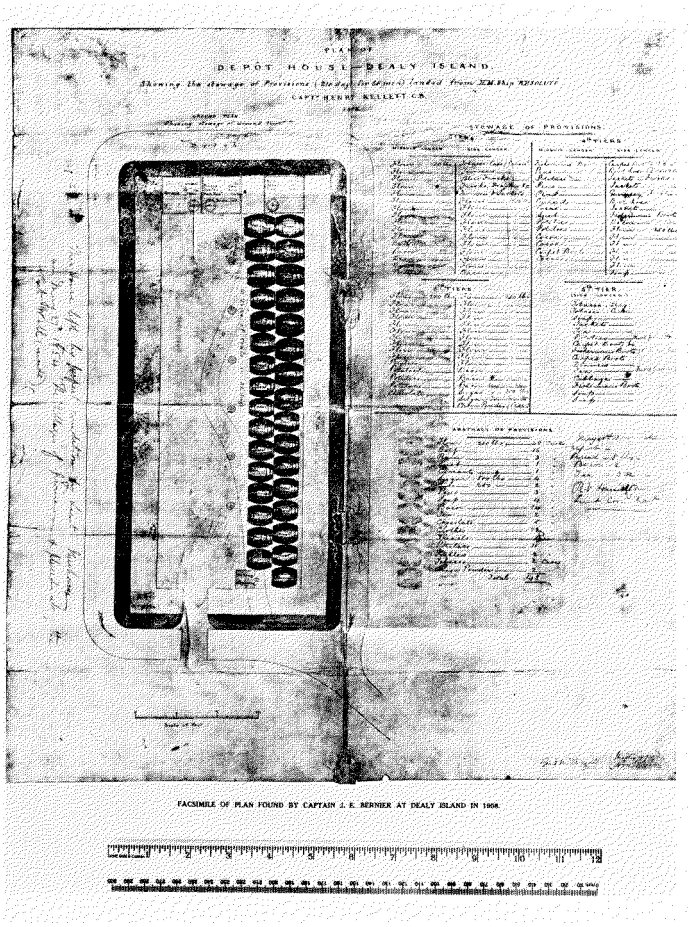
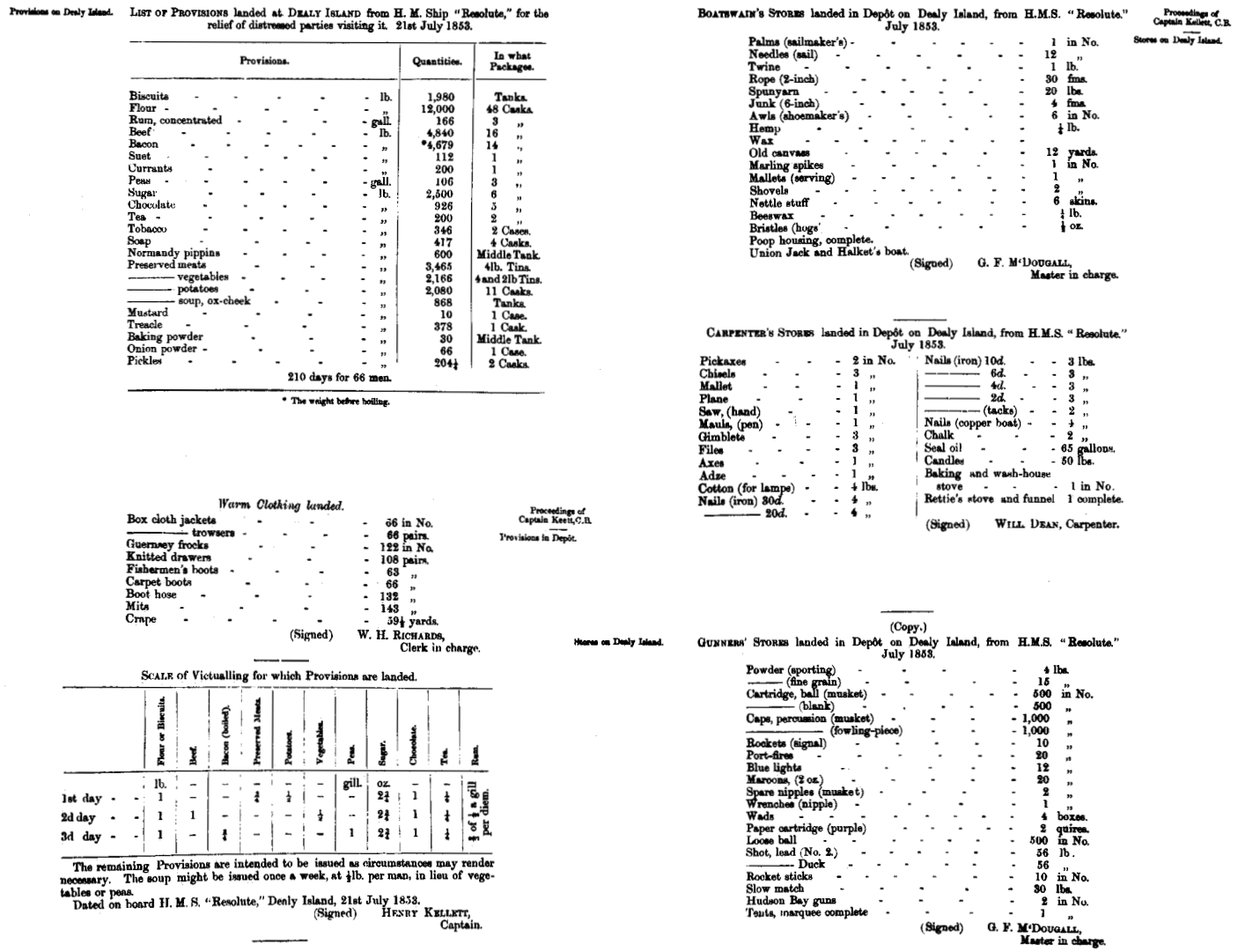


FIG. 3. Facsimile of Kellett's plan showing the storage of provisions within the storehouse. Courtesy of the National Map Collection, Public Archives of Canada.

The provisions left here are sufficient to sustain a party of sixty-six men on full allowance for two hundred and ten days, with stores, ammunition and fuel (Fig. 4).

The original memorandum was placed in the storehouse and contained, in addition to the above, notes on the safest routes to rendezvous, the number of hours that men should travel and rest and the provisions with which they should be supplied. Captain Kellett was a thorough and painstaking officer. It should be noted that Kellett's blithe reference to inhabiting the storehouse was apparently intended for future visitors rather than his own men, who were quartered on board the ships during their sojourn at Dealy Island. With construction of the storehouse completed in late July, Kellett's expedition sailed east in August.



Provisions on Dealy Island.

LIST OF PROVISIONS landed at DEALY ISLAND from H. M. Ship "Resolute," for the relief of distressed parties visiting it. 21st July 1853.

Provisions.		Quantities.	In what Packages.
Biscuits	lb.	1,980	Tanks.
Flour	"	12,000	48 Casks.
Rum, concentrated	gall.	166	3 "
Beef	lb.	4,840	16 "
Bacon	"	*4,679	14 "
Suet	"	112	1 "
Currants	"	200	1 "
Peas	gall.	106	3 "
Sugar	lb.	2,500	6 "
Chocolate	"	926	5 "
Tea	"	200	2 "
Tobacco	"	346	2 Cases.
Soap	"	417	4 Casks.
Normandy pippins	"	600	Middle Tank.
Preserved meats	"	3,465	4lb. Tins.
——— vegetables	"	2,166	4 and 2lb Tins.
——— potatoes	"	2,080	11 Casks.
——— soup, ox-cheek	"	868	Tanks.
Mustard	"	10	1 Case.
Treacle	"	378	1 Cask.
Baking powder	"	30	Middle Tank.
Onion powder	"	66	1 Case.
Pickles	"	204½	2 Casks.

210 days for 66 men.

* The weight before boiling.

Warm Clothing landed.

Box cloth jackets	56 in No.
——— trowsers	66 pairs.
Guernsey frocks	122 in No.
Knitted drawers	108 pairs.
Fishermen's boots	63 "
Carpet boots	66 "
Boot hose	132 "
Mits	143 "
Crape	39½ yards.

(Signed) W. H. RICHARDS, Clerk in charge.

Proceedings of Captain Kellett, C.B.

Provisions in Depôt.

SCALE of Victualling for which Provisions are landed.

	Flour or Biscuits.	Beef.	Bacon (boiled).	Preserved Meats.	Potatoes.	Vegetables.	Peas.	Sugar.	Chocolate.	Tea.	Rum.
	lb.	–	–	–	–	–	gill.	oz.	–	–	
1st day	1	–	–	¾	½	–	–	2½	1	½	¼ of a gill per diem.
2d day	1	1	–	–	–	½	–	2½	1	½	
3d day	1	–	¾	–	–	–	1	2½	1	½	

The remaining Provisions are intended to be issued as circumstances may render necessary. The soup might be issued once a week, at ½lb. per man, in lieu of vegetables or peas.

Dated on board H. M. S. "Resolute," Dealy Island, 21st July 1853.

(Signed) HENRY KELLETT, Captain.

Stores on Dealy Island.

BOATSWAIN'S STORES landed in Depôt on Dealy Island, from H.M.S. "Resolute." July 1853.

Proceedings of Captain Kellett, C.B.

Stores on Dealy Island.

Palms (sailmaker's)	1 in No.
Needles (sail)	12 "
Twine	1 lb.
Rope (2-inch)	30 fms.
Spunyarn	20 lbs.
Junk (6-inch)	¼ fms.
Awls (shoemaker's)	6 in No.
Hemp	½ lb.
Wax	
Old canvass	12 yards.
Marling spikes	1 in No.
Mallets (serving)	1 "
Shovels	2 "
Nettle stuff	6 skins.
Beeswax	½ lb.
Bristles (hogs'	½ oz.
Poop housing, complete.	
Union Jack and Halket's boat.	

(Signed) G. F. M'DOUGALL, Master in charge.

CARPENTER'S STORES landed in Depôt on Dealy Island, from H.M.S. "Resolute." July 1853.

Pickaxes	2 in No.	Nails (iron) 10d.	3 lbs.
Chisels	3 "	——— 6d.	3 "
Mallet	1 "	——— 4d.	3 "
Plane	1 "	——— 2d.	3 "
Saw, (hand)	1 "	——— (tacks)	2 "
Mauls, (pen)	1 "	Nails (copper boat)	½ "
Gimblets	3 "	Chalk	2 "
Files	3 "	Seal oil	65 gallons.
Axes	1 "	Candles	50 lbs.
Adze	1 "	Baking and wash-house stove	1 in No.
Cotton (for lamps)	¼ lbs.	Rettie's stove and funnel	1 complete.
Nails (iron) 30d.	½ "		
——— 20d.	4 "		

(Signed) WILL. DEAN, Carpenter.

(Copy.)

Stores on Dealy Island.

GUNNERS' STORES landed in Depôt on Dealy Island, from H.M.S. "Resolute." July 1853.

Powder (sporting)	4 lbs.
——— (fine grain)	15 "
Cartridge, ball (musket)	500 in No.
——— (blank)	500 "
Caps, percussion (musket)	1,000 "
——— (fowling-piece)	1,000 "
Rockets (signal)	10 "
Port-fires	20 "
Blue lights	12 "
Maroons, (2 oz.)	20 "
Spare nipples (musket)	2 "
Wrenches (nipple)	1 "
Wads	4 boxes.
Paper cartridge (purple)	2 quires.
Loose ball	500 in No.
Shot, lead (No. 2.)	56 lb.
——— Duck	56 "
Rocket sticks	10 in No.
Slow match	30 lbs.
Hudson Bay guns	2 in No.
Tents, marquee complete	1 "

(Signed) G. F. M'DOUGALL, Master in charge.

FIG. 4. Contents of Kellett's storehouse. Adapted from Kellett (1855).

