# Peat Bog Excavations at L'Anse aux Meadows 2018 -2019

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## Introduction

This text provides an overview of archaeological work conducted during the summers of 2018 and 2019 at the L'Anse aux Meadows (LAM) National Historic Site by teams led by Paul Ledger (2018, Parks Canada permit # AM-2018-28717) & Véronique Forbes (AM-2019-33140). Here, we summarize the aims, methods, and results of both field seasons, and also recount how what was initially intended as a single short field season to collect peat samples developed into a longer-term project.

## 2018 fieldwork

Our initial field season was undertaken as part of Paul Ledger's then postdoctoral project, the objective of which was to deploy an environmental-archaeological approach to examine the palaeoenvironmental and chronological context of human settlement at LAM. The fieldwork strategy was based on experience

**Figure 1: Map showing the location of excavation trenches discussed in the report (image by Bryn Tapper).**

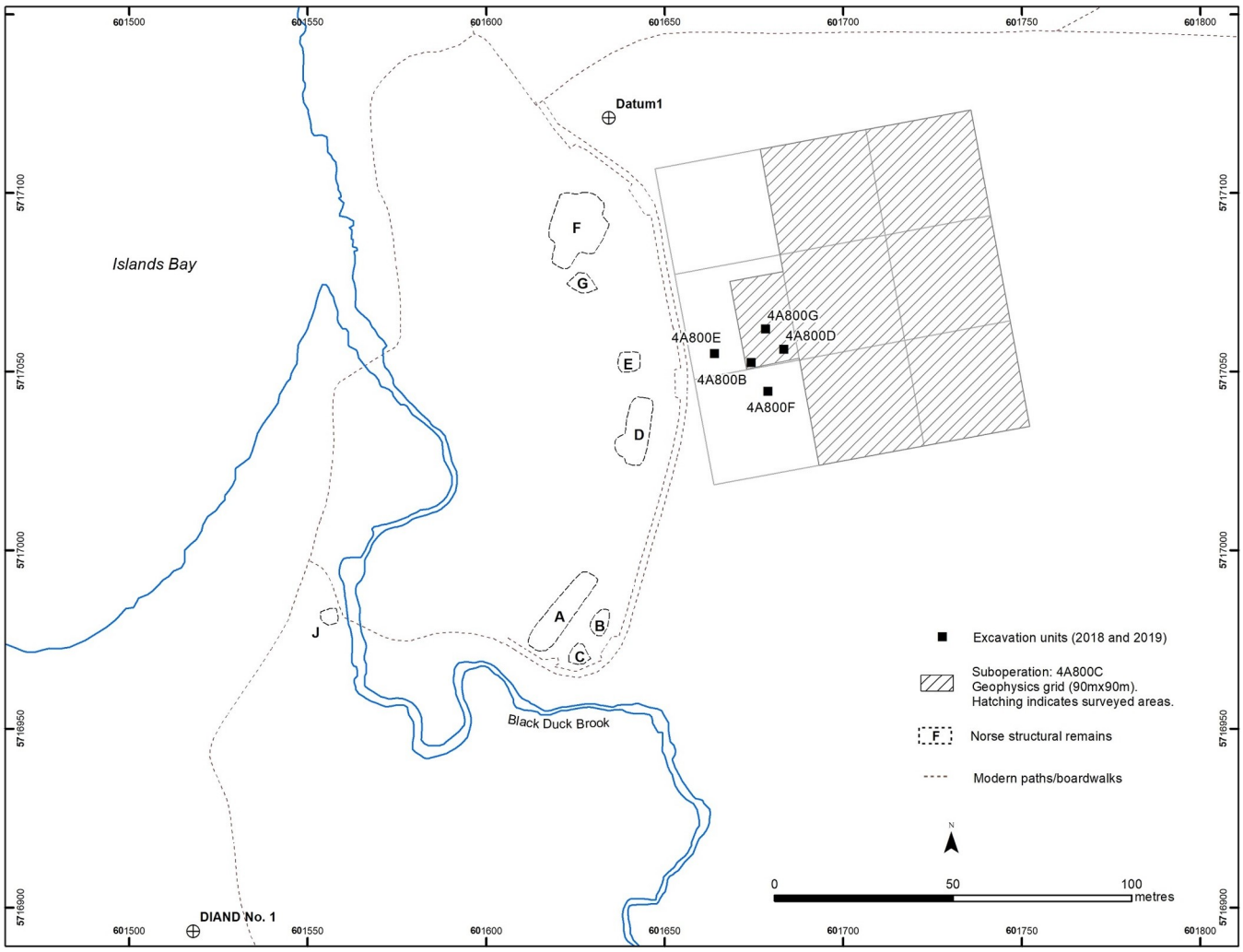

**Figure 2: S-facing photograph showing our fieldwork area on the left, marked by orange fencing, the Visitor center at the back, the boardwalk in the middle, and the terrace bearing the Norse structures on the right.**

working on similar studies focused on Norse Greenland and Yup'ik Alaska (Forbes et al. 2020; Ledger 2018; Ledger & Forbes 2019; Ledger et al., 2013, 2014, 2015), as well as current understanding of the archaeology (Ingstad 1970; 1977; 1985; Kristensen 2012; Wallace 1989; 2000; 2003a; 2003b; 2006; 2009) and previous studies of palaeoenvironmental change at L'Anse aux Meadows (Davis et al. 1988; Henningsmoen 1977; Kuc 1975). The aim of this field season was therefore not to conduct 'classic' archaeological fieldwork (e.g. excavation or survey), but rather to recover deposits of naturally accumulating peat suitable for high-resolution analysis of fossil pollen as well as plant and insect remains. This meant selecting a sampling location where peat would be 'archaeologically sterile' (e.g. resulting from natural build-up and devoid of archaeological features), while being as close as possible to the archaeology (to capture a strong anthropogenic signal), unfrozen, and up to 90-cm deep (based on our calculation of peat accumulation rates from data in Henningsmoen 1977 and Davis et al. 1988). Once such a suitable location was found, a trench would be excavated to enable profile sampling from one of the faces of the excavation. Our first field season, which took place from 6 to 11 August 2018 and involved Paul Ledger, Véronique Forbes & Linus Girdland-Flink, is summarized in the paragraph below.

