Chert Sourcing and Palaeo-Eskimo Stone Tool Technology

Report on Work Conducted Under Nunavut Archaeological Permit No. 2014-24A

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Cover photo: Dorset harpoon head found in situ in Area 1 test excavated at LdFa-1, Mingo Lake, NU.

Introduction

This report describes archaeological fieldwork activities conducted on July 15, 2014 at the LdFa-1 site under Nunavut Archaeologist Permit 2014-24A. This research represents the third year in a four-year program headed by the principal investigator, Dr. Brooke Milne (CEOS, Anthropology, University of Manitoba). Project co-investigators include: Drs. Robert Park (Anthropology, University of Waterloo), Mostafa Fayek (Geological Sciences, University of Manitoba), and Douglas R. Stenton (Culture and Heritage, Government of Nunavut). In 2014, Dr. Ian Ferguson (Geological Sciences, University of Manitoba) joined the research team to oversee an archaeogeophysical survey at the site.

Permits

Other relevant permits and exemptions were acquired by Milne in advance of this research from the following agencies:

- Nunavut Scientific Research License no. 01 014 14R-M (Nunavut Research Institute)
- Qikiqtani Inuit Association Land Use Exemption Permit no. Q14X006

Acknowledgements

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Project Objectives

Archaeologists refer to the original inhabitants of the Arctic as Palaeo-Eskimos, and chert or ammaaq was the most common type of stone they used to make their stone tools. However, very little is known about how these people acquired this stone, when, and from where exactly. Oral histories have described the presence of chert in the interior and Amadjuak Lake or Ammaaq Lake is thought to be an especially good place to find it.

Our previous research in the area has identified widespread surface scatters of this stone thereby confirming its presence in the interior of the island. Geochemical results from a

previous pilot study (see Milne et al. 2009, 2011) suggested that the surface chert derives from the same geological source, possibly the local bedrock weathering *in situ*. Moreover, this same study appeared to indicate that local toolmakers were further exploiting chert from several other unidentified sources. As such, one of our main research objectives for this project is to locate in situ outcrops of chert toolstone in the interior to better understand the depositional context of the widespread surface scatters and to gain a more complete understanding of Palaeo-Eskimo lithic acquisition strategies and technological organization in this region of Nunavut.

Stone is fixed geologically yet human populations must move geographically to hunt, visit, etc. As such, stone-tool using peoples had to acquire the stone they needed to make their tools and then carry it with them as they moved away from source locations to pursue other essential activities. Stone is a reductive medium, so as tools are made, used, and maintained, pieces of the stone are removed and discarded at various places on the landscape. If we can locate and then geochemically characterize chert source locations, we can then similarly analyze archaeologically derived chert from sites and compare the results to trace where people were carrying the stone across the landscape during their seasonal round. In turn, this allows toolstone acquisition and use in a technological system to serve as a proxy for human behaviour to interpret settlement, mobility, trade, and possibly culture change over time.

Our current four-year research project builds on our previous results (Milne et al. 2009, 2011) and applies a refined version of our previous sourcing methodology to characterize chert toolstone (see ten Bruggencate et al. 2014, 2015). The resulting information will allow us to achieve the following objectives: (1) identify other potential sources of chert used by the Palaeo-Eskimos in the interior of southern Baffin Island; (2) determine if the Palaeo-Eskimos who used neighbouring coastal regions also used chert from these same inland sources; (3) combine our inland and coastal findings in order to reconstruct Palaeo-Eskimo mobility patterns and settlement using chert as a proxy; and, (4) develop a database of chert distribution, both from archaeological sites and raw sources, and make it available as a resource of others studying stone tool technology in Nunavut.

To meet our objectives, this project originally planned for two seasons of geological and archaeological field survey (i.e. 2012, 2013) in the interior lakes region of southern Baffin Island. Investigative activities aimed to focus on the collection of additional raw chert samples to expand our existing comparative database, and to locate and test new Palaeo-Eskimo sites in the region. Additionally, one of the project's main goals was to locate source locations (i.e. quarries) where useable chert toolstone could be identified *in situ*.

However, due to unforeseen logistical issues in 2012, we were unable to access the interior region and instead carried out a limited survey near Iqaluit, NU to explore local rock formations. This work determined that there are no chert-bearing rocks in this region thus ruling it out as a possible source area. Fortunately, in 2013 we did reach the interior and spent six days conducting geological and archaeological surveys. The 2013 work resulted in the identification of two large chert source locations—LbDt-1 and LdDx-2—located on the Hone River and southern Amadjuak Lake, respectively. Both sites had been used by local

toolmakers for toolstone acquisition as evidenced by adjacent habitation structures and widespread scatters of chert debitage. However, more extensive investigation of the sites was not possible given the short field season and time constraints of our available airtime. Consequently, a third field season was organized for 2014 to return to LbDt-1 and LdDx-2 to investigate each location in greater detail. Our goals were to digitally scan each site using a terrestrial LiDAR system, carry out additional subsurface test excavations to better understand each site's occupational history, to collect additional raw and archaeological chert samples for geochemical testing, and to survey areas adjacent to each site to identify other occupational zones associated with toolstone extraction.

