

## Paleoeskimo Demography on Western Victoria Island, Arctic Canada: Implications for Social Organization and Longhouse Development

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(Received 15 April 2011; accepted in revised form 22 September 2011)

**ABSTRACT.** Paleoeskimo populations on western Victoria Island reached maximum levels in Early Pre-Dorset time and declined abruptly shortly after 3800 <sup>14</sup>C years BP. The largest subsequent recovery occurred during Dorset time, particularly during Late Dorset, about 1500 to 600 BP. Early Pre-Dorset settlement patterns were similar to those documented for the same period and culture elsewhere in Arctic Canada, with dispersed nuclear families and small extended families occupying the region for most of the year, but with annual aggregations producing sites with 15 or more dwellings. After 3800 BP, large Pre-Dorset aggregation sites are absent. Dorset settlement patterns are dominated by multi-family longhouse–hearth row aggregation sites and by sites with two to four dwellings. Possibly the Dorset were living mainly in snow dwellings on the sea ice during cold seasons, with longhouses and hearth-row sets representing coming-ashore aggregations. Architectural aspects of longhouses and hearth rows indicate a common purpose behind their construction and use throughout the region and apparently throughout Arctic Canada, but their place and time of origin remain obscure. Radiocarbon dates place most longhouses and hearth rows on western Victoria Island in Late Dorset time, as elsewhere, but some dates indicate that these structures were being used in the western Canadian Arctic by Middle Dorset time. The latest Dorset radiocarbon dates from the region overlap with the earliest of the more reliable dates on Thule houses.

**Key words:** Paleoeskimo, Pre-Dorset, Dorset, Thule, demography, settlement patterns, longhouse, hearth row

**RÉSUMÉ.** Les populations paléoesquimaudes de l'ouest de l'île Victoria ont atteint leur summum à l'époque pré-Dorset puis ont chuté rapidement peu après 3800 années radiocarbone BP. Par la suite, la plus grande reprise s'est produite à l'époque du Dorset, plus particulièrement vers la fin de celui-ci, soit entre 1500 et 600 BP. Les types de peuplements du début du Dorset étaient semblables à ceux documentés pour la même période et pour la même culture ailleurs dans l'Arctique canadien, c'est-à-dire qu'il y avait des familles nucléaires dispersées et des petites familles étendues qui occupaient la région pendant la plus grande partie de l'année, ainsi que des agrégations annuelles composées de 15 habitations ou plus. Après 3800 BP, il y a absence de grandes agrégations telles qu'au pré-Dorset. Pendant le Dorset, les types de peuplements sont dominés par des maisons longues multifamiliales et des rangées de foyers, ainsi que par des sites de deux à quatre habitations. Il est possible qu'à l'époque du Dorset, les occupants vivaient surtout dans des habitations en neige placées sur la glace de mer en saison froide, tandis que les maisons longues et les rangées de foyers étaient installées sur la terre. Les caractéristiques architecturales des maisons longues et des rangées de foyers indiquent que leur construction et leur utilisation avaient une raison d'être commune au sein de la région et apparemment dans l'Arctique canadien, mais leur emplacement et le moment de leur origine demeurent obscurs. D'après la datation au radiocarbone, la plupart des maisons longues et des rangées de foyers de l'ouest de l'île Victoria remontent au Dorset tardif, comme ailleurs, mais certaines dates indiquent que ces structures étaient utilisées dans l'ouest de l'Arctique canadien vers le Dorset moyen. La datation au radiocarbone du Dorset tardif effectuée dans la région chevauche la plus ancienne des dates les plus fiables établies relativement aux habitations de Thulé.

**Mots clés :** Paléoesquimau, pré-Dorset, Dorset, Thulé, démographie, type de peuplement, longue maison, rangées de foyers

Traduit pour la revue *Arctic* par Nicole Giguère.

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## INTRODUCTION

Savelle and Dyke (2002) documented Paleoeskimo demographic history on western Victoria Island (Fig. 1) on the basis of surveys in six regions: Page Point, Woodward Point, Linaluk Island, south-central Prince Albert Sound, Innirit Point, and Cache Point (see Savelle and Dyke, 2002:510 for specific locations on western Victoria Island). They identified a series of “boom-and-bust” population cycles from changes in the relative abundance of dwelling features throughout the Paleoeskimo period (ca. 4500–800/600 <sup>14</sup>C years BP; henceforth BP). Populations were at their highest during the early Pre-Dorset period. A rapid decline followed, beginning about 3800 BP, and by ca. 3200 BP, populations were at minimum levels or were absent. Although a slight peak occurred in Early Dorset time at about 2200 BP, it was not until the latest stage of the Dorset period that population levels rose substantially. Nevertheless, these later increases do not appear to have reached anywhere near the levels of the early Pre-Dorset occupation. In this paper, following similar paleodemographic studies on Boothia Peninsula (Savelle and Dyke, 2009), on King William Island and Kent Peninsula (Dyke and Savelle, 2009), and around the Gulf of Boothia (Dyke et al., 2011), we augment the treatment of the Victoria Island record by Savelle and Dyke (2002). We discuss changes in population dynamics by examining site sizes and dwelling characteristics through the boom-and-bust cycles summarized above. In addition, we describe previously unreported Dorset longhouses and hearth-row sets and present new radiocarbon dates that may have significance for Dorset-Thule interaction.

## BACKGROUND

Data in the present study were derived from surveys of six areas on western Victoria Island in 1999 and 2000 (Savelle and Dyke, 2002), from a survey of a seventh area at Walker Bay on northwestern Victoria Island in 2001, from excavations at a longhouse–hearth row set at Innirit Point in 2000, and from faunal analyses in 2006 from the same feature. With the probable exception of Walker Bay, these areas have experienced continuous isostatic rebound since approximately 10 000 BP. Relict shorelines are progressively older upslope, with the oldest shorelines defining the limits of postglacial submergence (approximately 50–150 m). Because of these circumstances, essentially the entire occupational history is archived within the archaeological record on the raised beaches.