Dealy Island is approximately 4 km long and 1.8 km wide, with a central plateau rising to a height of about 30 m on the southeastern side. The storehouse is located south of a steep precipice formed by this height of land, on a grassy, flat stretch of raised beach. South of the structure the ground drops through a sandstone boulder field to the present shore.

The building is constructed of sandstone obtained from the adjacent boulder field. The construction technique is double-walled dry stone masonry, with a sod-filled cavity in between. An earth mound surrounds the east, west and south walls and provides both additional support for the walls and added insulation to the base of the building (Fig. 5). Viewed as a vertical cross-section, the east and west walls are convex on the exterior and vertical on the interior. The east wall is higher than the west, creating a slanting roof.

The east wall of the building consists of flat pieces of sandstone laid in courses between four upright wooden posts. A wooden beam or top plate, attached to the tops of the uprights with mortise-and-tenon joints, runs along the east wall and serves as an attachment for the roof beams (Fig. 5). The beam running along the top of the east wall consists of two pieces, joined together with a scarf joint secured with iron spikes. The east wall is 13.8 m long.

The west wall is similar in construction to the east one, consisting of five upright wooden posts between which were laid the sandstone slabs (Fig. 5). A top plate also runs along the top of this wall to form an attachment for the other end of the roof beams. It consists of two pieces of wood, joined together by a scarf joint fastened with iron spikes and reinforced with small pieces of wood. The top plate is attached to the uprights with mortise-and-tenon joints. The west wall is 13.67 m long.

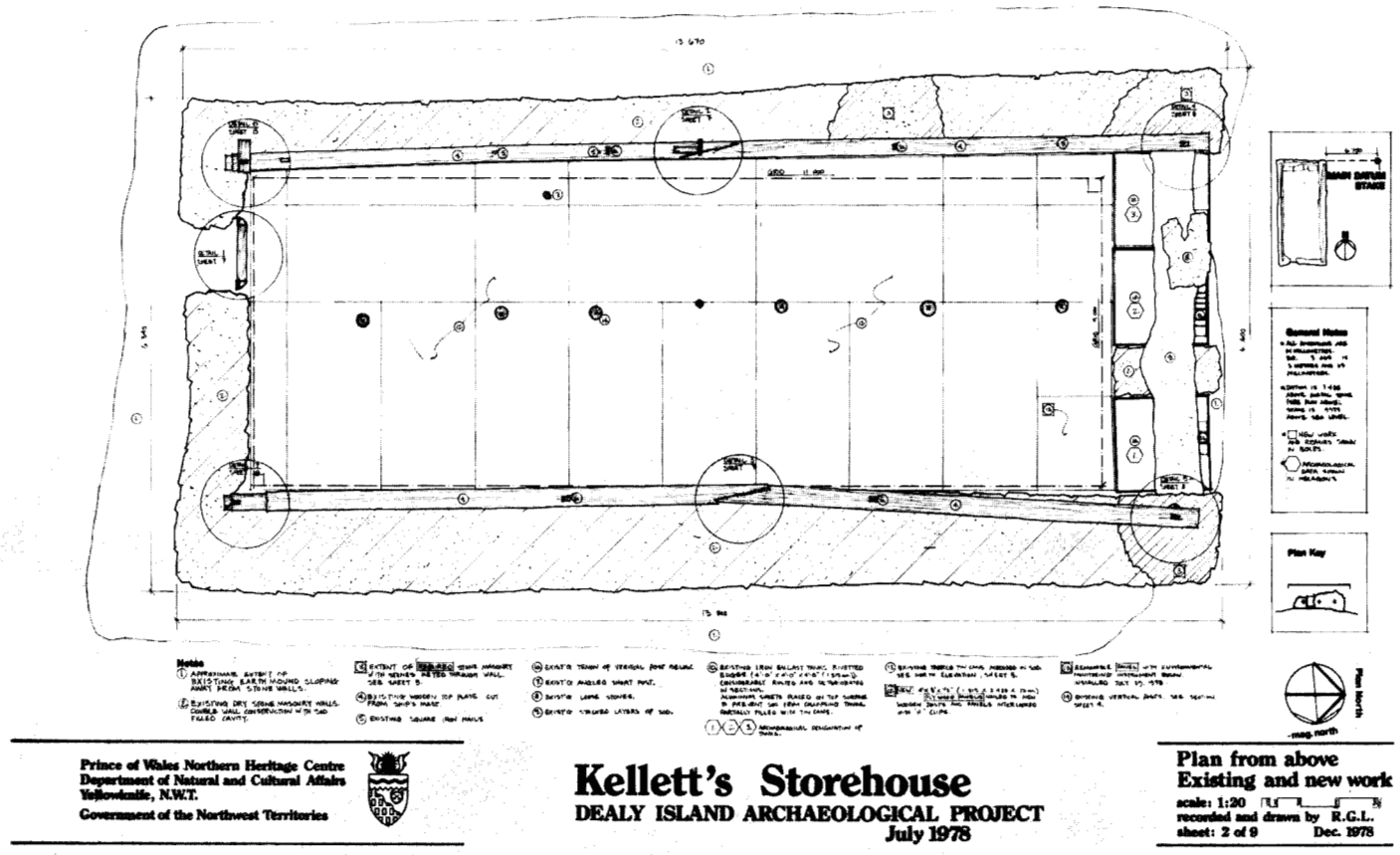


FIG. 5. Plan view of Kellett's storehouse.

The south wall of the storehouse is 6.34 m long, slopes from the east wall down to the west wall and contains the entrance passageway (Fig. 5). This consists of a wooden frame which is nailed, notched and dowelled together, using dove-tailed tenons. The frame itself is made up of two quarter-round, upright wooden posts of different heights (due to the angle of the roof), a quarter-round wooden lintel, and a series of vertical softwood boards for the threshold. These vertical boards are backed by interior horizontal battens. A cast-iron staple on the eastern upright served as the door latch.

The north wall differs markedly from the rest and consists of three large iron ballast tanks, empty tin cans and sod (Fig. 6). The three tanks form the base of the north wall, with two of them sitting side by side along the western portion of the north wall. The third tank is separated from the other two by a space 0.64 m wide, which is filled with sandstone blocks and sod to the top of the adjacent ballast tanks.

Above these tanks the wall consists of layers of sod in which are imbedded rows of empty tin cans and some sandstone blocks. This portion of the north wall has weathered considerably and is no longer as high as the wooden top plates on the east and west walls. The exterior ends of the tin cans were coated with tar, as were the exterior surfaces of the three ballast tanks. This was done presumably to enhance their longevity.

The interior of the storehouse is bisected by a line of vertical posts running north-south through the centre of the structure (Fig. 5). These were the support posts for the original roof. One of these posts (the most southerly) contains a sheave hole with the sheave intact, complete with copper flashing. This post was apparently part of a mast, and together with the jointed top plates on the east and west walls, lead me to believe that expendable materials from aboard ship were used in the construction of the building.

In 1977, when I first visited the site, there was no roof on the storehouse. As mentioned in Kellett's memorandum, the original roof was a rather elaborate affair of tarred canvas, coal bags and painted canvas. The pitch of this roof was intended to reduce the accumulation of snow, although the ever-present wind was a destructive agent that was not easily managed architecturally (Belcher, 1855:191). For this reason and others, the only parts of the roof to survive *in situ* into the 20th century are the centre support posts. Fragments of what are thought to have been the original rafters, however, were found scattered about on the ground around the storehouse.

The provisioning of the storehouse exhibited the same orderly thoroughness that characterized its construction, although there are some minor discrepancies in various records. The ballast tanks in the north wall were filled with canned soups, meats, vegetables, bread (hardtack), Nor-

mandy pippins (dried apples) and baking powder (Kellett, 1855:80). The remainder of the food and all the clothing were stored in oak casks in four tiers of two rows each along the east wall of the building. A fifth tier consisting of a single row of casks completed the storage arrangement (Fig. 3). Other items such as tobacco, mustard and onion powder were stored in wooden cases.

Ten tons of coal in 82 bags were placed adjacent to the tiers of casks. The other non-food items such as the gunners' stores, boatswain's stores and carpenter's stores were presumably placed along the west wall. A comprehensive inventory of medicines, instruments and surgical appliances was also placed in the depot, including such things as a silver catheter, scalpels, opium, spermaceti ointment and a bottle of brandy (Domville, n.d.). A tent complete with a marquee, a wash-house stove, a Union Jack and nineteen books were left in the storehouse, which bears out the confidence expressed in the following observation by Mr. McDougall:

> The last week in July saw the depot house and cairn on Dealy Island completed in very respect; with all information respecting our discoveries and future proceedings, as also a descriptive chart. Nothing I believe was forgotten, as will be seen in the list of contents. Both cairn and house are built of such stout materials, as will enable them to withstand the effects of time and weather for ages (1857:300).

The remarkable condition of the storehouse and its contents in the latter half of the 20th century is testimony to his foresight.

THE ABANDONMENT HISTORY OF THE SITE

Although the abandonment history of a site is not often discussed in archaeological reports, Dealy Island is unusual in offering a wealth of such information. No less than twelve published accounts exist, many with photographic documentation, which describe subsequent visits to the site after Kellett's departure in 1853. These accounts are interesting for several reasons, not the least of which is the

FIG. 6. The north wall of Kellett's storehouse before it was reconstructed. Note the ballast tanks in the lower portion of the wall.

insight they provide into the use and abuse of an archaeological site.

These published accounts also provide an opportunity to view various natural and cultural formation processes, i.e., those events responsible for forming the archaeological record (Schiffer, 1976:14-15). Natural formation processes include the postdepositional changes in sites and artifacts caused by noncultural processes such as wind, water and chemical action. Cultural formation processes, on the other hand, consist of the cultural activities responsible for forming evidence of the past. Such activities include the discarding and loss of objects at a site, as well as pot hunting and other kinds of collecting behaviour, including archaeology.

Pot hunting and collecting, in particular, have played major roles in the genesis of Kellett's storehouse as an archaeological site. We are seldom given the opportunity, however, to learn of such things, and that is why the activities of those who visited Dealy Island over the past 129 years are summarized here. There were undoubtedly dozens of other visits to the site which will remain forever unrecorded. Nonetheless, sufficient information can be gleaned from the following accounts to enhance our understanding of the condition of the storehouse as we first observed it in 1977.

As is aptly described in a historical overview by C.R. Harington (1964:82), tracing the historical record at Dealy Island is very much like placing one's finger on the pulse of Canadian arctic exploration. The first visit after its abandonment in 1853 occurred when Lieutenant George Mecham of the *Resolute* returned by way of Dealy Island after sledging to Banks Island in 1854, still in search of Collinson. He noted:

"The house we found in perfect condition, well banked up with snow on the outside, but the interior perfectly free from drift. The upper part of the bread in No. 1 tank was slightly damaged, and one rum cask about one fourth empty . . ."(McDougall, 1857:408).

There are no records of any further visits to Dealy Island for the next 54 years, until Captain J.E. Bernier stopped there in August, 1908. He was in command of a sovereignty voyage sent north by the Canadian government to assert and maintain Canada's claim to the Arctic Islands beyond her mainland coast (Bernier, 1910).

Bernier noted that the roof of the storehouse was gone, and lay in pieces some distance from the structure (1910:49). Although there was a considerable amount of water on the floor and a quantity of damaged stores, Bernier wrote that a considerable portion of the provisions was in a good state of preservation. The two muskets originally deposited in the storehouse were found to be useless and Bernier replaced them with two Ross rifles and 1000 rounds of ammunition. The expedition's geologist, J.G. McMillan, wrote:

"A can of pork when opened seemed to be still fit for food, and the woollen clothing was in as good condition as when left there fifty-five years ago. Felt and leather boots were damaged to some extent, due apparently to leakage into the casks" (Bernier, 1910:389-90).

Bernier also located various documents that had been left by Kellett, including a plan of the storehouse detailing the storage of the provisions (Fig. 3). One of these documents was found outside of the storehouse and Bernier surmises that it must have been disturbed by a polar bear, as it bore the paw mark of a large mammal. This is the first of many references to the destructive activities of these animals at this site.

