Geological Survey of Canada
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DISPELLING MYTHS OF THE HALIFAX HARBOUR, NOVA SCOTIA

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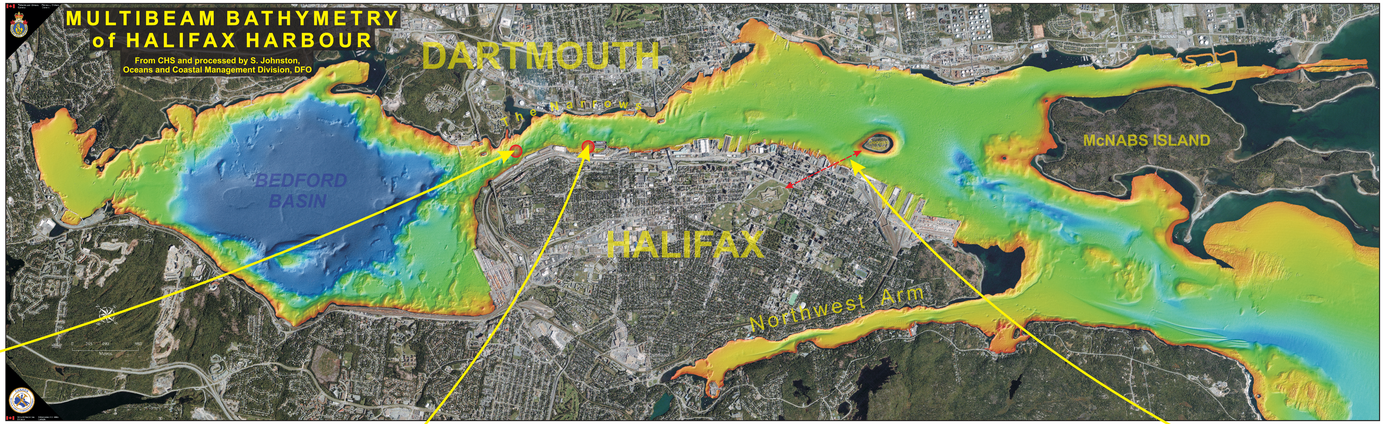
INTRODUCTION

Halifax Harbour has many myths associated with its history and some of them are related to the geology. Here we present three of the more popular ones and the modern evidence to clarify the story. They are:

- That a curse has been placed on the bridges of The Narrows,
- That the Halifax Explosion of 1917 in The Narrows created a large crater on the seabed of the harbour, and
- That a tunnel was built to connect Georges island with Citadel Hill under the harbour floor.



THE TALE OF THE CURSED BRIDGES OF THE NARROWS

An ancient legend claims that a curse was put on the Halifax Narrows (Figure 1) that will cause three bridges to fall in these waters. It was placed by a member of the First Nations in revenge for the death of his partner. Archives show that in fact two bridges use to span The Narrows, but both disappeared due to strange circumstances. Will the MacKay Bridge (Figure 1), the third built, be able to withstand the curse? Using side scan sonar and multibeam bathymetry, scientists have discovered the mystery as to why these two bridges, one built in 1884 and the other in 1893, collapsed, and why it is likely the MacKay Bridge will withstand this curse.

An unusual pattern of large rectangular objects that span across The Narrows were discovered while mapping the seabed in 1989 (Figure 2). Evidence from the Nova Scotia Archives shows that remains of not one, but two original harbour crossing bridges had been found (Figure 4).

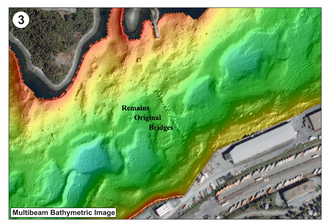
The two bridges were built at the same location, approximately 500 metres south of the present A. Murray Mackay Bridge (Figure 3). Further studies with underwater cameras, samplers and multibeam bathymetric mapping systems revealed details of the bridge remains and revealed why both bridges collapsed.

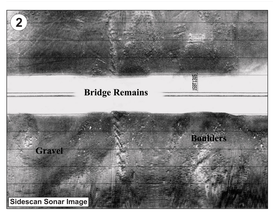
The first bridge was completed in May 1884 and had a steel swing section made by the Starr Manufacturing Company of Dartmouth. The swing section was located near the Dartmouth shoreline and was designed to open to allow ships to move into Bedford Basin (Figures 4, 6). The bridge was over a quarter of a mile in length and up to 40 feet in width. It was built mainly as a railway bridge but a foot path existed alongside the track and an average of 125 train cars used the bridge daily.

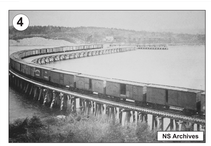
The bridge had been built on wooden piers with each base containing 20 tons of rock ballast. These are the rectangular features seen on the sidescan imagery (Figures 2, 5). On September 7, 1891, a hurricane hit Halifax Harbour with winds reported to be as high as 113 kilometres per hour. Much damage was done to the docks of the harbour and a large portion of the bridge collapsed during the night. All bridge infrastructure from 60 metres out on the Halifax side to the swing section near Dartmouth was washed away.

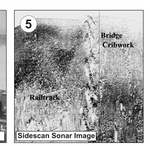
After lengthy deliberations, a second bridge was built in the same location, but this time using piles pounded into The Narrows seabed for support. This bridge appeared unstable after completion and granite blocks were placed on the seabed beside the bridge and connected with cables to improve bridge stability. Despite these efforts, the second bridge floated away on July 6, 1893, after a strong tide essentially lifted it from its foundation on a quiet summer night.