The rapid increase in population following initial colonization noted above (Fig. 2) is consistent with the behaviour of all species, including humans, moving into previously unoccupied environments, and subsequent crashes are likely consequences of over-population. We have discussed these cycles in Savelle and Dyke (2002, 2009), Dyke and Savelle (2009), and Dyke et al. (2011). We concluded that

there is no compelling evidence that the early Paleoeskimo population decline was climate-induced. Rather, we suggested that on Victoria Island, the population crashes may have been due to the overhunting of a critical resource, muskoxen. Regardless of the reason for the boom-and-bust cycles, however, societies would necessarily have adjusted to them.

## APPROACHES TO PALEOESKIMO SETTLEMENT ARCHAEOLOGY

Although several approaches might be followed, we restrict our analysis to an examination of variability in site sizes, site size frequencies, and feature types, which can be expected to reflect band sizes and fission-fusion behaviours, and ultimately, social relations. Band size and fission-fusion behaviour, in turn, are directly influenced by the nature of the resource base (e.g., Binford, 1980, 2001).

In this paper, as in our previous studies cited above, we define a site as (a) an individual dwelling feature isolated from (and generally not within sight of) any others or (b) an obvious grouping of two or more dwellings spaced a few meters apart, at the same elevation or closely similar elevations on adjacent beach ridges. The question of contemporaneity of features is important, especially at larger sites, but it is impossible to prove by direct dating. We deal with this issue further below.

## DATING OF SITES

We use site elevation as an indicator of relative dwelling age because prehistoric and historic Eskimo site positioning tends to have been strongly correlated with contemporaneous sea levels (Meldgaard, 1960, 1962; McGhee, 1976, 1979, 1981; Schlederemann, 1978). The set of radiocarbon dates derived from various Paleoeskimo features and listed in Savelle and Dyke (2002) is augmented here with additional dates from Walker Bay (Table 1). All dates reported here and in Savelle and Dyke (2002) are consistent with the notion that elevation above sea level corresponds to approximate site age. Combining the two suites of dates, 62 of the 71 dates are considered in this context. Of the remainder, six dates on shell are excluded because they may date the beach rather than the occupation, whereas three dates are excluded because of their association with features that are on bluffs (lookouts). For the remaining 62 dates, despite an overall east-west gradient in uplift rates that might produce a 1–2 m difference in beaches of similar ages between the eastern and western extremes of the study area, there is a strong positive Pearson’s correlation between feature age and elevation (0.768;  $p < 0.01$ ). If these 62 samples are divided according to materials, the strong correlations are maintained. For “immediate use” materials, *Salix* sp. (willow) charcoal and terrestrial mammal bone ( $n = 42$ ), Pearson’s correlation is 0.772 ( $p < 0.001$ ). For *Picea* sp. (spruce)

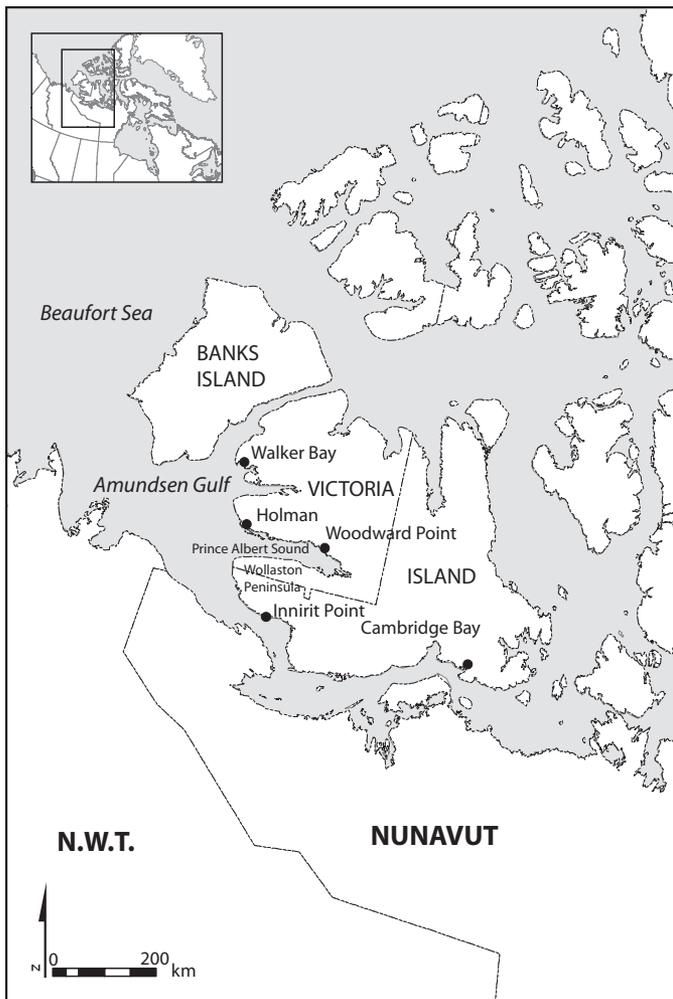


FIG. 1. Map of the study area, showing locations of the three longhouse sites discussed in the text (Innirrit Point, Woodward Point, Walker Bay) and the present settlements of Holman and Cambridge Bay.

charcoal ( $n = 20$ ), Pearson's correlation is 0.780 ( $p < 0.001$ ). Although dates on driftwood provide maximum age estimates, the great abundance of driftwood in the region (Dyke and Savelle, 2000) likely ensured that the Paleoeskimos availed themselves of fresh wood rather than collecting subfossil wood from raised beaches. If so, the overestimation of the age should be at most a few centuries.