Bernier spent the winter of 1908-09 at Winter Harbour, sending sledging parties eastward in the spring to study geological formations and terrestrial magnetism. The geologist, J.G. McMillan, made camp near the storehouse on Dealy Island during a sledge journey and noted that it was in much the same condition as the previous fall, "except that rather more snow had drifted in" (Bernier, 1910:120). Bernier left Winter Harbour in August of 1909, but not before he completely rebuilt the roof of the storehouse in the style of its original construction. He published an illustration of his renovation (Bernier, 1910:202).

Bernier returned to the Arctic in 1910, to issue whaling licenses on behalf of the Canadian government and, if possible, to sail through the Northwest Passage (Bernier, 1912). In August of that year, he landed once again at Dealy Island and noted that the storehouse was as it had been in 1909. There is an interesting photograph published in his 1912 report, showing the storehouse with the new roof intact and a Royal Navy wheelbarrow used in the original construction sitting along the west wall (Bernier, 1912:25). The boat left by Kellett was removed and subsequently donated to the National Museum in Ottawa. It was replaced with a new one.

Bernier's observations and actions indicate that the storehouse was still valued for its original purpose in the 20th century. Bernier replaced the decaying items with new ones, an obvious indication that the storehouse was still intended to serve as a safeguard against disaster more than half a century later.

A short seven years later the Canadian Arctic Expedition, under the leadership of Vilhjalmur Stefansson, stopped at Dealy Island in June 1917 (Stefansson, 1921:628-632). They were returning to Banks Island by dogsled and chose to rest at Dealy Island. On the basis of the following account, it appears that Stefansson's visit hastened considerably the deterioration of the storehouse.

When first observed by them, the storehouse was almost completely covered with snow, which had drifted in the lee of the cliff under which the storehouse stands. Stefansson noted that this was a poor building site (1921:628). Bernier's canvas roof was removed (and apparently not replaced) as it was sagging from the snow load. This was done, according to a member of the party, so that the sun could dry things (Noice, 1924:239). Everything inside the building was wet, and the casks were encased in ice and snow.

Much of the food and clothing was opened and sampled by Stefansson's party. The flour was edible and made into pancakes; much of the chocolate was in good or perfect condition and the currants were the "most delicious they had ever tasted." The latter were damp enough so that they were practically soaked in wine (Stefansson, 1921:630). Barrels of potatoes and other dried vegetables were spoiled, although the tinned mutton was still edible. Most of the casks in the upper tiers had burst through expansion of the contents.

Boots and clothing were scattered inside and outside the building, and Stefansson blames polar bears for this disturbance. Barrels of woollen underwear were found to be in good or excellent condition, as were the jerseys, woollen stockings and mittens. In fact, each of Stefansson's men took a pair of mittens, a sweater and a pea-jacket with them (Stefansson, 1921:631). Some of the latter were found to be in perfect condition and of a much better broadcloth than was available in Stefansson's day.

Stefansson concludes his visit to Dealy Island with the following observation:

> . . . something between one-third and one-half of the food, clothing and equipment left in the depot was still in usable condition, with certain things, such as the currants and mittens, as good as new, and others, such as sugar, quite as wholesome as ever although not in perfect condition (1921:631).

Almost three-quarters of a century after it was built, Kellett's storehouse provided both succor and diversion to a party of 20th-century arctic explorers, an event completely in keeping with Captain Kellett's original intentions. By Stefansson's time, however, the storehouse seems to have been viewed as somewhat of an anachronism, if his and Noice's accounts are any indication. Their failure to replace the roof indicates that they viewed the structure and its contents as an oddity, and not as a resource with which to avert tragedy. Disturbance and deterioration increased markedly from this point on.

Twelve years later, in April 1929, Dealy Island was visited again, this time by Staff Sergeant A.H. Joy of the Royal Canadian Mounted Police, Constable Taggart and an Inuk named Nookapeeungwak (Joy, 1929:62). They were on patrol and were looking for something to augment their supply of dog food for the homeward journey. The condition of the interior of the storehouse was deplorable by this time, being a jumble of broken barrels, rotten clothing and fermented food (Joy, 1929:67). Signs of polar bears were everywhere and their curiosity, added to the activities of Stefansson's party and the annual freezing and thawing, had contributed to the rapid deterioration of the storehouse. Even then, Joy succeeded in finding two hundred pounds of perfectly good canned meat, which was used by the dogs on the journey home. Seventy-six years after its construction, the storehouse again provided needed relief, in spite of the ravages of man, weather and beasts. This was not to happen again, for by the time of the next known visit, relic collecting had replaced survival.

The next visit to Dealy Island occurred in August of 1944, when the RCMP schooner *St. Roch*, under the command of Staff Sergeant H.A. Larsen, anchored there (Larsen, 1958). Larsen was under orders to complete the Northwest Passage from east to west, which he subsequently did, commanding the first ship to navigate the passage in one year. Larsen's Inuk hunter and guide, Joe Panipakuttuk, also published a brief account of his visit to Dealy Island, along with photographs (Panipakuttuk, 1969:10-17).

By this time the storehouse had outlived its usefulness, as can be discerned from the following observations by Larsen:

> The cache, partially destroyed and its contents scattered everywhere by marauding bears, had been erected in the shape of a house. Although most of its sturdy stone walls still stood, the roof had long since fallen in. At one end were iron tanks of hard tack, the tanks were rusted through and the hard tack was wet and soggy. Canned meats and vegetables stacked up and covered with sod formed part of one wall. The centre of the building was a conglomeration of broken barrels of flour, clothing, coal, rope and broken hardwood pulleys for ships blocks. Everything was still frozen in ice, which covered the interior of the cache. Outside were scattered leather seaboots, broken barrels of chocolates, peas and beans, all wet and soggy. On the beach were two broken Ross rifles and boxes of ammunition nearly buried in the sand (1958:43-44).

Larsen concluded that nothing usable remained, although he does mention finding a few good tins of ox-cheek soup. His accompanying photographs depict the disturbed state of the storehouse, and several of his crew members with the relics they removed. One of the men is wearing a pair of 19th-century Royal Navy felt boots (Larsen, 1958:40.)

Despite the deterioration of the storehouse, Dealy Island remained a historic rendezvous. In 1954 it was visited again, this time by two icebreakers, the HMCS *Labrador* and the U.S.S. *Burton Island* (Irvine, 1959). This was the first time that two naval vessels had met in approximately the middle of the Northwest Passage. On a voyage of scientific investigations, the *Labrador* went on to complete the Northwest Passage. The site suffered again, as officers and men "poked around in that old cache" (Irvine, 1959:137). An unknown number of cans of provisions was removed as souvenirs, along with some of the Normandy pippins.

Dealy Island was visited again in 1961 by C.R. Harington and an excellent article was prepared as a result (Harington, 1964). "Besides rummaging happily among the antique casks and trunks of blue serge uniforms and square toed shoes," Harington noted that the wheelbarrow was still there, 108 years later, as were both stoves. Many of the food containers were found to be in excellent condition and a few were taken to sample later. A tin of roast beef and mixed vegetables was eaten and considered to be very palatable. It is extraordinary that this 108-year-old food produced no harmful effects. Harington (1964:82) concluded that less than a quarter of the cached supplies were estimated to be usable.

The storehouse on Dealy Island was by now clearly established as both a curiosity and a site of historical interest. Its significance was not yet recognized, however,

and the building and its contents remained uncared-for and unprotected. Another published reference in 1974 notes that tins of meat, still unopened, remained within the dry stone walls and that empty tins and broken barrels were scattered about (Stevenson, 1974). These observations were made during a tour of historical sites in the Arctic by officials from industry, government and academia.

The tempo of visitation has increased dramatically since 1960, as indicated by the messages left in bottles at a cairn on Dealy Island. Most visitors to remote arctic locations feel compelled to leave a record; others are duty-bound to do so. There are 14 recorded visits to the site from 1961 on, including those from the military, government officials, industrial parties and aircraft pilots (Yorga, 1979:133). It is impossible to measure precisely the resulting disturbance, although we know that relic collecting continued.

One of the more recent visits to the storehouse is particularly germane to this report, as it involved archaeologists from Parks Canada. In 1976 they visited Dealy Island for ten hours, as part of a larger pilot project to record arctic historical sites which were being disturbed or destroyed (Phillips-Parmenter *et al.*, 1977). They noted the relative richness of the artifact assemblage and its excellent preservation, as well as the obvious ravages of souvenir hunters and vandals. There was ample evidence of recent damage to the structure, and protection of the site was recommended. They also collected artifacts.

This concludes a summary of the abandonment history of the Dealy Island site. In addition to the fact that such documentation is rare, it enhances our archaeological understanding of the site. Clearly, the storehouse served its original purpose for three-quarters of a century, culminating with Joy's visit in 1929. Placed in the Arctic by men in wooden sailing vessels, the storehouse retained its usefulness in the age of aircraft and automobiles.

Use of the provisions after Joy's visit was for curiosity only, and by this time the site had suffered severely. Paralleling the physical decay of the storehouse was its increasing appeal as a historical curiosity (Harington, 1964:83).

The deterioration of the storehouse can be attributed to both natural and cultural phenomena. This fits a pattern already observed by ethnoarchaeologists in Central America, where the natural decay of an abandoned house was consistently abetted by human activity (Lange and Rydberg, 1972:430). What is surprising is the amount of *documented* human disturbance at Dealy Island, when one considers its remote location. In summary, the storehouse underwent a series of alterations since its construction in 1853, resulting from use, the replacement of decaying items, the removal of the roof, illicit collecting, archaeological collecting, the destructive activities of polar bears, the annual freezing and thawing cycle, and vandalism. Although some of these alterations can be inferred from the condition of the storehouse in 1977, it is only through the historical record that the gradual formation of the storehouse as an archaeological site can be discerned.

Nonetheless, the artifact assemblage does reflect the occupation conditions of 19th-century Royal Naval exploration in the Arctic. This is probably true to a far greater extent than for most archaeological sites, as Kellett's men intentionally set aside for posterity a comprehensive inventory of material culture. This collection, despite the chaotic abandonment history of the site, is a virtual time capsule of Royal Navy subsistence and technology.

Ethnoarchaeologists are now cautioning archaeologists not to view artifact assemblages as representative of a cross-section of the range of activities carried out at a site (Gould, 1980:137). We are advised to consider the archaeological record as largely trash in the minds of the people who deposited it. Kellett's storehouse, however, is a notable exception to this admonition, considering the deliberateness with which the site was created.

The historical record of this site also prevents a crippling misinterpretation of what are seemingly straightforward facts. Archaeologists generally assume that the patterning of remains in a site directly reflects the structuring of past activities. Associated with the storehouse is a large midden, consisting of opened tin cans, glass-bottle fragments and crockery fragments (Yorga, 1979:34). From these remains it can be inferred that the storehouse was a habitation site, complete with an associated midden. We know from the primary historical sources, however, that the storehouse was never occupied. The habitation sites associated with Kellett's stay at Dealy Island consisted of two wooden sailing vessels frozen in the ice offshore. The midden is a result of subsistence activities on board the ships, not within the storehouse. The daily regimen of this large expedition is thus largely invisible, having disappeared when the ships sailed east.

Kellett's storehouse also challenges the proposition that "the amount of investment in facilities and the extent of modification of a campsite is directly related to the length of occupation" (Schiffer, 1978:244). Irrespective of the fact that the structure required 100 tons of stone to build, it was never occupied. It bears no relationship at all to the length of occupation of Dealy Island by Kellett's expedition.

Of particular interest is the position Dealy Island occupies in arctic history. Kellett, Bernier, Larsen and Stefansson helped create an abandonment history that reads like a "who's who in arctic exploration", though their reasons for going there differed. However, if the visitors after Kellett had not published or otherwise recorded their visits, little would be known of their involvement in the historical and archaeological record of Dealy Island. The exception would be Bernier, whose men carved a message on a rock near the building.

