Wrecks of HMS *Erebus* and HMS *Terror*

National Historic Site of Canada

HMS *Erebus* Archaeological Surveys 2015 and 2016

for the

Nunavut Impact Review Board

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Table of Contents

1. Project summary

1.1. Introduction

After the discovery of HMS *Erebus* in September 2014, the on-site archaeological tasks at hand quickly became obvious to UAT underwater archaeologists. The wreck rests on a shallow seabed in a state of preservation that exceeded prior expectations, although other historic wreck examples found in Arctic waters made this a reasonable preservation scenario. The 3-dimensional hull was remarkably intact and rose above the seabed up to the Upper Deck in most places. Its interior was presumed to be in excellent condition with the exception of parts of the Lower Deck living spaces either crushed or exposed to the elements in places where the Upper Deck had collapsed or had been ripped open. Artefacts seemingly in pristine condition were observed on top, inside and around the wreck, raising hopes for the discovery of ground-breaking information to unlock some of the perennial mysteries surrounding the Franklin expedition.

The immediate questions facing UAT archaeologists were: "What information can we realistically hope to extract from this site?" and "How do we tackle this 3-dimensional puzzle located in an environment that only provides a limited annual window(s) of opportunity to access the promised information?"

In reality, these two particular questions are not novel to UAT underwater archaeologists. Indeed, they are part of a linear process that follows any discovery and their gist is embedded in the annex of the United Nations Educational, Scientific and Cultural Organization's (UNESCO) 2001 Convention on the Protection of the Underwater Cultural Heritage, under Part III (Preliminary work), Rules 14 and 15:

> Rule 14. The preliminary work referred to in Rule 10 (a) shall include an assessment that evaluates the significance and vulnerability of the underwater cultural heritage and the surrounding natural environment to damage by the proposed project, and the potential to obtain data that would meet the project objectives.
>
> Rule 15. The assessment shall also include background studies of available historical and archaeological evidence, the archaeological and environmental characteristics of the site, and the consequences of any potential intrusion for the long-term stability of the underwater cultural heritage affected by the activities.

Upon the discovery of *Erebus* it was self-evident that the largely intact wreck was extremely promising archaeologically. Yet it would be simplistic to infer that since the wreck has rested on the seabed in this location for almost 170 years that it had achieved a state of equilibrium with

its environment and that it was entirely stable, especially given new environmental and climatic dynamics at play in the Arctic.

An assessment of the *Erebus* site in order to prepare for any future archaeological work became the UAT's priority: the very first dives following the 2014 discovery, conducted with a remotely operated vehicle (ROV) and shortly thereafter by UAT underwater archaeologists, actually started this structured process which was also guided by Parks Canada's Cultural Resource Management Policy. The three subsequent fieldwork campaigns that took place in April 2015, August-September 2015 and August-September 2016 were entirely dedicated to assessing the:

- Extent and the state of preservation of the wreck;
- Site's potential to enlighten our knowledge of the history of the Franklin expedition and the areas of the wreck site most likely to deliver this knowledge;
- Stability of the wreck structure;
- Preferred modus operandi to access the wreck's unique information; and
- Environmental risks to the wreck and any urgency to conduct intrusive archaeological work and excavation.

The site assessment will help guide future research and will be fundamental in shaping Parks Canada's privileged archaeological study of a truly remarkable shipwreck site.

1.2. Definition of the study area

The 2015-2016 study area corresponded to the boundaries of the Wrecks of HMS *Erebus* and HMS *Terror* National Historic Site of Canada situated in Wilmot and Crampton Bay at the eastern end of Queen Maud Gulf, within the Kitikmeot Region (Qitikmiut) of Nunavut, Canada. The site is approximately 125 km from Gjoa Haven and 275 km from Cambridge Bay, the two nearest communities in Nunavut. The historic site is a 10 km by 10 km zone that encompasses the wreck of *Erebus* and that is situated amongst an archipelago west of the Adelaide Peninsula and north of O'Reilly Island. It was created on April 8, 2015 by way of an Order Amending the National Historic Sites of Canada Order under the Canada National Parks Act and comprises "… the seabed and water column above the seabed … EXCEPTING all islands and foreshore lying above the ordinary low-water mark…"(Canada Gazette 2015). The area covers approximately 83.6 km2 taking into account the islands' collective area. As a result of the creation of this zone, the wreck of *Erebus* was afforded the protections of the Canada National Parks Act and the National Historic Parks General Regulations. The 10 islands or parts thereof within the zone that are above the low-water mark are under the jurisdiction of the Government of Nunavut (GoN).