Once a core sample confirmed the presence of suitable peaty deposits c. 30m east of the closest Norse ruins, we proceeded to delimit and excavate a 150 x 120 cm area in the peat bog. To disturb as little of the site as possible, we decided to de-sod half of the permitted area in the first instance (e.g. 150 x 60 cm), which would turn out to be the full extent of our 2018 trench. At first, excavation proceeded following 10-cm thick arbitrary levels, until, at c. 35 cm below ground level, we encountered a somewhat clear and sharp boundary between the *Sphagnum* peat above, and what lied below. We thus decided to expose the surface of this layer, and at this point, we stopped following arbitrary 10-cm levels. The waterlogged nature of the deposits made observations and excavation difficult, caused constant mixing of surface materials, and made *in situ* screening impractical. To mitigate this, we decided to sample the totality of the material excavated from this point on, and used a bilge pump in an attempt to drain the trench and control water ingress. We carefully resumed excavation, but it quickly became evident that the layer was significantly different from the overlying peat. It contained occasional to frequent patches of charred plant remains, charcoal and wood fragments, and was comprised of a series of finely laminated surfaces (c. 0.5-1.0 cm thick) that appeared trampled and could be peeled away in discrete layers with the trowel. Well-

preserved woody plant remains (leaves and twigs) were common throughout, and insect remains were clearly evident. This led us to interpret this layer as a previously undocumented cultural horizon. Since the objective of our study was to sample naturally accumulating peat deposits, and we were not adequately equipped to conduct detailed archaeological investigation, we decided to terminate the excavation at c. 46 cm below ground level out of caution. We cleaned and recorded the wall profiles and bottom of the trench. We were unable to collect the samples we had originally come for, but we took small samples of peat from the eastern wall to extract short-lived plant macrofossils for radiocarbon dating and to undertake preliminary plant and insect macrofossil analysis (detailed below).