## RESULTS AND DISCUSSION

Within the seven study areas for which we have information on site elevation and site size, 745 Paleoeskimo dwelling features occur at 77 sites. On the basis of the population boom-and-bust cycles of Savelle and Dyke (2002), we divided that sample into three age categories: Early Pre-Dorset (initial immigration and population expansion), Middle and Late Pre-Dorset (population decline), and Dorset. Figure 3 presents a detailed map of a typical beach sequence with Early Pre-Dorset to Late Dorset dwellings and—below 7 m—Dorset and Thule dwellings. Although

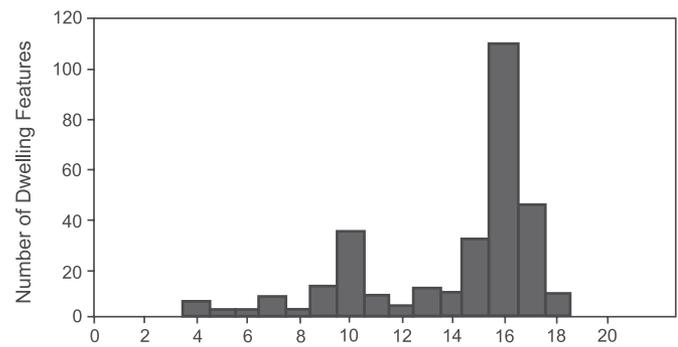


FIG. 2. Histogram of Paleoeskimo dwelling frequency by elevation (m asl) at Woodward Point. This pattern is consistent throughout our study area where we have essentially complete raised beach sequences (see Savelle and Dyke, 2002).

the second population increase took place during Early to Middle Dorset time, we include all Dorset sites in one category, because the small sample size, especially of Early Dorset sites, limits the usefulness of any comparison of these sites with sites dating to other intervals.

Those few sites for which appropriate data were not collected are not included in the demographic analyses. However, our approach does allow for the recognition of patterns in residential site sizes, which is appropriate for broad-scale demographic analyses and offers more comprehensive insights into demographic processes than simple feature or site counts alone.

Dwelling units recorded herein include well-defined axial features (midpassages) with or without peripheral gravel or stone rings, scattered stone arrangements typically with associated sod overgrowths, well-defined box hearths typically containing boiling stones, linear hearth-row sets, and longhouses (Fig. 4). With the possible exception of the longhouses, no Paleoeskimo features were recorded that suggest anything other than single seasonal occupations. Furthermore, of the hundreds of features recorded at Paleoeskimo sites, caches are rare and small (less than 0.5 m) piles of stone slabs. For the purposes of feature counts, we treat each hearth row, hearth-row set, and longhouse as an individual feature representing as many social units as there are hearths or hearth sets. We do not assume contemporaneity of these features. Doing so would lead to interpretations of band aggregations much larger than any ethnographically documented for mobile Arctic hunter-gatherer societies.

### Early Pre-Dorset

At sites of early Pre-Dorset age, single or few dwellings are most common. Sites of 1–2, 5–6, 11–15, and 19–20 dwellings likely represent group fission-fusion cycles (Fig. 5). Amongst historically documented mobile Inuit, household size varied, but most households numbered four or five individuals. Birket-Smith (1929) and Rasmussen (1931) provide details of family size for Caribou Inuit and Netsilik Inuit, respectively, and Binford (2001:296–297)

TABLE 1. New radiocarbon dates on Paleoeskimo features from Walker Bay and Cape Back and other Paleoeskimo dates referred to in the text. The last column gives the fractional area under the calibration curve for the stated range.

Lab code	Field site (Borden code)	Material	Elevation (m asl)	<sup>14</sup> C Age (δ <sup>13</sup> C)	Calib 6.0 2-sigma range BP	Area
<b>Walker Bay:</b>						
AA-46729	01-68 (OjPt-5)	<i>Salix</i> charcoal	3	1995 ± 60 (-26.7)	1734–2043	1
AA-46730	01-68 (OjPt-5)	<i>Picea</i> charcoal	3	2050 ± 62 (-23.8)	1874–2154	0.986
AA-46731	01-70 (OjPt-4)	<i>Picea</i> charcoal	3	1235 ± 73	1049–1291	0.926
AA-46732	01-71 (OjPt-3)	<i>Picea</i> charcoal	1–1.5	1375 ± 6 (-25.9)	1168–1412	0.987
AA-46733	01-71 (OjPt-3)	<i>Picea</i> charcoal	1–1.5	1064 ± 50 (-24.0)	905–1081	0.977
AA-44352	01-71 (OjPt-3)	<i>Picea</i> wood	1–1.5	1267 ± 38 (-25.8)	1122–1286	0.947
AA-46734	01-71 (OjPt-3)	<i>Picea</i> charcoal	1–1.5	1004 ± 54 (-26.5)	789–1007	0.957
<b>Cape Back:</b>						
TO-8149	98-48 (OaPo-1)	Driftwood charcoal	10.5	3250 ± 80	3334–3645	0.975
<b>Previously Published:</b>						
AA-41516	99-160 (NhPl-1)	<i>Salix</i> charcoal	7	1925 ± 71 (-26.4)	1701–2042	1
AA-41512	99-160 (NhPl-1)	<i>Rangifer</i> or <i>Ovibos</i> bone	7	1893 ± 42 (-20.2)	1720–1904	0.962
TO-8532	99-160 (NhPl-1)	<i>Picea</i> and <i>Salix</i> charcoal	7	2100 ± 60	1925–2183	0.880
AA-41503	00-121 (OdPc-10)	Burnt moss	8.5	1575 ± 40 (-26.4)	1379–1544	1
AA-41502	00-121 (OdPc-10)	<i>Salix</i> charcoal	5.5	1162 ± 39 (-26.4)	973–1176	1
AA-40580	00-121 (OdPc-10)	<i>Picea</i> charcoal	4.5	1443 ± 42 (-25.7)	1292–1402	1
AA-40857	00-121 (OdPc-10)	<i>Picea</i> charcoal	4.5	1318 ± 35 (-25.7)	1220–1298	0.726
AA-40860	00-130 (OdPc-13)	<i>Salix</i> charcoal	4–4.5	816 ± 37 (-26.9)	677–789	1
AA-41504	00-130 (OdPc-13)	<i>Salix</i> charcoal	4–4.5	619 ± 54 (-27.0)	537–668	1
AA-41506	00-135 (OdPc-8)	<i>Salix</i> charcoal	9.5	806 ± 39 (-25.2)	674–785	1
GSC-6346	(OaPp-1)	<i>Picea</i> and <i>Salix</i> charcoal	9.5	650 ± 50 (-26.33)	558–668	1