Underwater camera and multibeam bathymetric surveys show that much of the original cribwork of the first bridge is still intact rising above the bottom by several metres. The multibeam map shows the cribwork and the circular pier base for the swing section on the seabed (Figure 3). Much of the cribwork and rail track are covered with sea anemones fed by the nutrient-rich fast moving waters in The Narrows. The seabed consists of gravel with boulders and is swept clean of muddy sediments by strong tidal currents. The hard geological conditions of the seabed and the strong currents provide an answer as to why the bridges collapsed. The hurricane that brought down the original bridge separated it from its cribwork base. The second disaster was likely the result of the failure of the pilings to properly penetrate into the hard seabed. The present A. Murray McKay Bridge is built on solid bedrock.









DID THE HALIFAX EXPLOSION FORM A SEABED CRATER?

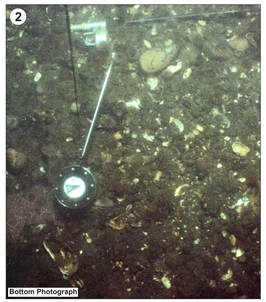
Another myth of Halifax Harbour is that the Halifax Explosion of 1917 developed a large crater in the bottom of the harbour. In his 1941 book "Barometer Rising", author Hugh MacLennan wrote: "Underneath the keel of the Mont Blanc the water opened and the harbour bottom was deepened twenty feet along the channel of The Narrows; the rigid ironstone and granite base of Halifax peninsula rocked and reverberated, pavements split and houses swayed as the earth trembled". But is this true?

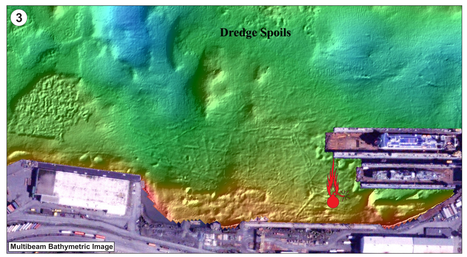
The 1917 explosion occurred on the Halifax side of The Narrows in Halifax Harbour, when, after collision with the ship *Imo*, the cargo aboard the ammunition ship *Mont Blanc* erupted into one of the world's largest non-natural explosions prior to the detonation of atomic bombs (Figure 1). The marine geological and geophysical surveys show that the seafloor of The Narrows is unlike most other areas of the inner Harbour. It consists of cobble and boulder-sized gravel with outcropping bedrock (Figure 2). The currents are strong enough to prevent significant deposition of fine-grained sediments. Beneath the gravel, the material consists of exceptionally hard till deposited by glaciers, which likely occupied the harbour many times during the Pleistocene Epoch (2.58 million years ago to 11.7 thousand years ago).

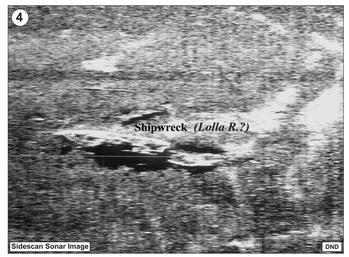
An interpretation of the survey information indicates that there is no crater formed by the explosion (Figure 3). The seafloor does not have large pieces of debris that would be expected to remain from the destruction of a large vessel such as the *Mont Blanc*. It is suspected that post-explosion clearance and dredging programs may have removed the debris. Many small sidescan sonar targets occur on the seabed of The Narrows and some may represent debris from the explosion of 1917, but they require visual identification.

The energy generated by the blast from the explosion on the *Mont Blanc* was likely directed outward and upward because of the hardness of the seabed. The minimal impact to the seabed at the site of the explosion in Halifax Harbour (Figure 3) is in contrast to the impact of nuclear test explosions at Enewetak Atoll, Marshall Islands, which formed craters up to 60 m deep and 1200 m in diameter.

Recently, during surveys conducted by the Department of National Defence in The Narrows near the site of the Halifax Explosion, a copper-clad schooner shipwreck was found (Figure 4). Research continues on this wreck and it is thought to have sunk during the Halifax Explosion, thus adding a new chapter to the story.





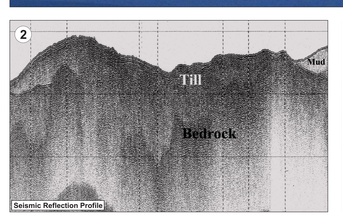


THE TALE OF THE THE TUNNEL TO GEORGES ISLAND

Perhaps the most persistent and well-known myth about Halifax Harbour is the idea that a tunnel runs beneath the harbour and connects Citadel Hill with Georges Island – two of the major early British fortifications of the harbour (Figures 1, 3).

Both of these hills are drumlins (mounds of gravel, sand, silt and clay deposited by glaciers) and are the sites of former military forts that were easily dug into the soft material. The story is continually fueled every time work is done on the downtown streets that involve replacing or repairing water and sewer pipes. On numerous occasions these street excavations have broken into chambers and tunnels that are lined with brick and in some cases are large enough to walk through. Some of them head to the harbour between Georges Island and Citadel Hill.

During the geological study of the harbour seismic reflection systems were used to look beneath the bottom of the harbour to understand the sediments and bedrock. These systems use sound to penetrate the bottom and images are produced that show layering of the sediments and rocks. Surveys were conducted between Georges Island and the Halifax shoreline and the images showed no evidence of tunnels or flooded tunnels (Figure 2). Surveys have been conducted in other cities with tunnels and they clearly appear on geophysical imagery. Thus there does not appear to be any connection between Georges Island and Citadel Hill beneath the harbour.



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