Activities in 2014

Based on our previous experience at LbDt-1 and LdDx-2 in 2013, the decision was made to access the sites daily using a Twin Otter aircraft rather than a helicopter. This larger aircraft would enable us to more easily transport the LiDAR system and suite of geophysical instruments intended for use in our site investigations. All of this equipment is bulky and heavy, and easily exceeds the stowage capacity of a helicopter. Daily Twin Otter flights to access the sites were scheduled for July 14 – 21, 2014.

Much to our disappointment on the first day of fieldwork (i.e. July 14), the pilots could not find a suitable landing spot for the aircraft at LbDt-1 despite more than an hour of searching. The research team returned to Iqaluit on July 14 and Milne requested to amend the archaeology permit to shift the project's focus to LdFa-1—a site that has been accessed by Twin Otter more than a dozen times in previous fieldwork projects.

With the amended permit, the research team set out on July 15, 2014 to access LdFa-1. Once again, the pilots circled the site for approximately 30 minutes after deeming landing areas used in previous years unsuitable. Eventually a very rough landing spot was identified and given the difficulties encountered, the pilots were not willing to return to LdFa-1 in subsequent days. Therefore, our research efforts in 2014 were restricted to a single day and a mere eight hours on the ground.

Archaeological Survey

Milne and Park surveyed the LdFa-1 site area to assess the site's stability and inspect previous areas of investigation. Because Milne had been at the site in 2013, nothing different was observed. The site is in good shape and previous excavation areas are regenerating very well.

Milne and Park proceeded to LdFb-5, which is a stone hunting blind situated to the west of LdFa-1 (see Figure 1). The feature remains stable, as described in Milne's previous reports from 2004 and 2007. No other archaeological survey was conducted in 2014.

Figure 1. Milne assessing the hunting blind at LdFb-5, Mingo Lake, NU.

Archaeological Site Testing

While Ferguson and Landry conducted a small geophysical survey of Area 5 at the LdFa-1 site (see Figure 2; and described in Milne's report for NAP 2014-22A), Milne and Park excavated two small 50 x 50 cm test units in Area 1 (see Figures 2 and 3).

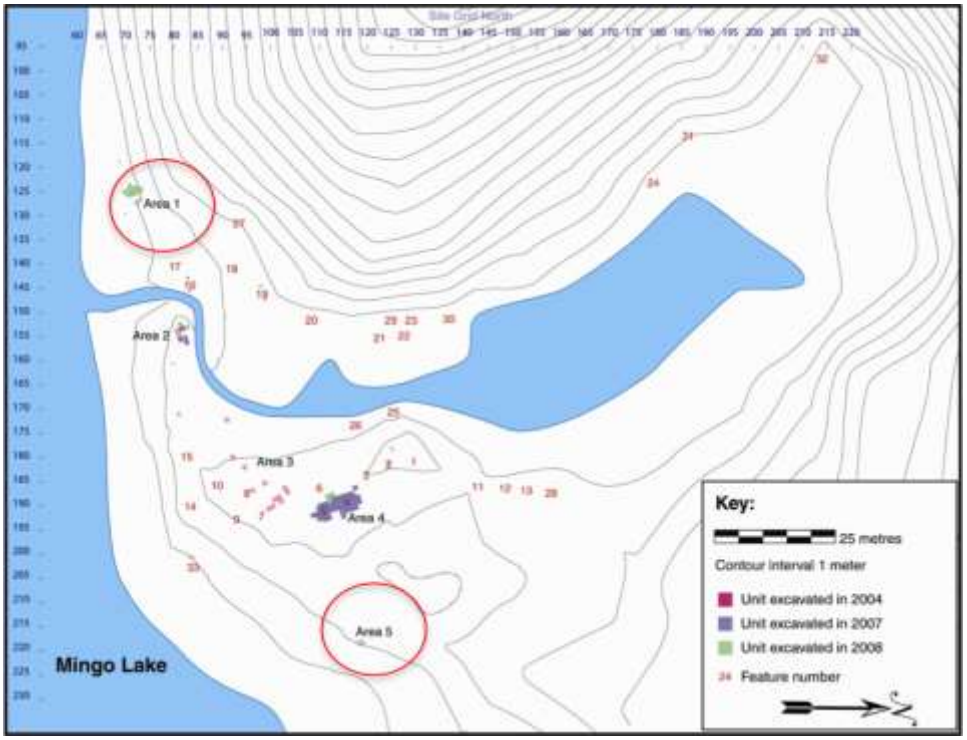

Figure 2. Map of LdFa-1 site indicating five discrete areas of investigation. Test units in 2014 were excavated in Area 1 while an archaeogeophysical survey was conducted in Area 5.

