

The expedition huts used by Robert Peary at Fort Conger

are threatened by the effects of climate change.

© Dr. Peter Dawson



Saving Our Arctic Heritage

What do you think the biggest threat to our Arctic heritage sites is? Unlike most parts of the world, where it is human activity, in Canada's Arctic it is climate change. Where the freezing temperatures once preserved delicate structures and organic materials, rising temperatures are now destroying them.

Among the most vulnerable sites are coastal settlements. In addition to the damaging effect of thawing soil and permafrost, at coastal locations rising temperatures also mean rising sea levels, reductions in sea ice, and bigger waves — resulting in more coastal erosion which can literally wash away significant portions of sites in a single season.

How can we preserve these places for future generations? So far archaeological surveying, making maps and taking photographs, has been the only option, but it is

slow ... and the end product are simple two-dimensional images.

But now archaeologists, computer modellers, and geomatics engineers from the University of Calgary have been using terrestrial laser-scanning technology to record and preserve arctic sites in astonishing detail, and in a way that allows the creation of life-sized replicas, which people can move about and study.

Fort Conger – a key Arctic exploration site

The first site to be recorded in this way was Fort Conger. Located in a remote northeastern corner of Ellesmere Island, about 100 km south of Alert, it is a key heritage site for early western exploration of the High Arctic.

First built in 1881 as part of the Lady Franklin Bay Expedition, 25 men lived there

for two years, and it was later used by Peary several times around 1899 as a staging post for his attempts to reach the Pole. Today Fort Conger consists of three dilapidated wooden huts a mere 30 feet from the shore of Discovery Harbour, and a precarious 10 feet above the high water mark. Further complicating matters is the presence of arsenic trioxide, a toxic legacy of the expedition, originally used to preserve natural history specimens. Removing the contaminated soil would pose a significant threat to heritage resources present at the site.

In 2010, Parks Canada asked Dr. Peter Dawson of the University of Calgary to investigate the possibility of using 3D laser scanning to record the site. Dawson and his colleagues Dr. Richard Levy of the Faculty of Environmental Design and Chris Tucker, President of SarPoint Engineering in Calgary, partnered with CyArk, an

Computer reconstruction of a Thule whalebone house.
Image courtesy Dr. Richard Levy and Dr. Peter Dawson, University of Calgary

international non-profit organization dedicated to using new technologies such as laser-scanning to create a free online 3D library of world heritage sites in danger of being lost, whether through climate change, as in the case of Fort Conger; war; or simply the ravages of time.

The result is a 3D image which can be viewed interactively on CyArk's website at cyark.org/projects/fort-conger or in an immersive 3D viewing room reminiscent of the 'holodeck' on Star Trek. In this way the entire building can be 'reconstructed' and studied in detail elsewhere.

Preserving Inuit architecture

The technique has also been used by Dawson and Levy to record and study Inuit architecture. In one case they have been able to use it in conjunction with computer modelling to reconstruct buildings that have long since disappeared.

In the late 12th or early 13th century, the Thule people, ancestors of contemporary Inuit and Eskimo groups of the North American Arctic and Greenland, expanded eastward from the Bering Strait region into Canada's Arctic. Because there was little driftwood available, they built winter houses from whalebones — with a framework of bone over a house pit, then covered by thick layers of hide and turf. The collapsed remains of such houses have been found, but few exist intact.

Scanning of whale skeletons and computer modelling was successfully used to reconstruct 'virtual reality models' of the houses, which could then be used to work out how they would have been constructed, and what they looked like inside.

Similar studies have been done of *igluryuaq* or winter sod houses of the Inuvialuit people in the Mackenzie delta area, preserving Inuit heritage which would otherwise have not only been completely lost, but not even properly understood. 

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