All underwater archaeological activities in 2015 and 2016 took place within a 200-m radius of the hull of the wreck, and encompassed parts of its surrounding seabed debris field. Following the 2014 discovery of *Erebus*, Parks Canada and the GoN agreed that the precise site location would not be disclosed; for this reason no absolute site location information is provided in this report, although archaeological data is presented within a relative geomatic backdrop. Given that the UAT will approach study of the wreck with an inclusive maritime archaeological approach, it is anticipated that future archaeological activities directed at *Erebus* could spread geographically beyond the wreck itself, to include for example remote

sensing surveys and collaboration with terrestrial archaeological work on nearby islands and the Adelaide Peninsula.

1.3. Objectives

The overriding objective for 2015 and 2016 field-work at *Erebus* was to complete the archaeological assessment phase of the project, within a planned multi-year project window of 2015-2020. Not all objectives within any given fieldwork episode were completed.

The first episode of fieldwork in April 2015 was called Breaking the Ice: HMS *Erebus* Revealed and took place under the umbrella of "Operation Nunalivut 2015", an annual Canadian Forces military exercise directed by Joint Task Force (North) based in Yellowknife, Northwest Territories. Archaeological objectives for this episode included:

- Installation of primary reference points for site surveying;
- Systematic removal of overlying kelp from the wreck;
- Extensive video and photo documentation of the site including 3D photogrammetric modelling;
- Exploration of interior spaces using inspection cameras inserted through various ruptures in the Upper Deck;
- Selected test excavation(s) with a water induction dredge and aluminum grid reference system;
- 3D underwater laser scanning of the Upper Deck, stern structure, and/or accessible between-deck space;
- Possible recovery of the two 6-pounder brass cannon located off the stern;
- Underwater video filming in support of a proposed documentary film production and a "Live Dive" from the wreck site; and
- Deploy a Canadian Hydrographic Service tide gauge to the seabed at the site.

The objectives for the August-September 2015 episode of fieldwork, entitled "Mission *Erebus* and *Terror* 2015", followed on from the April 2015 work, and included:

- Continuation of site recording, the evaluation of site condition, and in-depth investigations of the periphery and interior of the wreck site;
- Continuation of 3D photogrammetric modelling;
- Test excavation(s) in the debris field at the stern;
- Recovery of selected diagnostic and representative artefacts (surface collection) necessary to help reconstruct the story of the Franklin expedition;
- • A marine biology component to characterize the benthic communities (fauna and flora) found on the wreck in order to better understand Arctic marine biodiversity, the factors limiting or enabling the development of benthic communities in Arctic regions and the impact of these communities on the wreck;
- Deploy a current profiler to the seabed at the site and recover the Canadian Hydrographic Service tide gauge;
- Clear kelp from the Upper Deck, starboard side and stern;
- Photo and video coverage of the wreck and its debris field;
- Locate, map and record diagnostic features and visible in situ artefacts within a gridded

- Scout potential future excavation areas and potential entry points for future interior site penetration dives;
- Interior photo and video through visible hull openings;
- Collect wood species samples of selected features; and
- Explore the debris field beyond 5 m out from the hull perimeter, including a multibeam echo-sounder survey of this zone.

The objectives for the August-September 2016 episode of fieldwork, entitled "Mission *Erebus* and *Terror* 2016", were limited due to time constraints, and included:

- Site inspection to check on the condition of the wreck and to detect any change to the site since September 2015;
- Photo and video documentation;
- Complete the initial phase of 3D photogrammetric recording;
- Recovery of a current profiler deployed in September 2016;
- Multi-beam echosounder survey of the site and the surrounding debris field;
- Interior video using DeepTrekker ROV; and
- Meet and escort members of the Franklin Advisory Committee to the site.