The extant archaeological record at the storehouse does not allow a reconstruction of this full and varied history. The storehouse was not a habitation site and all the subsequent visits were brief. Despite the obvious richness of the artifact assemblage and its uniqueness in historical archaeological terms, the archaeological record of the storehouse is surprisingly invisible with respect to these events.

In providing these summary comments of an ethnoarchaeological nature, my intention is not to provide a cautionary tale for arctic historical archaeology. It would be of little value, as there is no other known site in the Canadian Arctic, to the best of my knowledge, like Kellett's storehouse. Observations from this site may or may not be applicable to others, despite similarities in age and origin. My concern has been to account for a unique site in its historical context.

PRESERVING THE STOREHOUSE AND ITS CONTENTS

Recurring reports of illicit collecting, in addition to a proposal calling for the construction of a natural-gas liquefication plant on Melville Island, prompted a three-man archaeological reconnaissance of the site in July of 1977. This project consisted of the author, Dr. J.D. Stewart, an archaeologist from Lakehead University, and Charles Hett, an artifact conservator from the Canadian Conservation Institute in Ottawa. The 1977 report of the Parks Canada archaeologists who visited Dealy Island had confirmed the richness of the decayed and frozen artifact assemblage (Phillips-Parmenter *et al.*, 1977) and, as a result, artifact conservation was considered to be a fundamental dimension of any further field work.

The 1977 field project included an evaluation of the structure of the building and a test excavation for the purpose of assessing the quantity and types of artifacts remaining. Hett collected various artifacts in order to determine the artifact conservation problems that would arise in the event of an archaeological excavation. Samples were also collected to assist in establishing the feasibility of various conservation treatments.

All the artifacts sampled and tested had an extremely high moisture content (Hett and Weaver, 1980:74). The contents of the storehouse had survived primarily because of the low ambient temperature in the Arctic. Removal of these cold, moist artifacts to a warm environment would result in their rapid deterioration. Small samples of organic materials, after only a few hours at room temperature, smelled so strongly as to make the laboratory unusable (Hett and Weaver, 1980:74). Yet, all was not well within the storehouse either, despite the arctic climate. The top 2-5 cm of the artifact assemblage was in the active layer and subjected to regular freezing and thawing. Deterioration was ongoing at this level.

These considerations were further complicated because the northern corners of the storehouse were becoming structurally unstable. To compound these problems, illicit collecting was increasingly rampant. Since all of these considerations were interrelated, but required different specializations, we decided to adopt a multidisciplinary approach to the archaeology and conservation of the site in 1978.

The first step in this planning process was assembling a variety of specialists representing archaeology, conservation, and architectural conservation. The storehouse was considered from all these perspectives and we decided to stabilize the structure and attempt the *in situ* preservation of its contents. This was the result of several considerations.

First, the extreme remoteness of this site makes it impossible to provide continuous on-site protection, either now or in the foreseeable future. The nearest community is approximately 400 km away by aircraft. It was necessary to ensure the architectural preservation of the structure while allowing visitors access without the benefit of site supervision.

Second, the contents of the structure are essentially frozen, with the exception of those materials at the top of the deposit which thaw during the brief summers (early or mid-July to mid-August with an average temperature of about 5°C). Regardless of the difficulties involved in removing these materials from a frozen matrix, the conservation implications of a frozen collection of this size are enormous.

Once removed from their frozen environment, organic materials such as wood, leather and textiles begin to deteriorate immediately, as mentioned earlier. Sophisticated laboratory procedures, and rigorous field-collecting techniques involving portable frozen storage facilities, are required to ensure their long-term preservation. *In situ* stabilization of the artifact assemblage was the only sensible alternative, as there were then no conservation facilities in Canada able to care for this extraordinarily large volume of frozen-site material. To remove the collection without such arrangements would have simply guaranteed its destruction. Because the site is unsupervised, however, a solution had to be devised which allowed *in situ* preservation while at the same time protecting the contents of the storehouse from disturbance and illicit collecting.

A final consideration in undertaking a nontraditional archaeological approach to this site was the ongoing need to save at least a portion of the rapidly dwindling archaeological resources of northern Canada for future archaeologists. With little or no soil development in the Canadian Arctic, many prehistoric and historic sites lie completely exposed on the surface of the ground. Historical archaeological sites are particularly vulnerable, as their contents are often recognizable to the untrained eye. Nineteenth-century exploration sites have suffered immeasurably as a result.

Although Dealy Island is in no sense undisturbed, a significant portion of the original artifact assemblage remains intact today, despite the vagaries of man and nature. This, along with the distinctive architectural remains, was a major reason for selecting Dealy Island as illustrative of 19th-century exploration activities in the High Arctic and hence appropriate for long-term preservation. The remainder of this section describes how the site and the collection were preserved.

THE ARCHAEOLOGY

In addition to the storehouse, there are several signal cairns, the large midden discussed earlier and the graves of three of Kellett's men on Dealy Island. These archaeological features, along with the storehouse, have been described elsewhere by the archaeological field director of the 1978 project, Brian Yorga (1979). The following discussion is limited to a summary of the work within the storehouse, based on the 1977 field reconnaissance and Yorga's report.

The 1977 test excavation revealed an unknown number of casks, frozen in the ice adjacent to the east wall, under a disturbed but unfrozen surface layer of barrel parts, barrel contents and coal; in short, the disturbance of 124 years (Fig. 7). The following field season, a 2-m grid was established within the storehouse and the interior was photographically recorded as found, using a 35 mm camera mounted on a bipod. Conventional recording techniques were not appropriate because of the large volume of artifacts in the surface layer.

This disturbed layer was then temporarily removed from the storehouse to a corresponding 2-m grid set up outside the structure, where all the artifacts were catalogued and prepared for eventual replacement in the storehouse.

A total of 1868 artifacts was removed from the unfrozen surface layer. Included in this assemblage were barrel staves, pieces of serge uniforms, leather fragments, rope, canvas, opened and unopened cans of provisions, packing-case fragments and pieces of iron (Yorga, 1979:96-100). These artifacts were not collected because of the immediate and large-scale conservation and storage problem they presented, not to mention the difficulties involved in transporting this quantity of wet material from a remote location. Though no longer *in situ* and in various stages of deterioration, these artifacts were also considered to be an integral part of the original assemblage and of obvious importance to any future work at the site.

After the removal of the disturbed surface material, an inventory was made of the artifactual material remaining within each 2-m square. An unknown percentage of this material was also disturbed, but because the permafrost table had risen to within a few inches of the surface of this level, it was impossible to determine the extent of the disturbance. A detailed visual inspection revealed an extraordinary matrix of both disturbed and undisturbed material culture (Yorga, 1979:101-103).

Limited excavations were conducted in the northwest and northeast corners of the storehouse to permit a more detailed examination of this level. A group of tent poles

FIG. 7. The disturbed interior of Kellett's storehouse, as photographed in 1977. The dark mass in the centre of the photograph is coal.

was visible above the surface level in the northwest corner; the first excavation unit was placed there. This unit was excavated down to the original floor of the structure and yielded a coal-burning ship's stove, associated copper-alloy stove venting and a group of 28 unopened, stacked tin cans (Fig. 8). The stove, the tent poles and a sample of the cans were removed for conservation and study at the Prince of Wales Northern Heritage Centre in Yellowknife. The remainder of the square was littered throughout with tin cans, clothing and wood fragments.

The other excavation was conducted in the northeast corner of the storehouse. Weathering of the sod wall above the ballast tanks had filled this area with fine silt. An opened wooden crate containing tobacco was uncovered, along with the ubiquitous tinned provisions. This unit, too, contained clothing, tin can and wood fragments and other deteriorating organic materials (Yorga, 1979:102).

Kellett's original diagram of the provisions within the storehouse shows only a blank space along the interior of the west wall (Fig. 3), although it is assumed that non-food

FIG. 8. A stove, tent poles and unopened provisions found *in situ* within the storehouse. This photograph was taken after excavation.

FIG. 9. A Royal Navy leather boot, one item among the voluminous contents of the storehouse.

items were stored here. The situation was more complex 125 years later. Although no excavation was undertaken along the west wall, a number of interesting specimens were observed during the course of the other work, including a relatively intact leather boot (Fig. 9) and a concentration of *lignum vitae* (hardwood) pulley fragments. There is every indication that there is a heavy concentration of artifactual material within a rich organic matrix along the west side of the storehouse (Yorga, 1979:26). This is apparently a result of the dismantling of the upper tiers of casks along the east wall throughout the abandonment history of the structure.

As a result of these archaeological investigations, it appears that the bottom tier of casks (consisting of two rows) originally placed in 1853 remain *in situ*. Portions of the second tier were also visible and it is likely that some of it also remains *in situ*. The frozen condition of the assemblage beneath the surface layer prevented complete verification of this.

In summary, the stratigraphy of the interior of the storehouse consists of four levels. First, there is the original floor of the structure. Overlying this level along the east wall is one tier of casks frozen *in situ*. The incomplete remains of a second tier are also visible. Along the west wall are the non-food items left by Kellett, but whether or not any of these materials remain *in situ* is not known. It is unlikely. Disturbed or undisturbed, this part of the assem-

blage is also frozen in place. The third level is a wet and frozen organic matrix consisting of complete and decaying artifacts, coal and some animal feces. This matrix surrounds and contains the materials of level two. This third level varies in thickness but is continuous throughout the storehouse. The fourth level consists of the seasonally unfrozen and severely disturbed surface material. This heterogeneous jumble, by providing an effective seal for the contents below, limited all but the most ardent relic collector to what could be seen on the surface and thus undoubtedly ensured the survival of the *in situ* remains.

The ballast tanks in the north wall have rusted badly and all of their contents have been disturbed. It is interesting to note that Normandy pippins, now shrivelled and blackened almost beyond recognition, were found on the ground around the second ballast tank (Yorga, 1979:33). The contents of the ballast tanks were not inventoried or disturbed.

Archaeological work was also done outside the storehouse, and consisted primarily of surface collecting. The ground surrounding the structure was littered with artifacts, which form much of the collection that was sent to the Northern Heritage Centre for conservation and analysis. Included in this surface collection are bottle glass, clothing, roof canvas fragments and leather boot fragments.

Most artifacts located outside of the storehouse were contained in the garbage midden. They consisted of opened tin cans, as well as glass-bottle and crockery fragments. The badly deteriorated cans were left *in situ*. A representative sample of cans in better condition was recorded by provenience and packaged for removal to Yellowknife. The remaining cans, in good condition but of no immediate research value, were assigned proveniences, bagged and placed in the storehouse under the new floor.

Finally, surface collections were made near the three graves, located on a coarse sand and gravel beach about 750 m northeast of the storehouse. These collections consisted of stoneware and glass bottle fragments, as well as one clay pipe stem fragment (Yorga, 1979:38). Both grave middens were completely collected and the artifacts sent to Yellowknife. The graves were not disturbed.

ARTIFACT CONSERVATION

One of the most challenging aspects of the 1978 field project was the safe removal of over 2000 artifacts and fragments for preservation, study and exhibition. The bulk of this collection was recovered outside of the storehouse, where its vulnerability to pilfering necessitated its removal. A complete inventory is available in Yorga's field report (1979:104-119).

As a result of the 1977 survey and the subsequent laboratory analysis of selected specimens at the Canadian Conservation Institute (CCI), a workable approach was developed for the 1978 field season. Detailed preparations were made not only for the field conservation of the artifact collection, but also for appropriate storage in Yellowknife. This identification and definition of problems, together with experience gained in the treatment of wood and metals from other High Arctic sites, ensured that there were relatively few surprises for the two conservators on site, and none for which there was no provision. This is significant for a project in which such a large volume of artifacts was handled.

As mentioned earlier, the removal of these objects to a warmer climate with pronounced variation in relative humidity leads to rapid deterioration. Immediate care was often required at the time of excavation in order to preserve the artifacts. For organic materials such as textiles, leather and wood, both moisture content and low temperatures had to be maintained. A biocide was applied to the textiles and leather to inhibit bacterial growth. To hold metal artifacts stable, vapour phase inhibitors were used. These inhibit metal corrosion when placed in a well-sealed container.