summarizes family sizes of Inuit in general. Thus, and following others (e.g., Maxwell, 1985:98; McGhee, 1996:123–124), we suggest that for much of the year, single families or groups of two or three families lived and hunted together, probably moving frequently. However, as noted by Jenness (1922), for much of the fission part of the cycle during historic times, groups of 12–20 individuals were also common. Accordingly, the sites with five or six dwellings may indicate micro-bands in this size range or perhaps slightly larger. The larger sites, on the other hand, are likely the result of seasonal band aggregations (e.g., Binford, 1980, 1982; Kelly, 1995). Historic maximum band aggregations amongst mobile groups in the Arctic ranged up to about 150 (Binford, 2001:251). Progressively larger sites, especially those with 11–15 and 19–20 features, and possibly those with 22–26 features, are consistent with amalgamation of five- to six-household micro-bands into increasingly larger units until macro-band size is attained. The large cluster of dwellings on the 12–13 m beaches at Innirit Point (Fig. 3) may represent such an amalgamation. These aspects of the early Pre-Dorset settlement pattern are consistent with that of historically documented mobile Arctic hunter-gatherers. Given the lack of any evidence of significant food storage, the pattern fits well within Binford's (1980) foraging type of settlement system: that is, a system used by highly mobile societies caching little or no food.

As noted above, the question of contemporaneity of features is important. It is impossible to prove by dating methods, and as far as we can see, the problem is intractable. However, we see no reason to doubt that most features at a site were simultaneously occupied. Because essentially all hunter-gatherer groups exhibit seasonal fission-fusion behaviour (Kelly, 1995), one kind of evidence of a band aggregation to be expected is a site with many dwellings.

Thus, the patterns exhibited on Victoria Island are consistent with that behaviour. As we have discussed previously (Dyke and Savelle, 2009; Savelle and Dyke, 2009; Dyke et al., 2011), we are not assuming simultaneous occupation for all dwellings at every site, but the suggestion that larger sites represent larger gatherings is consistent with hunter-gatherer behaviour. The peaks at 11–15 and 19–20 dwellings represent aggregations within the size of historic Inuit gatherings, and even the largest sites (up to 40 dwellings) are consistent with historical Inuit group aggregations.

#### *Middle and Late Pre-Dorset*

The Middle and Late Pre-Dorset pattern of site sizes (Fig. 5) differs considerably from the Early Pre-Dorset pattern. Although sites with one or two features remain the most common, the household amalgamation sites, especially in the five- to six-household range, are lacking, and no sites have more than eight dwellings. Because the Middle and Late Pre-Dorset period is longer than the Early Pre-Dorset period (1000 vs. 700 years), and because our survey intensity was similar on all beach sequences, this difference is not likely due to our failure to locate larger Middle and Late Pre-Dorset sites. Instead, the different pattern suggests a substantially different settlement system, whereby minimum unit sizes of one to two households were presumably maintained for much of the seasonal round, and amalgamation tended to be restricted to micro-bands. The practice of macro-band gatherings of the Early Pre-Dorset societies had evidently been abandoned. The lack of macro-band sites may be partly a function of lower regional population size. However, if key prey resources had declined significantly, the smaller Middle and Late Pre-Dorset bands might also reflect the cost-benefit ratio of varying group sizes.