2. Future steps and recommendations

The introduction of this report outlined two fundamental questions for the assessment work to answer: "What information can we realistically hope to extract from this site?" and "How do we tackle this three-dimensional puzzle located in an environment that only provides a limited annual window of opportunity to access the promised information?". We are confident that we have acquired enough information to address these questions in order for the archaeological work to proceed.

There is no doubt that the archaeological and historical potential of the wreck of *Erebus* are vast. In evaluating this potential we recognize two elements. First, its potential lies in the range and importance of the historical questions the site could answer. In the case of the Franklin Expedition, these questions are numerous and have increased in number and evolved in character given the context of the wreck's location in Wilmot and Crampton Bay. For example, important and tantalizing questions range from:

- What caused men to return to *Erebus* after April 1848, if indeed they did so, and how much of the supplies remained in the final stages of their ultimately fatal journey?
- When and how did *Erebus* arrive in;
- What were the number and identity of living crew members on the ship in the area of its sinking (Ugjulik), if any; and
- What was the fate of these men once the ship could no longer travel farther?

The shipwreck promises many more insights into the general chronology and progress of the expedition, especially in its later stages.

Second, the potential of the site lies in its intrinsic archaeological value. It was immediately evident to all and very early on the very first dives that this potential is immense. The extent of the ship's hull and the protection it offered from the elements to its contents obviously encapsulates a mountain of information.

Systematic inquiry over the last two years, as demonstrated in this report, has confirmed that although the natural elements have impacted the site and in some areas relatively significantly so, many zones offer untouched capsules of what could be the very last moments of the expedition. The area with the highest potential is the stern area of the Lower Deck based on our current understanding of the site. This is where the officers' cabins are found, and initial investigation has shown that they still have integrity, at least as high as their fitted bed places for example. This is quite remarkable and promises to yield important information, not only because of the role of the officers in recording events and the probability of identifying specific individuals, but also because of the clearly compartmentalized nature of the area; these are clearly capsules within a capsule. A few of the cabins are readily accessible, and most would become accessible by either removing or consolidating part(s) of the collapsed Upper Deck. The galley area is also of interest but it is generally devoid of physically compartmented spaces. Some elements, like an intact seamen's chest, is visible yet out of reach at present but would offer a unique insight into the life of the lesser known figures of the expedition. The Sick Bay needs to be explored because it is well sheltered at the bow and on ac- count of perennial interest in the demise of the health of the crew. The Orlop Deck will be more of a challenge because of the limited and constrained access points, and the challenge to work deep in- side the wreck, but the first images obtained clearly reveal that we have a lot to learn from what has been well preserved in the hold. Indeed, we have yet to image any interior elements of the steam propulsion system. What is more, there are seemingly limitless questions regarding the technology encapsulated in the ship, shipboard life with its wooden walls, and material culture employed in relation to not only British polar explorations of the mid-nineteenth century in general, but also the most exquisitely equipped and storied of them all. Finally, the debris field cannot be omitted as some areas outside the wreck clearly relate to key interior spaces of the ship, notably the stern cabin that has partly collapsed onto the seabed. What is more, the inner periphery of this debris field will help to understand the site formation process during and after sinking, while the outer periphery, namely the reef to the north, could offer insights into the trajectory of the ship inside the pocket of islands of Wilmot and Crampton Bay.

Beyond the potential of the site to shed light on a pivotal historical moment in the exploration of the Northwest Passage, a crucial component of the assessment work was to pinpoint the threats that loom over the wreck. Again, first hand observation of the site quickly demonstrated that in some areas it is very vulnerable to the elements. Whereas historically ice has undoubtedly affected the site, the present day pounding effects of summer storms as they periodically channel in from the north and west are very real. The displacement of timbers and artefacts, and in one case the fracture of one object, not tome mention the pulsating movement of a deck section were witnessed firsthand by the UAT archaeologists immediately after a gale in September 2015. There is no doubt that the site is still actively deteriorating, and will continue to do so.