The unstable materials were kept frozen both in the field and in transit, until the conservators were able to treat the materials in the laboratory. Insulated wooden boxes designed for portability were constructed prior to the field season to serve as refrigerated containers. Freezer packs were used to maintain low temperatures in the boxes. The freezer packs were chilled in the permanent snowfield near the storehouse. As the collection was to be shipped to the Northern Heritage Centre, freezer space was prearranged there and also with a commercial firm in Yellowknife.

The importance of having conservators in the field as part of this project cannot be overstated. Specifically, the two conservators, Charles Hett and Robert Senior of the CCI, cleaned, labelled and packed all the artifacts in the field. They attended to all items requiring special attention, such as a frozen and compacted uniform buried in the earthwork along the west wall of the storehouse. They also provided guidance at all times on which specimens were suitable for removal and the conservation treatments that would be required. This was extremely valuable, not only because freezer space was limited in Yellowknife, but also because artifact conservation is often laborious and expensive and decisions must be made about priorities. The cold storage system, the key aspect of the field conservation program, was also developed and maintained by them. This required the provision of a waterproof labelling and cataloguing system. Finally, they assisted the archaeologists with experimental techniques for excavating in permafrost, including the use of a portable propane blow torch and the application of hot water to the excavation area. A wide range of materials, including woollen textiles, was safely removed using the latter technique.

On a practical level, a great deal was learned concerning the specialized conservation materials and equipment required for frozen-site archaeology. This information may well be useful to other northern archaeologists, and is available in a recent paper (Hett and Weaver, 1980).

Laboratory treatment of the Dealy Island collection is ongoing at the Northern Heritage Centre and the CCI,

under the overall supervision of the Northern Heritage Centre's conservator. Treatments for each class of artifacts have been developed and will be summarized below (Cross, 1982). There is a growing awareness among archaeologists that their responsibility to the data does not end with excavation and publication. Clearly, adequate facilities and conservation expertise must be available to ensure the long-term preservation of frozen-site collections, in whatever repository they reside.

Ceramics and glass constitute a large portion of the inorganic specimens. The greatest conservation problem for this class of material is physical damage through incorrect storage and handling. Although this material is stable as it now exists, conservation requires salt removal. Because of the porous nature of ceramics, there is a high probability that salts from the environment have penetrated the ceramic fragments. Under certain conditions, these salts can migrate through the sherds and effloresce on the surface. To prevent this, all pieces are soaked in successive changes of de-ionized water until a silver nitrate test indicates that no more salts are present.

Also included among the inorganic specimens are a large number of metal artifacts, including food cans, barrel hoops and two stoves. The unopened cans containing foodstuffs are kept frozen until they can be treated under carefully controlled conditions, due to the health hazards they pose. After analysis at the CCI, the mutton and other unidentified food contents were judged to be potentially pathogenic due to their age and the results of freezing and thawing (Fox, 1979).

The treatment procedure developed by the CCI underscores the potentially hazardous effects of these specimens, if improperly handled. Their procedure requires that the cans be opened inside a glove box from an air-abrasive unit placed inside a fume hood. All the resulting garbage (rags, abrasive disks and gloves) is sterilized in an autoclave before being considered safe to discard. The tin cans and their contents are also autoclaved for 30 minutes. Only after this are the objects considered biologically safe to handle. All tools and equipment must be washed with surgical scrub soap and sterilized.

This treatment report is alarming news, considering the abundance of unopened food cans in the storehouse. They have undoubtedly been one of the most popular items removed through illicit collecting, and the actual number of them in private collections will never be known. I am taking this opportunity to advise those who possess these tinned provisions of the potential danger and to suggest that they contact the Northern Heritage Centre in complete confidence for information regarding their disposition.

Opened or fragmentary cans pose little or no health threat. They are stored in cabinets with vapour-phase corrosion inhibitors and quantities of silica gel, a desiccant or drying agent. Although most of the cans appear to be stable, some are exhibiting signs of active corrosion. Halting this corrosion also requires the removal of chlorides or salts through boiling in successive changes of de-ionized water until the silver nitrate test indicates their absence. The specimens are then dried in an oven to remove all residual moisture, and surface scaling is removed by brush. The cans and fragments are coated with a dilute consolidant solution, and particularly fragile areas are reinforced with fibreglass and resin.

Organic material is generally far more susceptible to deterioration than inorganic, both in the field and in the laboratory, so organic materials are kept frozen until laboratory treatment can begin. Organic artifacts in the Dealy Island collection include wood, leather, cork, textiles and rope.

Treatment of the wood requires slow thawing and slow drying out to prevent checking, splitting or warping. The goal is a gradual reduction of the moisture content so that the objects can be stored, exhibited or studied without damage in the climate-controlled environment of the Northern Heritage Centre. The wood artifacts, wrapped in polyethylene plastic, are removed from the freezer and weighed and measured each week to record the change taking place. There should be a very gradual loss of weight which indicates that the moisture content of the wood is adjusting to the environment. When no further weight change is noted, the objects are removed from the refrigerator, wrapped in layers of polyethylene, and placed in the Northern Heritage Centre's reserve collection area which is controlled to 50% relative humidity. The wood is considered stable when further weighings indicate no change in weight.

Leather and textile specimens from Dealy Island are being conserved at CCI. The textiles, including serge (twilled woollen cloth) and canvas, must be slowly thawed in a well-ventilated area to discourage mold growth. Dry cleaning with gentle brushing and a vacuum follows to remove surface dirt. The pieces are then sewn between layers of nylon netting (to avoid direct handling) and washed with a neutral soap in de-ionized water. After air drying, missing or weakened areas are backed with an appropriately coloured fabric to provide extra support and prevent further physical damage.

A leather artifact requires a gradual thawing treatment similar to that used for wood, although there are other treatments besides the one described here. The leather is then cleaned, treated with a fungicide to prevent mold growth and softened with saddle soap or a leather dressing. Finally, it is reshaped to its original form. It is also weighed regularly to note when the piece is stable enough for storage in the climate-controlled collection area.

STABILIZING THE BUILDING

Consistent with the multidisciplinary approach of the project, the services of an architectural conservator, Mr. Martin Weaver, were enlisted to address the structural deterioration of the storehouse observed in 1977. A build-

ing conservation plan was devised prior to the 1978 field season and a description of the subsequent field work follows.

A small meltwater stream, originating in the snowfield beneath the escarpment, had flowed across the site for an unknown number of years, gradually undermining the northern ends of the east and west walls. Much of the stonework had collapsed as a result. To prevent further deterioration, a stone dam was constructed across the path of the stream to divert the flow away from the building. This simple piece of engineering, using stones from the nearby boulder field, was still effective when the site was evaluated in 1981.

The next task was to restore the stonework which had collapsed. The stones which had fallen from the two wall ends were excavated for inclusion in the reconstruction. The standing stonework which appeared to be unstable was also carefully taken down at this time, after it had been photographed. The two wall ends were then constructed using the curved profiles of the south corners as models (Fig. 10).

Two of the primary reasons for the collapse of the dry stone walls were the lack of through-stones bonding together the inner and outer faces of the walls, and the disintegration of the turves which had been built into the core of the wall (Hett and Weaver, 1980:75). Throughout the recon-

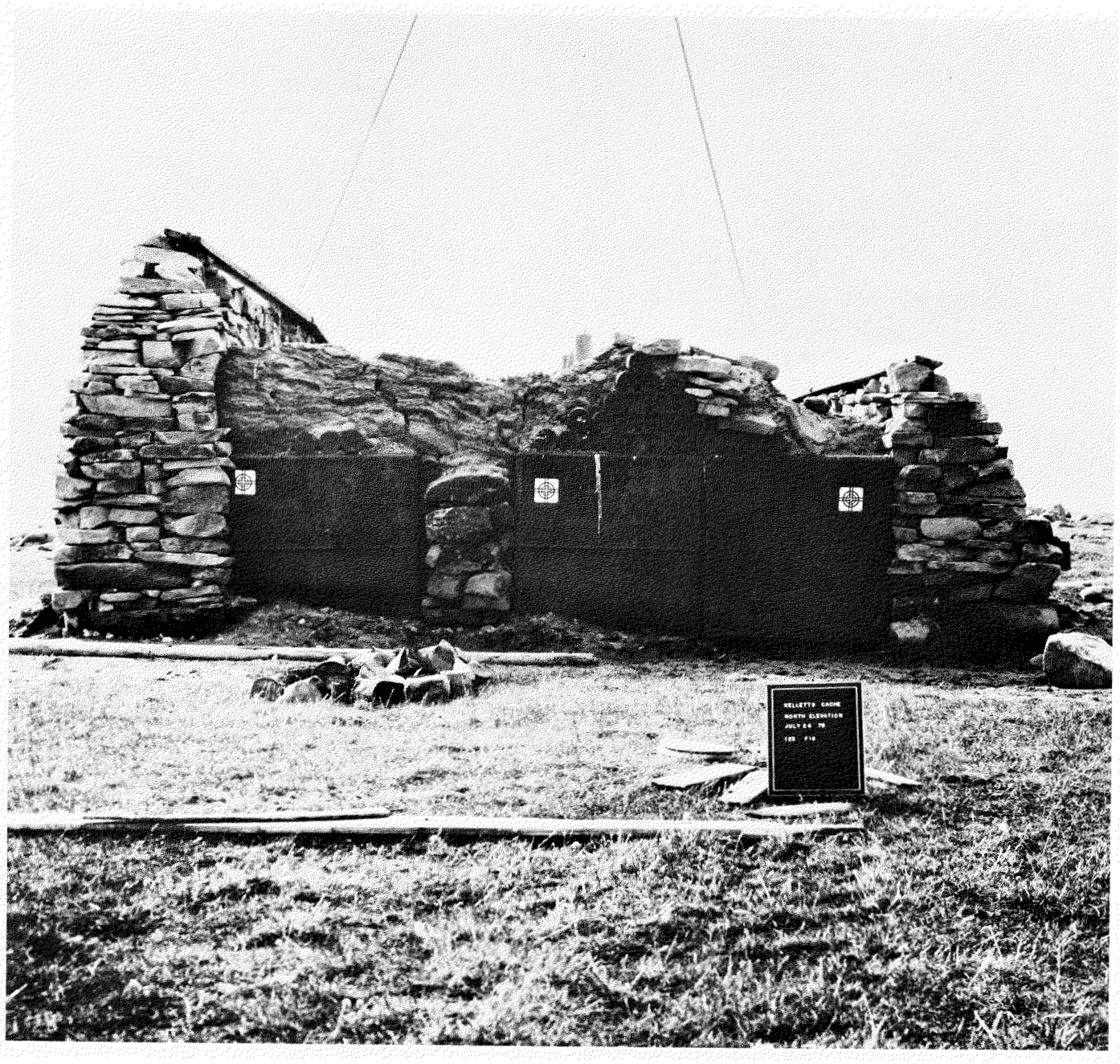


FIG. 10. The north wall of Kellett's storehouse after it was reconstructed.

struction the new work was bonded to the old by using long through-stones. In addition, each stone was firmly bedded on the stones beneath, without the use of earth or sand, as these materials have a tendency to settle and disintegrate.

A portion of the west wall was also in a state of impending collapse. The defective masonry was dismantled and set aside for re-use. The wall was then taken down to the frozen gravel on which the structure was originally built, and rebuilt using early photographs from the Bernier expedition as a guide to the original position of the stonework.

The tops of the ballast tanks in the north wall had rusted to the point of being dangerous, should visitors ever walk on them for a better view of the building and its surroundings. One-eighth inch aluminum plates were fitted over the tops of the tanks to prevent any further collapse of the rusted iron. The conservators also reasoned that the aluminum plates would corrode as sacrificial anodes, thus extending the life of the iron (Hett and Weaver, 1980:76). To reduce the visual impact of the shiny aluminum, the plates were coated with a polyvinyl acetate emulsion to create a sticky surface and then were dusted with silt obtained from disintegrating sod in the north wall.