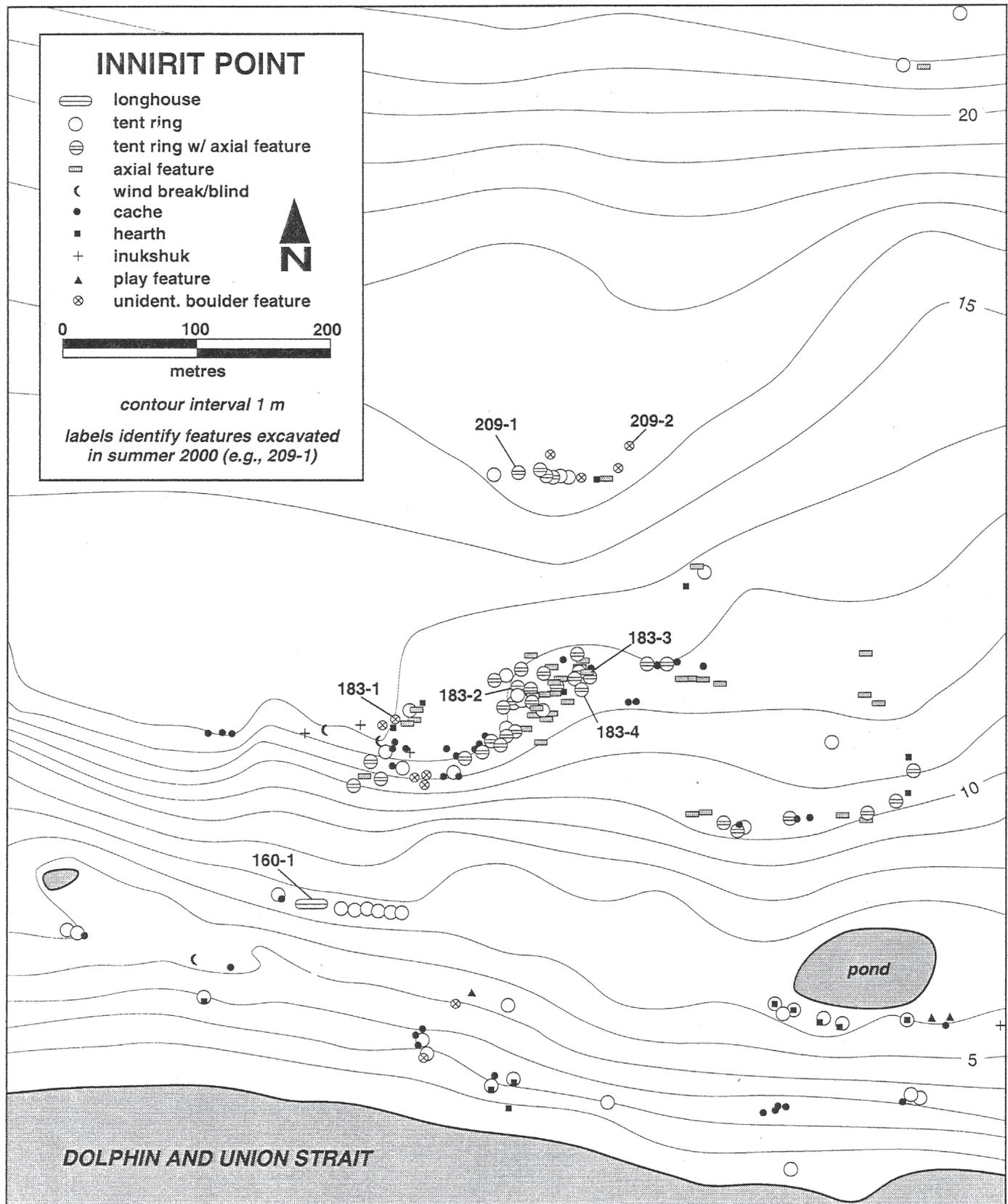


FIG. 3. Sites on a raised beach sequence at Innirit Point. Feature 160-1 is a Dorset longhouse or triple hearth-row set. Dwelling features at and above 12 m are of Pre-Dorset age. Dwelling features at about 6 m and lower are of mixed Dorset and Thule origin, and many of the higher-level caches are of Thule age.

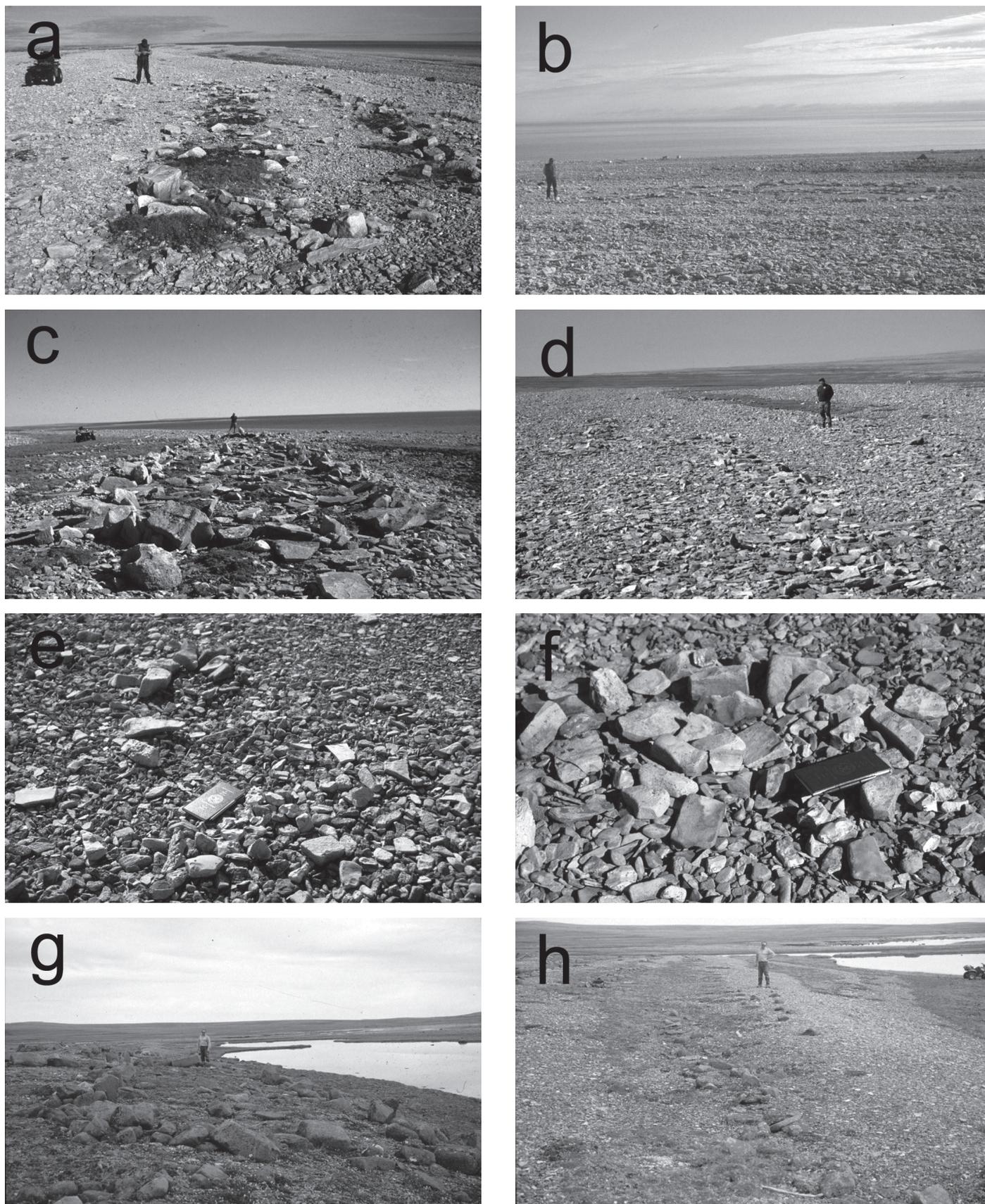


FIG. 4. Paleoeskimo dwelling features. a) Longhouse or triple hearth row at Innirit Point, view east; b) same feature, view south; c) longhouse at Woodward Point, view southeast; d) hearth-row sets 1 and 2 at Woodward Point, view west; e) Late Dorset hearth at 4–4.5 m asl at Woodward Point, chert cores beside notebook; f) another Late Dorset hearth at 4–4.5 m asl at Woodward Point, chert cores beside notebook; g) longhouse at Walker Bay, view east; and h) hearth rows 1 and 3 at Walker Bay, view east and a row of solitary boulders south of hearth row 1.