Moving forward, it is clear that the methodology developed in the research design will have to mirror that used during the site assessment phase: efficient use of multiple tools adapted to the questions at hand and to the specificity of the area under direct investigation. Excavation will be war- ranted in areas of higher interest, of concentrated contents and of good integrity, like the officer's cabins, the Sick Bay, the debris field astern of the wreck and the individual seamen's chests. At this point, an intrusive approach is really the only way to fully address the important questions that are before us. It is also not only required, but also justified in the context of the observed impacts of the harsh environmental conditions present in this part of the Arctic. Less intrusive documentation will need to be utilized in more disturbed areas or in

pockets harder to access that are not as exposed to the impact of the elements. Documentation with remotely operated tools will likely be the norm for interior zones that offer limited physical accessibility. All the same, the recording will need to be flexible and adapted to the desired objectives and the time restrictions imposed by the situation and the environment. Already, the recording method- ology developed during the last three years has embraced this reality, using three-dimensional techniques (multi-beam and photogrammetry) for site mapping, direct survey methods and basic baseline and datum points to support the traditional hand mapping of artefacts. These methods are interrelated through a grid system based on the Parks Canada alpha-numerical methodology which in turn is integrated in a GIS. This flexibility permits the use of just about any recording method, whether traditional or high technology, to provide the required results given the time at hand.

Article 2.5 of the UNESCO Convention cited above attests that the "preservation in situ of under- water cultural heritage shall be considered as the first option before allowing or engaging in any activities directed at this heritage". This does not mean that it is the only way forward: the spirit of the Convention encourages an intrusive approach like excavation if important scientific or historical questions can be answered through this type of project, or if the site is threatened. We have not seen many sites in Canada that meet the spirit of these values so completely. Indeed, we hope that this assessment report has demonstrated that targeted excavation of portions of the HMS *Erebus* wreck is the only way forward. Through under- water archaeology we shall unlock some of the mysteries in *Erebus* about its compelling story and ultimately preserve the commemorative integrity of its unique deposit of archaeological materials.

This assessment report will serve as the foundation of the development of a research or project design for the work to be conducted at HMS *Erebus*. This research design will spell out the principle research questions, and the methodological approach and techniques to be used, as well as a discussion around all the crucial elements of the multi-year project to come. The document will have to take into account the recent discovery of HMS *Terror* in September 2016 in a state of preservation that seems even greater than that of *Erebus*. We are in the privileged position of having access to an unprecedented amount of data regarding the 1845 Franklin Expedition, something unfathomable less than a decade ago, data that will rewrite the story of the fate of Franklin's men. Parks Canada is committed to using the highest archaeological standards to shed light on this important story from the Canadian Arctic.

3. Summary of community consultations

The underwater archaeological surveys conducted on both wrecks *Erebus* and *Terror* are conducted for the most part through the Franklin Interim Advisory Committee (FIAC) which is composed of key stake holders of the Franklin shipwrecks. The FIAC's role is to advise the Parks Canada super-intendant of the Wrecks of *Erebus* and *Terror* National Historic Site on any action taken in regards to the wrecks HMS *Erebus* (since 2014) and now HMS *Terror* (since 2016).

The stake holders of the FIAC include:

- The Kitikmeot Inuit Association (KIA) (Fred Pedersen)
- The Department of Culture and Heritage of the Government of Nunavut (Doug Stenton)
- Inuit Heritage Trust (William Beveridge)

- Nattilik Heritage Center of Gjoa Haven (Jacob Keanik),
- Department of economic development and Tourism of the Government of Nunavut (Nancy Guyon)
- The Community of Cambridge Bay (James Panioyak
- The Community of Cambridge Bay (Louie Kamookak)
- Nunavut Tourism (Sarah McNair-Landry)

The FIAC meets by telephone conference once a month and in person twice a year. This has been the case since the formation of this group after the creation of the WET NHS in the summer of 2015. More specifically regarding the archaeology, IN ADDITION TO THE MONTHLY UPDATES, the FIAC has been briefed on the results of the 2015-16 project and on the archaeological work to come in 2017 on the following dates:

- November 30th 2016: Members of the FIAC were brought on the site of HMS *Erebus* to see the wreck site first hand and see the diving activities so they can understand the logistical challenges and the dynamics of the project
- May 4th: detailed verbal update on the April 2017 robot dives on HMS *Terror* and an update on the 2017 plans for HMS *Erebus*
- January 25th 2017: detailed in-person presentation at the bi-annual meeting held in Yellowknife. This presentation gave a detailed summary of the results contained in the archaeological report of the assessment of the wreck of HMS *Erebus*. Copies of the report were handed out to the FIAC members for comments. As well, a detailed research design was presented to the FIAC members at that time and a copy of this document was presented as well.