PRESERVING THE COLLECTION *IN SITU*

With the exception of the relatively small sample of artifacts removed for conservation and analysis, the contents of Kellett's storehouse were preserved *in situ*. Besides the need to protect the collection from theft and deterioration, it was desirable to allow visitors access to the interior of the building.

The installation of an insulated floor within the structure was determined to be the best way of achieving these ends. It would seal off the contents of the storehouse from collectors and theoretically allow the collection to remain frozen. It was thought that insulation under the floor would prevent the annual surface thawing of the frozen mass of artifacts, thereby greatly reducing the rate of artifact deterioration. A plywood and wooden joist floor was subsequently designed by Susan Hum-Hartley, a senior restoration engineer.

A wooden floor was particularly appropriate, as the materials were readily available in Yellowknife and easily assembled in the field without specialized equipment. Keeping in mind the abandonment history of the site, the floor was designed to take a load of 600 $lb \cdot ft^{-2}$ in order to support the polar bears that regularly visit the site. The use of wood also made it easy to alter the lengths of the loads so that nothing was too large for the Twin Otter aircraft that transported the field crew.

The installation of the floor began with the establishment of a datum line which was marked with chalk to set the level of the floor. It was necessary to remove all portions of the midden which protruded above this line. The central coal seam also had to be lowered. The artifacts removed, including several oak barrels and a group of tent poles, were sent to Yellowknife.

The interior stone walls were drilled with masonry bits and chiselled to take projecting-type Rawlbolts. A 2 × 6 in. wall plate was attached to these bolts to support the floor joists. The 2 × 8 in. and 2 × 12 in. joists were then fastened to the wall plate using steel framing anchors (Fig. 11).

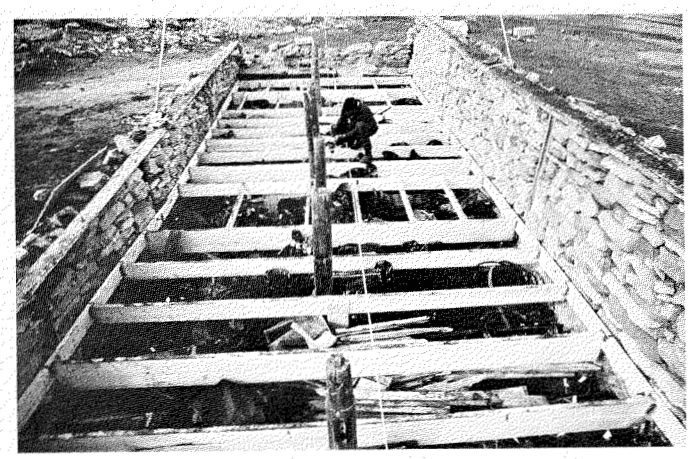


FIG. 11. The installation of the wooden joists to support the insulated floor.

Rigid polystyrene sheet insulation (Styrofoam) was installed next, supported by battens nailed to the sides of the joists. A minimum of three inches of insulation was used in the floor, and in some areas a total thickness of four inches was laid down. Half-inch plywood sheets were laid over this, handsawn on site to ensure a snug fit against the irregular sandstone slabs and the ship spars which once supported the roof (Fig. 12). The plywood was nailed in place, and where junctions between sheets were not directly supported by joists, steel "H" clips were used to prevent vertical movement. Just prior to the installation of the flooring, all the artifacts which had been removed earlier from the unfrozen surface layer of the storehouse were replaced under and between the floor joists.

The final flooring task was the construction of a small removable panel to allow access to a battery-powered environmental monitoring instrument installed beneath the floor (Fig. 13). This instrument, a hygrothermograph, records the temperature and relative humidity both above and beneath the floor and is part of our attempt to evaluate the efficacy of the insulated floor.

FIELD RECORDING METHODS

The storehouse was completely documented as it was found in 1978 and again after the stone repairs and stabilization had been completed. These data were collected and compiled by architect Robert Lemon, using a combination of photographic and hand-recording techniques (Janes *et al.*, 1979). The exterior walls of the building were recorded by a series of scale-rectified photographs, while work on

FIG. 12. The insulated floor in place.

FIG. 13. The installation of the hygrothermograph in a compartment beneath the insulated floor. The wires leading out from the instrument are connected to temperature and humidity sensors.

FIG. 14. A photographic elevation of the east wall of Kellett's storehouse, as found in July 1978.

the interior was photographed from above using a Whittlesey foundation bipod. The plans, sections, construction details and a record of the new floor were completed by hand-recording, including measuring, mapping and drawing.

Scale-rectified photography produces a photographic image that is accurately scaled, through the use of proper camera positioning and adjustment. As a result, it can be used in the place of laboriously measured and drafted drawings. The exterior walls of the storehouse were photographed in this manner and a series of photo-elevations were later produced by Lemon (Figs. 14, 15). A Super Cambo 4 × 5 view camera with a 135 mm lens was used in the field.

The length of the walls, number of camera positions and the amount of usable area of the negative (distortion occurs along the edges) determined that the scale of the negatives would be 1:100 and a grid of 10 mm was drawn on the camera's ground glass prior to entering the field.

In the field, the camera was adjusted and focused until the ground-glass grid exactly matched the target spacing on the wall, and the film and the lens plane were tilted to the same angle as the wall. A Polaroid print was taken to ensure that the exposure and focus were accurate and then three negatives were exposed for each section of the wall.

The long east and west walls of the storehouse were each photographed in two overlapping sections from two camera stations using scale-control targets spaced at 3000 mm centres on a horizontal datum constant to all four walls (Lemon in Janes *et al.*, 1979:12-13). The shorter north and south elevations were each photographed from one

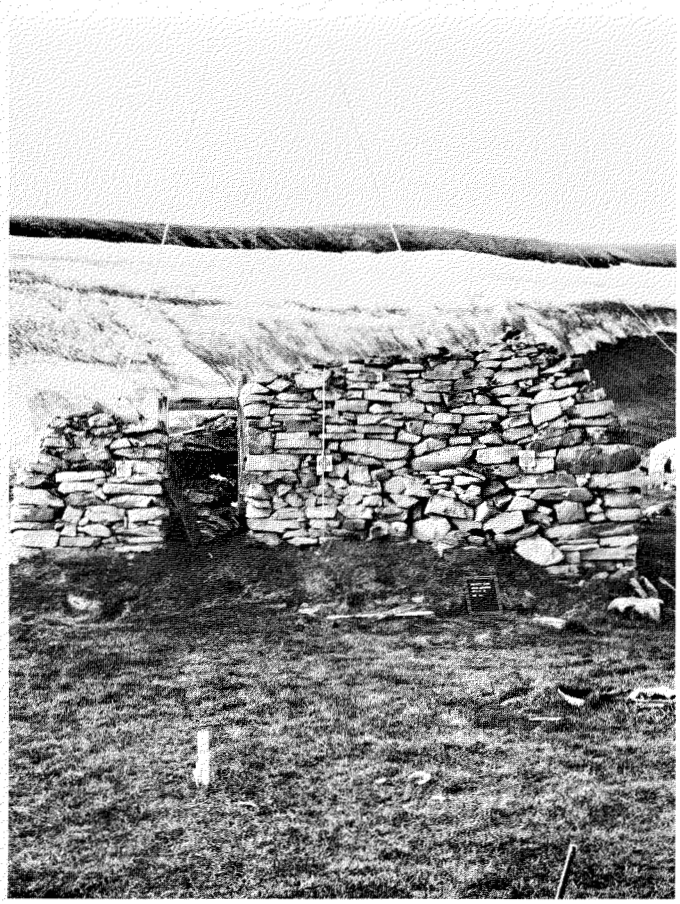


FIG. 15. A photographic elevation of the south wall of Kellett's storehouse, as found in July 1978.

camera station, with targets at 2000 mm centres. In all cases the camera stations were 13.5 m from the datum on a line perpendicular to the centre target of the three targets, in the section of the wall being photographed.

The interior of the storehouse was also photographed from above, by means of a bipod, during all stages of the archaeological investigations and floor installation. This device consists of two telescoping aluminum poles supported by guy lines. A plexiglass platform designed to hold a 35 mm camera was hoisted to the apex of the poles, 8.53 m above the floor of the storehouse. An Olympus OM-1 camera with a 35 mm shift-lens allowed the recording of the entire interior in three sections from one camera position. A 20 mm Nikon lens was able to cover the whole structure in one image. A 12.19-m pneumatic shutter release was made by splicing two cables together, allowing the shutter to be operated from the ground.

Hand-recording techniques were used to measure and sketch the plans, sections and details of the building. A grid was laid out in the interior of the structure from which all dimensions were taken and two cross-sections were plotted, one east-west and the other north-south. These sections show the stone wall profiles and the interior floor profile and indicate the framing of the new wooden floor (Fig. 16). Two plans were also drawn depicting the horizontal profile of the stone walls at the datum level and the position of the wooden top plates, the plywood floor and the width of the stone walls. Detailed dimensions were taken of all wooden construction details and large-scale drawings were produced. Various wooden fragments and timbers strewn about the site were also sketched, noting the location of nails and other details that might provide clues to their former placement on the building.

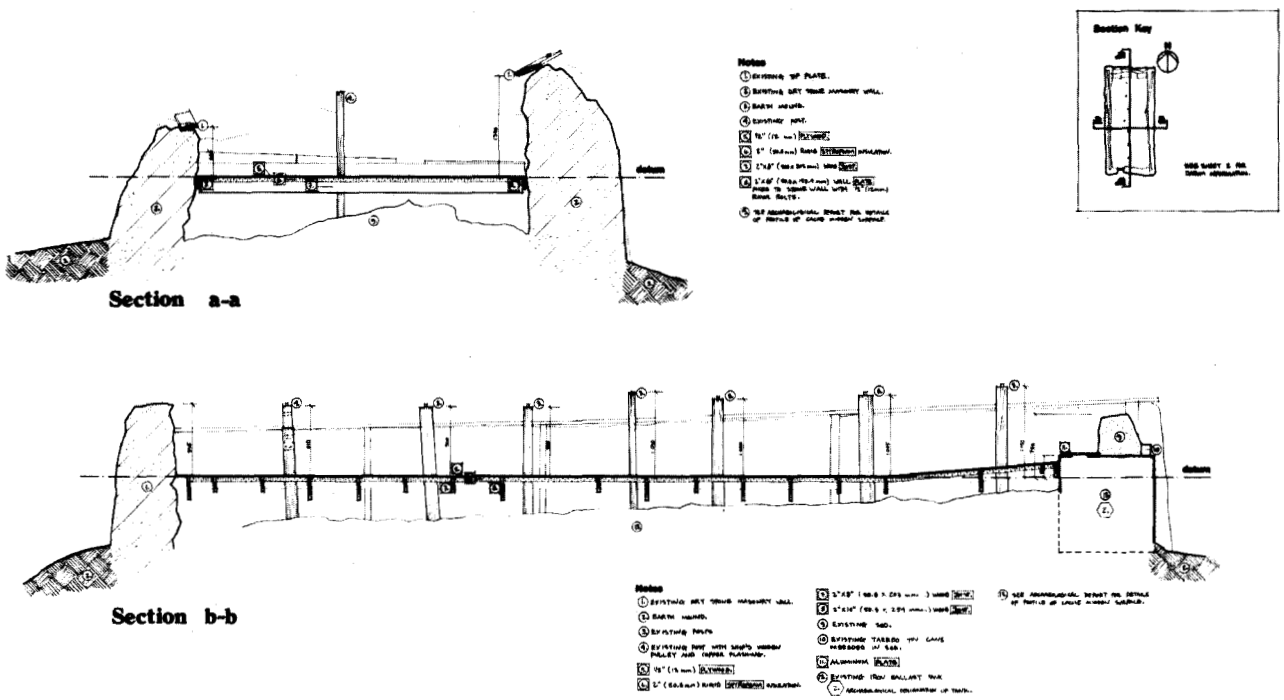
EVALUATING THE PRESERVATION APPROACH

Because the work undertaken was largely experimental and unprecedented in the Arctic, return visits to the site were essential to evaluate the results of the *in situ* preservation programme. Regular visits would have been required in any event, if only to observe the degree of site use and abuse.