**Preliminary results of analyses on samples collected in 2018**

This section summarizes preliminary data that was published in Ledger et al. 2019. Three radiocarbon dating assays obtained on short-lived plant macrofossils suggest that the cultural horizon dates from between the mid-12th to late-13th century, while the overlying *Sphagnum* peat layer accumulated from the 14th century. The analysis of pollen and associated microfossil proxies from a small peat monolith spanning both the cultural horizon and the natural peat reveals tree, shrub, and heath percentages that are high in respect to the aspect of the site and previous studies at LAM (Ingstad 1985; Davis et al. 1988). Probable apophytes (plants indicative of disturbance) are elevated at ca. 10% total land pollen, and the cultural horizon is also notable for the presence of a few exotics (pollen from plants not native to Newfoundland) as well as a single grass pollen (classified by size measurement as cereal-type pollen), but likely deriving from a wild grass. In terms of plant macrofossils, we recovered numerous pieces of wood, measuring up to 20 mm along their longest axis, from the cultural horizon. Although we initially interpreted those as wood debitage (Ledger et al. 2019), Dawn Elise Mooney (archaeological wood specialist) later advised that more detailed analysis would be required to confirm/infirm this. Over 200 individual seeds were recovered from a 450-ml subsample, and those that were identified include birch and dock/sorrel. The concentration of beetles is high relative to what would be expected from 'archaeologically sterile' peat, with 106 individual beetles (MNI) recovered from the 450-ml subsample (for comparison see Buckland et al. 2009; Forbes et al. 2020; Khorasani et al. 2015; Panagiotakopulu & Buckland, 2013; Vickers et al., 2011 for a comparisons). The most frequent taxon is a genus of rove beetles (*Pycnoglypta*) abundant on sub-Arctic archaeological sites (e.g. Forbes et al. 2017). Other notable finds include a species of rove beetle (*Acidota quadrata*) not previously recorded from the island of Newfoundland (although see Dussault et al. 2016 for archaeological records dated to the first millennium CE associated with the Pre-Inuit Dorset occupation of Philip's Garden, also on the Great Northern Peninsula). We also identified two specimens of a pill beetle species (*Simplocaria metallica*) considered adven-

**Figure 3: Planar view of the surface of the cultural horizon, showing water ingress. Paul Ledger operating the bilge pump.**

**Figure 4: Paul Ledger examining charred material more closely.**
**Note the black greasy smear on right index finger and thumb, indicating the presence of charcoal.**

**Figure 5: East profile of the trench.**
**The dark red brown/black layer at the base of the excavation is the 'new' cultural horizon.**