During these meetings, the FIAC members endorsed the proposed actions and methodology for the archaeological work on the site of HMS *Erebus* and were supportive of the works conducted so far. No issues were raised as far as the archaeological work on the wreck of HMS *Erebus*. One recommendation was made in January regarding the work in 2017 April on the wreck of HMS *Terror*: to work with the Hunters and Trappers Association of Gjoa Haven to deploy the equipment and people on the ice and for support in bear monitoring and camp support. This recommendation was followed and the project was planned and put in place with the HTO.

In addition to these meetings and consultations with the FIAC, in-person meetings regarding the archaeological work on HMS *Erebus* were held with the Hamlet Council of Gjoa Haven on the 22nd of April and on the 21st of September of 2015 to present the results of the work after the main components of the project, to show artefacts and to explain the following steps in regards to conservation. The Hamlet Council was supportive of the work and the main concern expressed was regarding the security of the site as there is fear that it may be looted. Parks Canada has been working with different partners to ensure that potential visitors are tracked and is presently putting in place a guardian program that will support physical presence of Gjoa Haven community members at the site during summer months.

4. Outreach

In addition to these formal updates with FIAC and Hamlet council, Parks Canada staff have been in contact with local residents of the Kitikmeot communities through various events or planned encounters since the discovery of HMS *Erebus* in September 2014. Among these events were:

- April 22 2015: presentation to all the students of the Gjoa Haven elementary and secondary schools to explain the Franklin Story and the work of underwater archaeologists
- September 21 2015: presentation to all the students of the Cambridge Bay elementary school to explain the Franklin Story and the work of underwater archaeologists, and to show artefacts recovered from the site.
- September 21 2015: presentation to all the students of the Cambridge Bay secondary school to explain the Franklin Story and the work of underwater archaeologists, and to show artefacts recovered from the site.
- September 21 2015: presentation to all the students of the Gjoa Haven elementary school to explain the Franklin Story and the work of underwater archaeologists, and to show artefacts recovered from the site.
- September 21 2015: presentation to all the students of the Gjoa Haven secondary school to explain the Franklin Story and the work of underwater archaeologists, and to show artefacts recovered from the site.
- September 21 2015: evening public presentation in Cambridge Bay to explain the Franklin Story and show artefacts recovered from the site. Approximately 60 attended.
- September 21 2015: evening public presentation in Gjoa Haven at the Nattilik Heritage Center to explain the Franklin Story and show artefacts recovered from the site. Approximately 30 people attended.
- September 7 2016: presentation to students of the Taoloyak secondary school (grades 9-12) to explain the Franklin Story and the work of underwater archaeologists, and to show artefacts recovered from the site.
- November 16 2016: Meetings with the elders of Gjoa Haven at the Nattilik Heritage Center to inform them on the Franklin project. Seven elders and an interpreter attended.
- November 17 2016: evening public presentation at the Nattilik Heritage Center in Gjoa Haven to update the community on the projects on HMS *Erebus* and HMS *Terror*. Approximately 10 people attended.
- November 28-29 2016: Presentations to four classes at the Cambridge Bay secondary school
- November 30 2016: evening public presentation to the Cambridge Bay Community

5. Screening Decision Report

The “Recommended project-specific terms and conditions” were fully respected. Parks Canada field researchers staged all operations, as planned, from the CCGS *Sir Wilfrid Laurier* (deploying the 10 m Parks Canada survey vessel *Investigator* daily for survey activities). Consequently, all water production, fuel storage and transfer, trash incineration, and sewage treatment were conducted on board ship. All personnel were accommodated on ship.

Parks Canada hired Nunavut beneficiaries in support of survey operations and heritage program interpretation. Members of the FIAC made a visit to the Erebus site on August 31, 2017, where they were given a first hand update on project progress.

6. References

Canada Gazette (2015) Order Amending the National Historic Sites of Canada Order, P.C. 2015-438, April 8, 2015, SOR/2015-88. Part II, vol. 149, no. 8, pp. 1189-1193, April 22, 2015. Queen's Printer for Canada, Ottawa.