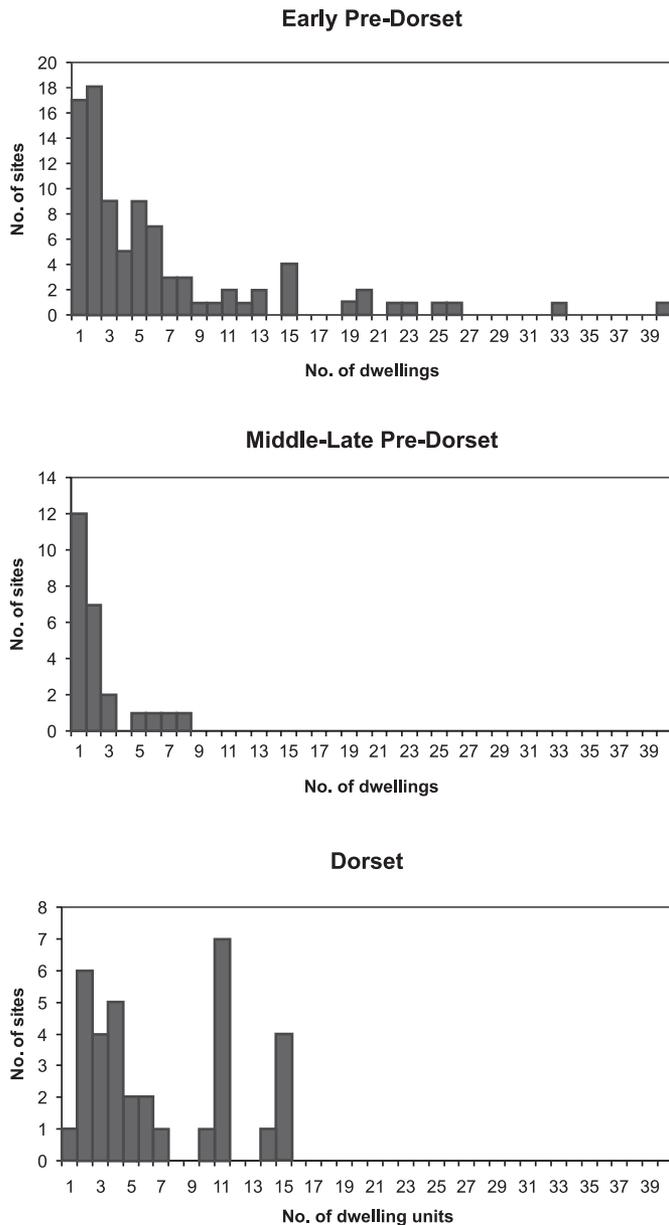


FIG. 5. Histograms of site sizes for Early Pre-Dorset, Middle and Late Pre-Dorset, and Dorset periods.

Specifically, as suggested by Binford (2001:242), when prey resource abundance decreases, greater net benefit is associated with smaller group sizes, because the energy required to move from one locality to another (as required of groups that cache little or no food) is less for smaller groups than larger groups.

#### *Dorset*

Although Dorset sites are few, most of the dwelling features are similar in form to those of earlier periods and also similar in the lack of any semisubterranean (cold-season) houses. The prominence of 10–11 and 14–15 Dorset household sites (Fig. 5) provides the main contrast to the earlier periods. All Late Dorset sites of 10 or more units

are longhouses or hearth-row sets. Furthermore, one of the six-unit features and one of the three-unit features are also hearth-row sets. Building materials also changed at this time. Whereas flagstones were used almost exclusively in constructing Pre-Dorset dwellings, boulders of up to 1 m diameter and heavy blocks were commonly used in constructing longhouses and hearth rows. Although we do not know how many hearth-row sets at any site may have been occupied simultaneously or if hearth-row set and adjacent longhouse occupations were always contemporaneous, we follow Damkjar (2000) and Appelt and Gulløv (1999) in treating each longhouse and hearth-row set as representing a separate occupational episode. We use the term longhouse to designate solidly constructed features with stone walls and interior compartments (Fig. 4), whereas hearth-row sets lack solid walls and occur as single lines of hearths or as two or more parallel lines of hearth sets (Fig. 4). Some hearth-row sets have well-defined rectangular flagstone perimeters, such as the one at site 99-160 (see below).

There is little doubt that longhouses and hearth rows represent band—probably macro-band—amalgamations, and several reasons for their development have been inferred. Plumet (1982) suggested that they represent regional macro-band occupations during the season after nighttime darkness had resumed but before occupation of winter houses and that they had not been adopted from other longhouse-using cultures. Schledermann (1990) suggested that they represent communal cooking and sharing of food; McGhee (1996) and Appelt and Gulløv (1999), that they functioned as centres for communal socializing, dancing, contests, and ritual celebrations; Damkjar (2000), that they represent responses to subsistence resource scarcity by fostering communal sharing within an expanded household; Murray (1999), that they symbolically expressed a sense of community or territory amongst relatively mobile Dorset groups; Friesen (2007), that they expressed social egalitarianism; and Park (2003), that they were constructed by a few individuals only, the construction emphasizing a worldview of linearity. It is likely that longhouses and hearth rows served one or more of these functions.