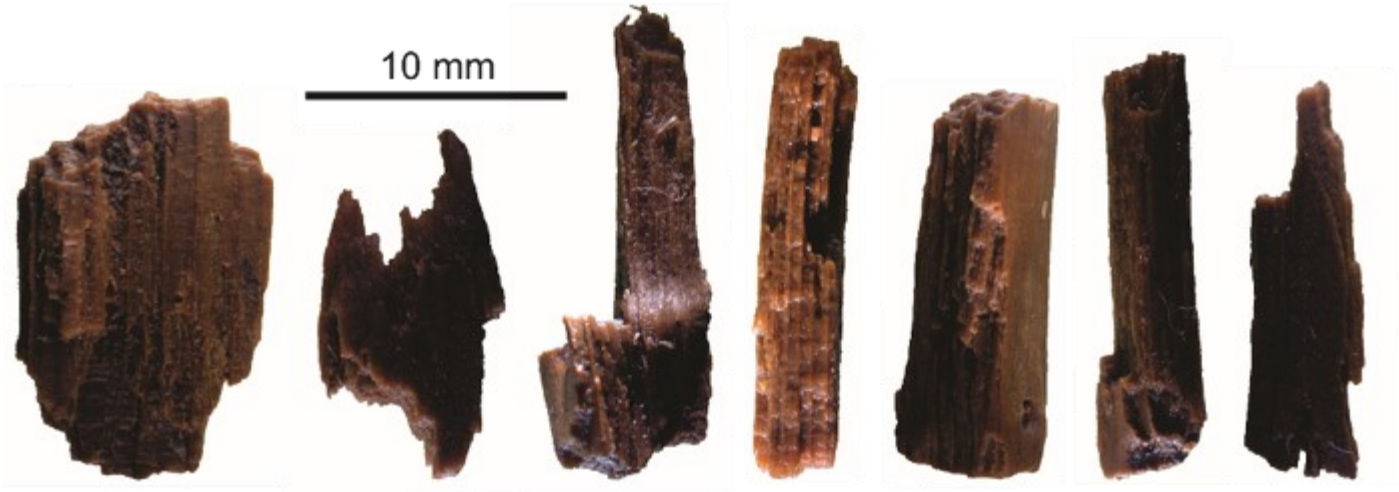


**Figure 6: A sample of the wood fragments recovered.**

tive in Canada (non-native, and therefore introduced) (Bousquet et al. 2013).

We cannot emphasize enough that these results are preliminary. As of yet, we are unable to confirm the cultural affiliation of the new cultural horizon, although its age indicates it formed following Norse abandonment of LAM. The biogeographical anomalies identified above do not prove that any of these plant and insect taxa were introduced by the Norse, nor by the Pre-Inuit Dorset, Beothuk, or other Indigenous groups known to have inhabited the site (see Wallace 1989). At this early stage, it should suffice to say that our small dataset confirms its anthropogenic origin – in other words, the fact that its formation resulted (at least partly) from human activities taking place either on the spot or nearby. It also demonstrates the exciting potential of a continued investigation into the ecological legacies of the various peoples who once lived at this location. Given that our 2018 fieldwork raised more questions than answers, and since we were unable to collect the sort of peat monolith required for higher-resolution analyses, we decided to return to LAM the following year.

**2019 fieldwork**

The overall objectives of our 2019 fieldwork were to further investigate the cultural horizon encountered

**Figure 7: Some of the plant and insect macrofossils mentioned in the text. From left to right: a dock seed, *S. metallica*, *A. quadrata*, *Pycnoglypta sp.***

**Figure 8: Dawn Elise Mooney using sponges to try to dry test pit 4A800G before a photograph is taken.**

the previous summer and to (finally) collect suitable peat samples for high-resolution palaeoenvironmental analyses. Fieldwork took place between the 5th and 30th August and involved Véronique Forbes, Paul Ledger, Dawn Elise Mooney, Bryn Tapper & Allan Wolfrum.

The first two weeks of fieldwork were partly devoted to mapping and geophysical survey by Allan Wolfrum in a 90 x 90 m area of the peat bog east of the terrace bearing the majority of excavated features at LAM, and which included our 2018 trench. The survey used a magnetometer, an EM38 magnetic susceptibility/conductivity meter, and a metal detector. The wet and bumpy conditions of the bog, and high vegetation in some places (including the area between the 2018 trench and the boardwalk leading to the reconstructed turf buildings), made this especially challenging. Some of the anomalies detected represent surface refuse or other recent objects, such as wires and beer can caps observed on the surface in areas not surveyed seem to indicate. The geophysical survey demonstrated the difficulties of working with the EM38 in such a wet environment, and the results suggest future investigations would be made easier by cutting vegetation in targeted areas prior to fieldwork, if at all possible.