Figure 3. Test units excavated by Milne and Park in Area 1 at the LdFa-1 site, Mingo Lake, NU. Those areas previously excavated by Park in 2008 are visible in the background.

Both Area 1 test units yielded exceptionally well preserved organic and faunal remains, as well as chert debitage and chert tool fragments (see attached catalogue; Figures 4 and 5). These finds are entirely consistent with what was previously identified in this area in 2007 and 2008. Area 1 represents a unique Late Dorset occupation and diagnostic artifacts like a harpoon head (report cover photo), a chert burin-like-tool fragment, a burin-like-tool implement handle, and harpoon foreshaft further confirms this. The abundant faunal remains are near exclusively caribou.

Both test units were excavated until they reached sterile soil at approximately 15- 20 cm below surface (see Figure 6). Thereafter, the units were backfilled and the original sod carefully replaced (see Figure 7).

Figure 4. Burin-like-tool handle excavated from Area 1 at LdFa-1 in 2014.

Figure 5. Well-preserved harpoon foreshaft excavated from Area 1 at LdFa-1 in 2014.

Figure 6. Profiles of completed test unit excavations in Area 1 at LdFa-1, Mingo Lake, NU.

Figure 7. Backfilled test units in Area 1 at LdFa-1, Mingo Lake, NU.

Analysis of Finds

Analysis of the artifacts and faunal remains found in 2014 is underway. Geochemical testing of newly acquired chert debitage from LdFa-1 will proceed in the next 4 – 6 weeks. We have spent considerable time and effort refining and reevaluating the sourcing technique to ensure its accuracy (see ten Bruggencate 2014, 2015). Destructive testing permits will be acquired prior to testing any archaeological chert samples. Analysis of the faunal remains is in progress as is the debitage analysis. All resulting data will be added to the larger database created for this incredibly unique inland archaeological site.

Discussion and Research Plans for 2015

While the 2014 field season did not go according to plan, the research team still met some of the research objectives outlined for the project. We collected additional samples of archaeological chert from Area 1 for geochemical testing and we completed a small archaeogeophysical survey in Area 5. The results of the survey have been published (see Landry et al. 2015) and will greatly facilitate future research at LdFa-1 using the same instrumentation in 2015.

A final field season is planned for 2015 and we aim to revisit LdFa-1 and LbDt-1 to exhaustively document both sites with the LiDAR system and geophysical instrumentation (i.e. ground penetrating radar, magnetometer/gradiometer, EC and DC resitivity). The results will provide an accurate and enduring digital record of the surface and subsurface features at both sites. We will also conduct more extensive archaeological surveys at LbDt-1 to better understand its spatial distribution and to identify, if present, culturally diagnostic artifacts so as to better understand the site's long-term occupational history.

Geological survey and sampling at LbDt-1, and in its immediate vicinity are also planned. We aim to build on the geochemical reference database for chert toolstone acquired from this site location. This information will greatly facilitate our efforts to match archaeological chert samples, particularly from coastal sites, back to this important source location as our analyses continue.

References Cited

Landry, David B., Ian J. Ferguson, S. Brooke Milne, and Robert W. Park
2015 Combined Geophysical Approach in a Complex Arctic Archaeological Environment: A Case Study from the LdFa-1 Site, Southern Baffin Island, Nunavut. *Archaeological Prospection* DOI: 10.1002/arp.1505

Milne, S. Brooke**,** Anne C. Hamilton, and Mostafa Fayek
2009 Combining Visual and Geochemical Analyses to Source Chert on Southern Baffin Island, Arctic Canada. *Geoarchaeology* 24(4):429-449.

Milne, S. Brooke, Robert W. Park, Anne C. Hamilton, and Mostafa J. Fayek
2011 Chert Sourcing and Palaeo-Eskimo Raw Material use in the Interior of Southern Baffin Island, Arctic Canada. *Canadian Journal of Archaeology* 35(1):117-142.

ten Bruggencate, Rachel, Mostafa Fayek, S. Brooke Milne, Robert W. Park, and Douglas R. Stenton
2014 Just a crush? Contamination of archaeological samples by different grinding media. *Open Journal of Archaeometry* 2:134-138.

ten Bruggencate, Rachel, S. Brooke Milne, Mostafa Fayek, Robert W. Park, and Douglas R. Stenton
2015 Characterization of chert artifacts and two newly identified chert quarries on southern Baffin Island. *Lithic Technology* [Forthcoming]