Corresponding with the development of these new macro-band features during the Dorset period is a reduction in the frequency of single-family dwellings and micro-band settlements of more than six dwellings (Fig. 5). The most parsimonious explanation for this pattern is that many of these settlements were then located on the sea ice. In this regard, McGhee (1996:118) has summarized the marine mammal-oriented subsistence economy of Dorset culture, noting that “more extensive sea ice and a longer period during which this hunting platform was available may well have produced a more efficient and productive economy” relative to earlier Paleoeskimo cultures. Furthermore, ice-adapted equipment, such as ice creepers and snow knives, has been found in Dorset sites, suggesting that the Dorset possessed a snow-based technology that included the construction of snow dwellings (Maxwell, 1985). This technology, which included the sea mammal oil lamp—a necessity

for the heating of snow-based dwellings—may indicate that Neoglacial cooling had reached the point at which the increase in the duration of sea ice, and hence ringed seal availability, forced or enticed a fundamental economic reorientation. Alternatively, the mere advent of the oil lamp may have rendered the snow house a viable long-term dwelling. The putatively correlative longhouse appeared no earlier in cold North Greenland than in warmer regions (Damkjar, 2000 and below), which hints at a lack of climate forcing.

### VICTORIA ISLAND LONGHOUSES AND HEARTH-ROW SETS

One facet of Dorset longhouses and hearth rows that has received little attention, except in studies by Appelt and Gulløv (1999) and Friesen (2007), is the social composition of the groups using them. Although these groups are generally believed to represent macro-band aggregations and various social and ritualistic functions, little else has been inferred. Part of the problem has been that, while inter-site variability in size of longhouses has been investigated (Damkjar, 2000:174), intra-site descriptions of larger sites are rare. However, as demonstrated by Appelt and Gulløv (1999) and Friesen (2002, 2007), such data can reveal important aspects of Dorset social behaviour. In our study area, three sites with longhouses and hearth-row sets, 01-71 (OjPt-3), 00-121 (OdPc-10), and 99-160 (NhPI-1), allow us to build on those previous investigations.

#### Site 00-121 (OdPc-10)

Site 00-121 east of Woodward Point (Fig. 1) consists of one longhouse, originally reported by McGhee (1971), and three hearth-row sets (Fig. 6). The longhouse (Fig. 4) is located at 8.5 m elevation about 230 m inland from the hearth rows. It is 31 m long and varies in width from 5.35 to 5.9 m. It contains an axial alignment of circular to irregular boulder structures that appear to represent living areas or midpassage hearths, of which there are 14 or 15. An external box hearth measuring 40 × 55 cm is located 3 m north of the longhouse. About 200 m north is a square Paleoeskimo dwelling feature measuring about 3 × 3 m on coarse beach gravel at 16.5 m elevation. This is the only feature, other than the hearth-row sets, in the vicinity of the longhouse.

Hearth-row set 1 is at 4.5 m elevation, oriented along a raised beach of coarse gravel. The set consists of two parallel hearth rows, one defining the seaward side, the other the inland side, with regularly spaced hearths. The 15 hearths in each row are distinctly paired; that is, they are positioned opposite to each other. The seaward hearths are large and the landward hearths are smaller and less conspicuous. The set is 27.75 m long, and the rows are 3.2 m apart at the east end and 3.5 m apart at the west end.

Set 2 is 1 m inland of set 1, is also oriented along a raised beach of coarse gravel, and overlaps set 1 in length by 6 m

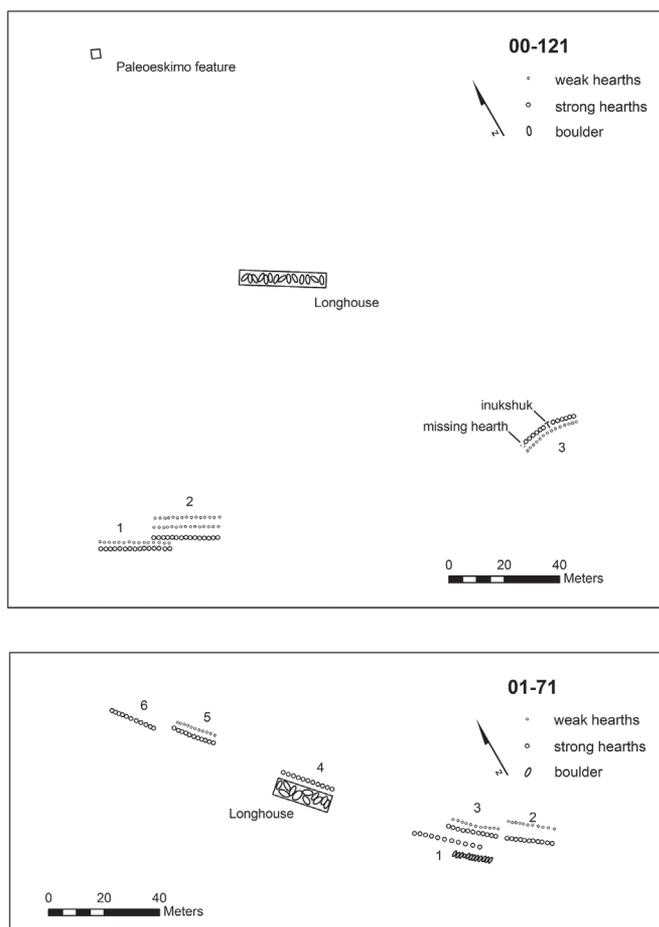


FIG. 6. Sketch maps of the longhouse and hearth-row sites east of Woodward Point and at Walker Bay. Boulders within longhouses are schematic only. The diagram for site 00-121 is not to scale.

(Fig. 6). The set is 23.95 m long and consists of three parallel rows of 15 hearths each, spaced 4–5 m apart, with the hearths in each row positioned opposite hearths in the neighbouring row. As in set 1, the seaward row contains hearths that are more prominent and larger.

Set 3 is approximately 200 m east of the first two sets. This set is curved and it obliquely crosses one raised beach ridge and the swale to the seaward. The lower end of the feature is 5.5 m above the high tide line. The curved length of the set is 24.55 m, and it varies in width from 2.8 to 3.0 m. The set consists of two parallel lines of hearths, with 14 large hearths in the seaward row and 12 smaller hearths in the landward row. The hearths are in opposite pairs, except that two hearths are missing in the landward row. One of these was the corner hearth at the west end. The other, the eighth hearth from the west, has been re-used as an inukshuk in a caribou drive line that runs through the feature.