I returned to Dealy Island in the summer of 1980 to find that the structure had indeed suffered since the work was completed in 1978. The insulated floor had been broken through in three places, although no disturbance was observed below the floor level. Both man and polar bears appear to have been responsible, judging from the appearance of the holes.

No other structural deterioration was observed and the stone dam controlling the flow of the melt-water channel was found to be working satisfactorily. The ground around the north wall of the building was considerably drier than it had been in 1978.

The hygrothermograph chart was removed from the instrument beneath the floor, and fresh batteries were



installed. The instrument runs for two months each year and monitors the warmest period of the year in July and August. It must be manually reset and supplied with fresh batteries annually.

The instrument records the temperature and relative humidity both beneath the floor and above the floor, with the latter sensor located within the building. The chart removed in 1980 covers the period 30 July - 17 August 1978. Charles Hett, who transcribed and interpreted these data, assumes that the instrument stopped running as a result of the weak battery current produced at low temperatures. Unfortunately, there has been little development in recording devices that can run for longer periods of time unattended in a polar region. Nonetheless, the instrument recorded temperatures beneath the floor ranging from a high of 7°C on 1 July to −12°C on 19 August: a gradual cooling trend is perceptible. The temperatures became stable at below zero by the middle of August. The relative humidity readings are surprisingly high, although they are thought to be somewhat suspect as a result of ice formation on the sensors in August.

Mercury thermometer readings were also taken beneath the floor in the damaged areas. Five of the six readings were 0°C and one was −1°C, contrary to the instrument readings. More importantly, a significant build-up of ice was observed under the floor in these areas, literally entombing the cultural material. This indicates to me that the floor is performing its intended function, as surface ice was not observable in 1977 or 1978.

I made a repeat visit in July 1981, with the assistance of the project's architectural conservator, Martin Weaver. In addition to repairing the damaged floor, we inspected the structure in detail from an architectural standpoint.

The floor was repaired and strengthened in six separate locations with additional joists, and new insulation and plywood flooring were laid down. The building had suffered further human disturbance since 1980: two of the aluminum plates covering the ballast tanks had been removed, presumably to gain access to the interior of the tanks. These plates had been deliberately concealed in 1978 for aesthetic reasons, and an opposable thumb is required to remove them, making disturbance by polar bears an extremely remote possibility. The plates were replaced and again concealed with deteriorated sod.

The hygrothermograph chart was removed and replaced with a new one. The data indicate that for the period 26 July - 15 August 1980 the average temperature beneath the floor was 3.89°C. The average temperature beneath the floor between 30 July and 19 August 1978 was .64°C. The difference is attributable to the much warmer temperatures during the summer of 1980. The outside sensor indicates that the average outside temperature in 1980 for the period in question was 7.47°C, compared to an average of 1.86°C in 1978. The outside temperature sensors may not be reliable, and these figures have not been verified. The relative humidity beneath the floor for 1980 was remarkably steady, never lower than 70% and never exceeding 75.5%. It averages 74.58% from 26 July through 15 August. We assume that the relative humidity sensors performed adequately compared to 1978.

As the site had been officially declared a Northwest Territories Archaeological Site with full protection under the Historic Resources Ordinance, a plaque was erected in front of the building in 1978. By 1981 the plaque was down, its steel posts twisted beyond use and scarred with claw marks. A polar bear, either ignorant of the law or threatened by an unusually tall object in the arctic landscape, had made short work of the sign. The posts were removed and the sign bolted to the floor of the building.

No further structural deterioration was observed. All the dry-stone masonry appeared to be stable, with no new cracks or bulges. The surface ice under the floor had increased to a thickness of about 5-10 cm, where it could be observed through holes in the floor. Whether this layer of ice encapsulates the artifact mass uniformly throughout the building is not known. Selected floor panels will be removed in the future to determine the extent of the ice. It is likely, however, that there is less ice in the northern portion of the building, at least in proximity to the hygrothermograph. It has always been relatively dry there, because of the ventilation provided by the rusted-out ballast tanks in the north wall. This might also mean that the instrument data collected to date is a poor reflection of the actual conditions beneath the floor because of the sensor's proximity to the north wall. This will be assessed during the next field inspection.

An unwelcome result of the floor's insulating quality could be the displacement of the joists or wall plate by a heavy build-up of ice over the artifact mass. Although this is of little concern at the present time because of the considerable air space between the ice layer and the bottom of the floor, ice build-up will be monitored. It may be that in the future a drainage system will be required within the structure to remove the water resulting from the spring snow melt, as this moisture is the major source of ice. Roofing the building is another alternative.

Meltwater had also reappeared along the north wall, albeit with no damaging results. There is no comparison between the volume of water observed in 1977 and that observed in 1981. It could become a problem again, however, as the building appears to be situated in a natural drainage area, and perhaps can never be completely freed from ground water. The spring run-off that year was apparently of sufficient volume to overflow the diversion scheme built in 1978. A completely new drainage channel might have to be cut north of the building in the future. For now, the north wall and the corners remain stable and will continue to be inspected on a regular basis.

As part of the 1981 return visit a cameraman filmed the work at the site. This 16 mm film will be used to produce a series of short films on the need to protect and preserve the archaeological resources of the Northwest Territories.

Dealy Island was selected to illustrate this message, because of its excellent preservation and recognizable architectural remains (Fig. 17). The Anik satellite system will distribute this information throughout the North. The Northern Heritage Centre in Yellowknife has a permanent exhibition devoted to the history and significance of Dealy Island, including some of the specimens collected in 1977 and 1978.

FIG. 17. Kellett's storehouse upon completion of the stabilization and restoration work. Viscount Melville Sound is in the background.

CONSERVATION AND FROZEN-SITE ARCHAEOLOGY

There is nothing new about frozen-site archaeology to archaeologists who work in northern Canada. The constraints and hardships that it imposes are accepted as part of a day's work. My concern, after three field projects on Dealy Island, is that we may be overlooking certain unique requirements of frozen-site archaeology to the detriment of both the sites and the collections. I do not intend to complicate northern archaeology with additional considerations that are more idealistic than possible; northern archaeology is difficult enough in its present stage of development. I would, however, like to point out several considerations which stem from a growing conservation ethic, and which are as applicable to the circumpolar world as they are to any other region where archaeological research is undertaken.

Simply put, the planning of archaeological projects in the Subarctic (those areas with discontinuous permafrost) and the Arctic must more systematically recognize on-site and post-site conservation requirements. These are best evaluated during a site reconnaissance and then incorporated into the excavation planning process. Depending on the site in question, conservation considerations should include not only artifacts, but also features and architectural remains. It is irresponsible to disturb and remove collections from stable, frozen sites when no provisions have been made to safeguard the objects from the accelerated deterioration which follows.

Recognizing that professional archaeologists receive little or no exposure to conservation at any level in their training in North America, professional advice will have to be sought from other sources. The skills and experience of a trained conservator are minimal requirements in the planning of any frozen-site archaeological excavation. I emphasize the planning stage, as this may be all that is required. A thorough pre-excavation evaluation of a frozen site should provide a conservator with sufficient information with which to advise on the safe removal and transportation of collections in the field. The conservator must be consulted prior to the evaluation, however, to ensure that the right sorts of information and observations are collected. Having a conservator along to do the initial evaluation in the field is obviously the most desirable. Laboratory treatment of objects is an entirely different matter and should not be attempted without explicit guidance. Many procedures can be performed by non-specialists, but it is best to seek advice, rather than risk irreparable damage to the artifacts. The guiding principle must be to recognize the limits of one's knowledge and to grant conservation its role as an often highly technical discipline with its own theory and methods.

A conservator on every archaeological field project is ideal, but, unfortunately, not possible. The number of conservators with training in archaeology and ethnology is small, and it is doubtful if most archaeological projects could afford to retain a conservator for the duration of the project, even if one were available. Conservators, too, must recognize this and accept the fact that field archaeologists are most often the only ones in a position to ensure the safe removal of artifacts. Conservators must share what knowledge they consider appropriate, and not withhold critical advice because they fear that non-specialists are performing their rightful duties. We are particularly fortunate in Canada to have access to the Canadian Conservation Institute, a federal institution with an international reputation, where advice and guidance are free for the asking.

This multidisciplinary approach to frozen-site archaeology can do much to contribute to the long-term preservation of sites and collections in northern Canada. If the resources are not available to remove, treat and curate the remains of a frozen site properly, then the decision to abandon or postpone the work must be made. Too many collections are now suffering from over-zealous removal and well-meaning neglect. Much progress could be made if all aspects of conservation, including removal, treatment and storage, were considered to be as fundamental as final report costs in all research proposals. It is up to the archaeologist to make known these new requirements to the funding agencies. The tenets of intellectual freedom to which we all subscribe must also include the rights of posterity's scholars to study the collections we remove today.

ETHNOHISTORICAL OBSERVATIONS ON 19TH CENTURY BRITISH EXPLORATION IN THE ARCTIC

Ethnocentrism and Beyond

Compared to fur trade research in subarctic Canada, there has been very little interest in an appraisal of the Royal Navy as an agent of change in the Arctic during the 19th century. Much of the scholarship concerned with this period has concentrated on the exploration activities of the Royal Navy alone, apart from any broader anthropological considerations (Cyriax, 1939; Neatby, 1970; Owen, 1978; Wright, 1949, 1959). Recently however, several researchers have examined questions of contact and change as a result of 19th- and early 20th-century exploration in the Arctic (Hickey, 1979; Savelle, 1981; Schledermann *et al.*, 1975; Wallace, 1981; Wenzel, 1979). Kellett's storehouse offers a further opportunity to examine the nature and effects of British exploration.

In reading the accounts of Royal Navy personnel engaged in the search for the Northwest Passage, one is immediately struck by the ethnocentrism which characterized their activities. (I define ethnocentrism as the belief that one's own cultural practices and values are better than those of other societies.) It is reasonable to conclude that this ethnocentrism was, in fact, their undoing. To wear uniforms rather than caribou skins was simply to taunt disaster. But as in all realms of human activity, the situation was far more complex than this seemingly reasonable interpretation will allow. The Royal Navy both succeeded and failed in its exploration attempts for a variety of reasons, including their own world view, logistical considerations, profound climatic changes imperceptible to them and the consequences of cultural adaptation among the historic Inuit population.

In retrospect, the ethnocentrism which characterized Royal Navy operations in the far north was often preposterous. The quotation from McClintock cited earlier indicates that unthinking adherence to this attitude could be deadly. But is this so unusual? As Roderic Owen (1978:133) observed, ". . . elaborate stores of food, clothing, and means of travel were the *sine qua non*; not because without them men would burst (as in outer space without an imported bubble of Earth's atmosphere), but because they were men of their era with the (then) latest products of modern English technology". The analogy to space travel is a useful one. Would anyone from contemporary North America imagine going to the moon without a life-support system? The High Arctic might as well have been the moon in mid-Victorian times. Very few people ever have more advanced ideas than those belonging to their own generation (Owen, 1978:133). This is not intended to serve as a justification for the moral and technological superiority the British Navy often wrongfully assumed, but to place hindsight where it belongs.

Closer examination of the literature reveals many exceptions to British ethnocentrism. Kellett, for example, successfully deployed hunting parties and knew of the habits of arctic birds and mammals (1854: 86, 89, 91, 92; 1855:75, 79, 80, 90, 98). He also published (1855:105) an abstract of edible animals procured by the crew of the *Resolute* on Dealy Island in 1852/53. It includes a total of 1353 musk oxen, caribou, hares, ptarmigan and waterfowl. Kellett encouraged hunting by allowing his men to keep as private property the small game they procured (Kellett, 1855:75). None of these subsistence activities were archaeologically observable on Dealy Island, undoubtedly because the meat was consumed on the ships and the faunal remains thrown overboard. McDougall, the sailing master, also writes repeatedly of the importance of fresh meat and their attempts to secure it (1857:31, 103, 119, 136, 170, 176, 277, *passim*). Cyriax (1939:64-65) writes that Sir John Franklin himself said in 1845 that he would seize every chance of killing game.