Our specific aims regarding the new cultural horizon were to (i) delineate its spatial extent within a 20-m radius of our 2018 trench; (ii) prove its thickness in our original trench; (iii) establish its topography; and (iv) recover a series of bulk sediment and small monolith samples for further environmental analyses and radiocarbon dating. Experience acquired from the first field season led us to implement the single context recording system (Lucas 2003; MOLAS 1994) adapted to fulfil requirements of Parks Canada's recording and excavations procedures (Parks Canada 2005). In practice, this means that excavation proceeds by identifying the latest 'single context' (stratigraphic unit) present in plan, recording it, and then removing it in its entirety across the excavation area to reveal the preceding stratigraphic event. A Harris matrix illustrating stratigraphic relationships between each excavated unit is collated, allowing the establishment of the relative chronologies of all excavated deposits during excavation (Harris 1979). This approach is especially useful for sites with complex and deep stratigraphy (such as in urban setting, or other multi-phase sites), and also allows for higher-resolution reconstructions of the sequence of events at the site, while also facilitating systematic environmental sampling (Branch et al. 2005). What is perhaps unusual here is that we applied single context recording to the investigation of a peat bog, which is, to our knowledge, the first time this is done. This meant that each time we encountered a 'layer' of peat that was significantly different (in terms of floral composition, inclusions, texture, compaction, etc.) from what lay

**Figure 9: Our original (2018) trench (4A800B), re-opened in 2019, at the end of excavation, showing wood encountered at the bottom, and water ingress (facing W).**

above it, we attributed it a unique Lot number, and recorded and excavated it as an individual unit. For each context thus identified and excavated, we collected bulk samples for further environmental analyses, with the remainder of the peat/sediment carefully examined over a screen to allow the collection of any small item (ecofact or artifact) missed during excavation. To control water levels in our trenches, we used a bilge pump and large sponges. This required us to have at least two team members working together at any one time.

After having re-opened and removed backfill from our original 2018 excavation area (4A800B), we reached the cultural layer identified in 2018, recorded it, and excavated what remained of it. Again, we found undiagnostic cultural material (e.g. charcoal and wood debris). Only up to 5 cm remained of the cultural layer, suggesting most of it had been excavated/sampled in 2018. However, the peat below was also exhibiting a laminated structure, and contained occasional charcoal and frequent twigs and rootlets that were oriented horizontally. Our preliminary interpretation of this deposit is that it represents a transition between the cultural layer and woody peat below, but whether the formation process of this layer was natural (accumulated peat) or cultural (trampled surfaces) will only be ascertained through further analyses (currently ongoing in the Masters project of MUN student Jeffrey Speller). To verify whether we had reached the end of the cultural material, and help us decide if we should continue excavating in this area, we decided to proceed by excavating the woody peat layer in a 40cm x 40 cm sondage. The latter contained frequent branches, twigs and roots, monocot remains and occasional wood. It was approximately 10-cm thick and laid on top of large wood fragments that may represent branches, large roots, or possibly driftwood. There was no evidence that any of these wood remains were worked or cultural in origin. We decided to extend the sondage to expose the wood and underlying deposit, which revealed a large root or branches, laying above a deposit of silty sand with sub-angular to rounded pebbles and clay. These may possibly represent an eastern extension of the driftwood horizon and beach deposits identified by Kuc (1975) in the area located between the Norse houses and the coast of Epaves Bay.

Four additional test pits were excavated in an attempt to delineate the spatial extent of the cultural layer within a 20 m radius of our 2018 trench. Here, we only summarized our results and reported key observations. We believe we have identified the extension of the cultural layer encountered in our 2018 trench in two of the 2019 test pits: 4A800D, placed c. 8m east of the 2018 trench, and 4A800G, c. 8m north. This interpretation is based on our identification of deposits which, although largely composed of *Sphagnum* peat, were compact, of laminated structure (e.g. 'peeling off' from each other), and contained patches of charcoal, wood debris and twigs oriented horizontally. The other two test pits were found to be sterile (devoid of archaeology). 4A800F, to the south, revealed a similar stratigraphy as encountered in the other trenches, but contained more woody inclusions.

**Figure 10: 4A800D, located east of our original (2018) trench, at the end of excavation, showing the surface of the cultural layer (facing E).**

Apart from rare charcoal specks, no anthropogenic material was found and excavation ceased at c. 50cm below ground level, where abundant roots and branches prevented us to go any further. In 4A800E, placed west of the 2018 trench, and which was therefore the closest to the terrace bearing the Norse structures, we encountered sedge-dominated peat deposits which were, based on field observations, significantly different from that in the other four trenches. At c. 18cm below ground level, the sedge peat became laminated, but apart from rare flecks of charcoal, there was no anthropogenic material nor obvious difference between the sedge peat above and that below. However, the lower deposits included silty sedge peat, with sand, gravel, as well as bark and wood inclusions. We stopped at c. 55 cm below the surface, upon encountering sandy deposits similar to those at the bottom of our 2018 trench.

In view of the relative thickness of the cultural deposit encountered, and absence of obvious anthropogenic features or artifacts within, we decided to collect our main monolith samples from 4A800B, as this would limit further disturbance to the bog. Two overlapping large (40 x 35 x 35 cm) sampling tins were therefore inserted into the eastern wall of the excavation, and these were extracted using a cake slicer, a spade and trowels. Additional, smaller monolith samples were collected from the eastern wall. We also decided to collect an additional large monolith in 4A800E in order to investigate the nature of well-preserved insect remains, bark and twigs that were encountered in the lower portion of this excavation trench, and also to investigate the formation process of the sedge bog in this part of the site. The tin was inserted into the western section, and the sample was extracted in the same manner as detailed above. Two smaller monoliths were collected from the eastern wall of that same trench. We also collected small monoliths from the eastern wall of 4A800D, and two more from the eastern wall of 4A800G, to extract materials for radiocarbon dating.

All in all, our 2019 fieldwork season allowed us to determine that the new cultural layer encountered in 2018 was not very thick (up to 10 cm), and we did not observe any obvious cultural feature or diagnostic artifact in any of the excavation trenches. We established that the layer was resting above woody peat that appears to have grown over deposits of wood and silty sand, which may correspond to an eastward extension of stratigraphic features observed by Kuc (1975) in the western sedge bog. This will hopefully be clarified once radiocarbon dates are obtained and environmental-archaeological analyses are completed. The excavation of four additional test pits revealed that the cultural layer extends northwards and eastwards, but that it does not seem to be present towards the south or the west, despite the main concentration of cultural remains known at the site having been found west of our working area.

**Figure 11: Trench 4A800E after removal of the monolith sample at the end of the 2019 season (facing W).**

Importantly, this fieldwork enabled the collection of a series of samples for further archaeological-environmental analyses, and to finally attain the original objective of our 2018 fieldwork. In addition to allowing an evaluation of the palaeoecological and chronological context of Indigenous and Norse occupations at the site, analysis of these samples will help us better understand the nature and mode of formation of both the new cultural deposit and the peat bog, which will inform the establishment of a strategy for future work at the site.

**What next?**

We were fortunate to secure funding from SSHRC for a further 5-years of research at the site. Our project, 'Biocultural and Archaeological Legacies at L'Anse aux Meadows', aims to reinvigorate research at the site by focusing on legacy data and continuing our environmental-archaeological analyses. Although the pandemic has largely halted work in the laboratory, and led us to cancel our 2020 field season, the analysis of peat monoliths collected in 2019 is slowly progressing, and we are hoping to be able to 'kick-off' the project officially this year. To stay tuned for updates, we invite you to follow the PEAT Lab at Memorial University:
https://www.mun.ca/archaeology/research/resources/PEAT_lab.php

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