Of particular interest are two observations by Kellett. He reveals that he does not think that a large party of *Europeans* (emphasis his) could support themselves by hunting, even during the period from May to October, when the country "teemed with animal life" (Kellett, 1855:75). He noted that the animals soon became shy and scarce. This belief must have caused him a certain uneasiness, because he also recognized the critical importance of fresh meat in their diet. Kellett observed:

> The health of the crew during the winter has been better than I could have anticipated; the good effect of the spring feeding manifest. The very superior quality of our provisions of every sort, with the many comforts supplied us, assisted materially in keeping the men in the same condition nearly as when we commenced the winter. We continued to serve out weekly musk ox beef until Christmas Day to the whole crew, retaining sufficient for the sick, and those the surgeon considered necessary to place on the diet list. Those men, except at the surgeon's express wish, have not had a bit of salt meat the whole winter (1855:78).

Kellett apparently understood that fresh meat in large amounts prevents scurvy.

Ethnocentrism was also losing its grip in other areas of exploration activity during Kellett's voyage. For exam-

ple, travelling boots made of canvas were made by the expedition's shoemakers. These boots were made large enough to contain two pairs of socks, blanket wrappers and boot hose (McDougall, 1857:165). This description resembles a crude mukluk, obviously a vast improvement over the leather boot for arctic travelling. In a sense, Kellett's men were reinventing the wheel, learning in isolation and by trial and error the lessons of arctic adaptation.

Exploiting the knowledge of the indigenous people would have been much more efficient. It was not available for reasons related to climatic change, which will be discussed shortly. When rare references to Inuit do appear in Kellett's proceedings, they are singularly superficial and uninformative (1855:92, 93-94, 95). McDougall was less reticent, but his observations are equally useless. After meeting five Inuit near Cape York in Lancaster Sound he wrote, ". . . they outvied all we had previously seen in want of cleanliness, and were, without exception, the most disgustingly filthy race of human beings it has been my lot to encounter" (McDougall, 1857:72).

Irrespective of McDougall's opinions, Kellett's recognition of the importance of country food and his men's attempts to fashion suitable footgear are indicative of an evolving perception and a growing body of knowledge respecting arctic exploration. Admittedly, this evolution of awareness was an agonizingly slow and costly process, having started in 1497 with John Cabot's British Northwest Passage Expedition. The application of such knowledge and experience would receive one of its fullest expressions in the voyages of J.E. Bernier (1909, 1910, 1912). Bernier, in addition to being a prodigious hunter, was a meticulous planner. Having learned the lessons of polar exploration well, his sled crews were outfitted in caribou-skin clothing and sealskin boots. He used local Inuit as hunters and sled drivers whenever possible, to ensure a steady supply of fresh meat (Dorion-Robitaille, 1978: 73-78).

Other names come to mind, from both within and outside the Royal Navy tradition, which exemplify a more sensible approach to the possibilities and limitations of arctic work. John Rae, who obtained the first definite news about the fate of the Franklin expedition in 1854, was one of the first arctic explorers to live off the land by hunting and fishing (Owen, 1978:360). Leopold McClintock's achievements were no less unique for the age, and he is considered to be one of the pioneers of modern sledge travel. Stefansson credits him with being one of the first arctic travellers to lengthen his journeys, in both time and mileage, by hunting. Stefansson also credits G.F. Mecham, S. Osborn and B. Pim, all Franklin search participants, with the same insight (Stefansson, 1921:322). Charles Francis Hall, leader of the 1864-69 U.S. Franklin Search Expedition, is a remarkable example of nearly complete identification with the Inuit. He spoke their language, ate their food and generally adopted their way of life (Hall, 1970).

How, why and when these and other arctic explorers were able to transcend their own culturally-bound behavior are questions which deserve further study. Were personnel of the Royal Navy generally slow to respond simply because they were part of a complex, hidebound organization whose leaders were oblivious to the wisdom of cultural relativism? Was it individual initiative or official policy that led to change? Wallace (1981:28-29) intimates that the Royal Navy was hampered by class distinctions and a reluctance to adopt native ways. The British Admiralty papers are a particularly rich archival source which may provide some answers.

Kellett's storehouse exists because the Royal Navy believed in the superiority of its own solutions. But before 19th-century naval exploration is condemned as generally inappropriate and foolish, it is necessary to recognize that insight into indigenous adaptation was slowly accumulating. Kellett and others were responding to this in their own ways, despite the conservatism of centuries and the legacy of empire.

Logistics and Ultimate Objectives

Nineteenth-century Euro-Canadian presence in the western Subarctic provides an interesting contrast to arctic exploration. The fur trade, the dominant activity in the former region, differed markedly in aims and procedures from the Royal Navy. Brief mention of some of these differences is useful if for no other reason than to discourage facile comparisons. It is tempting, but dangerous, to view historic events in the archipelago in terms of models derived from other northern contact situations.

The subarctic environment can be as precarious as the Arctic. Subarctic winters are long and severe, and the animal resources are subject to cyclic and noncyclic fluctuations, as well as being highly scattered and localized. The Euro-Canadian traders were required to be as self-sufficient as possible, because the riverine supply network which linked them with the south was fragile and inefficient and did not permit the importation of sufficient provisions, in addition to trade goods.

The traders overcame the limitations imposed by the environment by trading with Dene for meat and fish and by employing them as hunters, fishermen and guides (Helm *et al.*, 1981; Janes, 1975). In so doing, the Euro-Canadians were able to maintain year-round operations while simultaneously exploiting the dispersed and variable food resources of the Subarctic. Their dependence on native co-operation and expertise was nearly complete.

This is in striking contrast to the British Northwest Passage expeditions, all of which carried massive quantities of food, supplies and equipment. Franklin had sufficient food for five years on his final voyage, and indicated that it could be made to last for seven (Cyriax, 1939:64). Reliance on local fish and game was clearly unimportant. It was the modern sailing vessel which permitted these large aggregations of sailors in the Arctic for extended

periods of time, as it allowed them to travel more or less self-contained through what in their minds was a forbidding land. And, as we know, sometimes their time ran out. Again, the analogy with space travel is revealing.

Although exploration is often the precursor to trade, there is a fundamental difference between these two enterprises. The subarctic fur traders were in a dependent position of necessity, as the Dene hunters were the principal means of procuring furs. Successful trading required physical presence in the region to ensure an adequate flow of furs. This in itself meant the introduction of change for specific purposes. The search for the Northwest Passage, on the other hand, had as its objective the acquisition of geographical information. Chances of success were inversely proportional to the amount of time the explorers had to spend in northern regions. There was no vested interest in establishing one's presence and introducing change, for whatever reason. The Royal Navy was passing through, and the fact that Kellett established an unmanned depot to assist his colleagues is mute evidence to the Royal Navy's fleeting presence in the High Arctic. As contexts of culture change, the subarctic fur trade and arctic exploration reveal more significant differences than similarities, thus eluding simple comparison.

Climatic Change — Profound but Imperceptible

Prehistory in the Arctic cannot be understood without reference to the climate, as much of the scholarly literature testifies (Maxwell, 1980; McCartney, 1979; McGhee, 1969/70, 1975, 1978; Schledermann, 1976, 1978, 1980a). Even the events of the recent past, i.e. the 19th century, must be viewed within the context of an ever-changing environment.

There is general agreement among climatologists that the arctic climate deteriorated between ca. 1430 and 1850 A.D. (Barry *et al.*, 1977; Bryson and Wendland, 1967; Koerner, 1977; Lamb, 1966). During this period, known as the Little Ice Age or the Neo-Boreal climatic episode, the arctic pack ice underwent a great expansion and sea temperatures in the North Atlantic were one to three degrees C lower than present values (Lamb, 1966:65). It is assumed that this was paralleled by an advance in the summer limit of permanent pack ice throughout the entire North American Arctic (McGhee, 1972a:123). The coincidence is tragic, as the Royal Navy was most persistently committed to the discovery of a Northwest Passage during the latter part of this cooling trend.

Without the benefit of retrospective climatic investigations, they did not know that they were sailing in arctic waters during some of the coldest summers of the previous seven centuries (Koerner, 1977:16,18). There were exceptions to the oppressive ice conditions during this period, e.g. in 1819 when Parry sailed through Lancaster Sound to Melville Island in one season (Parry, 1821). Franklin's expedition met the opposite extreme, and died to a man as a result of the unrelenting ice.

Climatic Change — The Inuit Response

Assessing the impact of Kellett's storehouse as an instrument of culture change requires a consideration of the historic Inuit response to the Neo-Boreal climatic deterioration. It is thought that the High Arctic Islands north of the Viscount Melville Sound/Lancaster Sound demarcation were generally abandoned throughout the 19th century, except for the Polar Inuit on Greenland and the eastern coast of Ellesmere Island (McGhee, 1927b:53, 1978:103-117). Savelle (1981) has examined this hypothesis further and concludes that 19th-century occupations of the High Arctic Islands were very restricted, and were primarily a response to European activities in the area.

Although the abandonment hypothesis remains to be archaeologically verified throughout the High Arctic, both of these interpretations are corroborated by the archival documents pertaining to Kellett's voyage, the archaeological information and the abandonment history of the storehouse. Kellett (1854, 1855) does not write of encounters with native people in the vicinity of Melville Island. Second, the archaeological evidence of indigenous occupation in Bridport Inlet, Melville Island, predates Kellett's storehouse by over 700 years (Schledermann, 1980b). Most importantly, the documentary history of the site and its remarkable completeness in the late 20th century argue against a knowledge of its whereabouts among the Inuit. It is as if the Inuit did not know it existed.

This last point is important because recent research has demonstrated that historic Inuit made full use of a Royal Naval depot on northern Banks Island, despite the Neo-Boreal abandonment (Hickey, 1979; Schledermann *et al.*, 1975; Wilkinson and Shank, 1975). In that instance, Copper Inuit from Victoria Island travelled north to help themselves to the valuable depot left by McClure of the *Investigator*. If Inuit living in the low Arctic Islands knew of Kellett's storehouse, they might have declined to make the journey because of the risk inherent in having to support themselves in unfamiliar territory. In addition, it would have been a very long journey.

Savelle (1981:113) writes of a similar situation at Fury Beach on the east coast of Somerset Island, where a large cache, including tools, food, firearms and boats, was deposited in 1825 by Parry. It does not appear to have been utilized by 19th-century Inuit, and Savelle concludes that historic Inuit occupation was very limited.

Considering all these lines of inquiry, Kellett's storehouse played no detectable role as an agent of change among the local population. While this does not preclude the possibility that the site was visited and used by Inuit, present evidence suggests that the storehouse was not the focus of any regular extractive activities on the part of the historic Inuit. Had there been year-round or seasonal Inuit habitation in the region, the conclusion would undoubtedly be very different. Nevertheless, certain characteristics of British exploration would have lessened the traumas of any contact situation, as previously discussed: ethno-

centrism would have kept to a minimum any face-to-face contact, and the nature of naval exploration obviated a reliance on local resources. What we must now begin to investigate are the processes of culture change which occurred indirectly as a result of the use and circulation of European material goods in the Arctic. One such investigation is presently underway (Hickey, 1979).

I have tried to show that the values and policies of arctic exploration were also undergoing change and that this interplay of policies and individuals is very important in assessing the ethnohistorical implications of exploration in the Arctic. What is required now is comparative research on exploration sites throughout the high and low Arctic, with some of these questions in mind. Sites must be studied to determine the full range of adaptive techniques employed in arctic exploration through time. Perhaps this will provide further insight into the reasons that expeditions such as Greely's continued to suffer privation and death for want of the indigenous skills and knowledge that they themselves did not possess.

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