In addition to the features described above, approximately 3 km southwest of site 00-121 is a short late Paleoeskimo hearth-row set (site 00-139, OdPc-21) located on a local strip of fine beach gravel surrounded by coarse gravel at 6.5 m elevation. The structure has six pairs of

hearths, and the seaward hearths are larger than the landward ones. Numerous chert cores and flakes are clustered at the hearths. The feature is 8.45 m long, close to the short end of longhouses reported by Damkjar (2000), and it ranges in width from 3.55 to 3.7 m.

#### *Site 01-71 (OjPt-3)*

Site 01-71 is located on a high, narrow raised beach ridge 1 m above high tide in a cove along the north shore of Walker Bay about 7 km north of Pemmican Point and about 15 km east-northeast of Berkeley Point (Figs. 1 and 6). The raised beach is the first behind the active one, and it is bracketed by long swale ponds on both the inland and seaward sides. The site consists of one longhouse and six hearth-row sets along about 150 m of beach ridge, all oriented parallel to the beach (Fig. 6).

The longhouse is similar to that at site 00-121, being constructed from large boulders up to 1 m in diameter, with average diameter of 0.5 m (Fig. 4). The longhouse trends parallel to the beach ridge a little seaward of the ridge crest. It is 21 m long, with a consistent width of 6.5–6.6 m. However, its interior is very disturbed, with three nearby tent rings and two boulder caches—all probably Thule—apparently constructed from boulders removed from it. Determination of the number of original compartments was thus difficult, but it appears to have originally contained between 9 and 11. A hearth row parallel to and immediately adjacent to the longhouse is of identical length and contains 11 hearths. It is therefore likely that the longhouse originally contained 11 compartments.

Hearth-row set 1, about 30 m southeastward along the beach ridge from the longhouse, consists of an inland row containing 11 hearths over a length of 18 m. The seaward side of this set is a boulder line parallel to and 3–4 m from the hearth row, with 12 boulders but lacking hearths. It starts 11 m east of the inland row and is 13 m long.

Set 2 consists of two parallel and paired hearth rows ranging between 4.7 and 5.5 m apart. The seaward row is 15 m long, but a probable former corner hearth is marked by a gravel depression 1.5 m farther along this line. The inland row is 17.8 m long, extending past the probable missing hearth in the seaward row by 1.5 m. The inland row contains 11 hearths. The seaward row contains 10 hearths and the depression probably representing an eleventh.

Set 3 comprises two parallel and paired hearth rows spaced 3.2–3.23 m apart. It is 3 m west of set 2 and 2 m inland of set 1. The seaward row is 17 m long, and the landward row 16.1 m long. The seaward row contains 11 distinct hearths, and the inland row, 11 smaller hearths.

Set 4 is a disturbed hearth row on the crest of the beach ridge 3.5 m inland from the longhouse. It is parallel to and extends the full length of the house. The row contains 7 distinct hearths and 4 indistinct stone features, probably disturbed hearths. Thule tent rings and meat caches in the immediate vicinity were probably constructed from boulders removed from the longhouse, this hearth-row set, and

set 5. This set is either an external hearth row associated with the longhouse or it is the axial feature of an older structure that predates the longhouse. The geometric configuration suggests that the first interpretation is more probable.

Set 5 is composed of two parallel hearth rows with large seaward hearths and smaller landward hearths located 25 m northwest of the longhouse. Some landward hearths have probably been removed in part by Thule people for construction of meat caches nearby. The seaward row has 11 hearths and the landward row has 11 small or partial hearths. The set is 18.7 m long. The row of larger hearths is 1.8 m wide. The gap between the two rows ranges from 0.7 to 1.2 m, and the inland row is about 1 m wide.

Row 6 is a single row of 11 evenly spaced boulder hearths, all large. The largest boulders are 30–40 cm. An ice-wedge trough 1.5 m wide runs across the feature. The feature is 14.8 m long on one side of the trough and 1 m long on the other (total 15.8 m).

#### *Site 99-160 (NhPl-1)*

Feature 99-160-1, located at Innirit Point (Figs. 1, 3, and 4), was excavated in the summer of 2000. The feature yielded mainly pieces of worked chert, wood and bone debitage, charcoal and burnt bone, and only two dozen or so formal tools (microblades, utilized flakes, end scrapers, a bifacial tool, a bone needle), none of which are diagnostic of any particularly part of Dorset time. The feature measures about  $9 \times 4$  m and seems to consist of three rows of hearths. The central row is the most prominent in both the use of slightly larger flagstones and the concentration of anthropogenic vegetation along it (Fig. 7). In addition, all three rows occur as nearly continuous linear arrangements rather than as series of individually isolated hearths, so that, together with scattered but nevertheless discernable flagstone ends, the whole forms a rectangular plan with a central axial feature. Overall, this pattern is more reminiscent of a longhouse with axial living compartments than of rows of isolated hearths. The feature is unique amongst the longhouses and hearth-row sets described in this paper and possibly elsewhere. It is morphologically intermediate between longhouses and hearth rows.

The hearth groupings in this feature are not as regular as those at sites 00-121 and 01-71, but patterns are discernable. In Figure 7, structural rock and charcoal and burned bone locations define the clearest hearths. In addition, two upright stones with associated vegetation in the southern row—in the gap between three delineated hearths to the east and five to the west—are probable hearth remnants. Six of the defined hearths form closely spaced pairs, four at the west end of the middle row, two in the southern row. These presumably represent reuse of hearth areas. If so, the southern and middle rows each contain nine hearths. The northern row is much weaker, but it is the same length as the other two, which suggests that, if indeed it is a hearth row (and the one identified hearth supports this interpretation), then most of the row of flagstones represents hearths

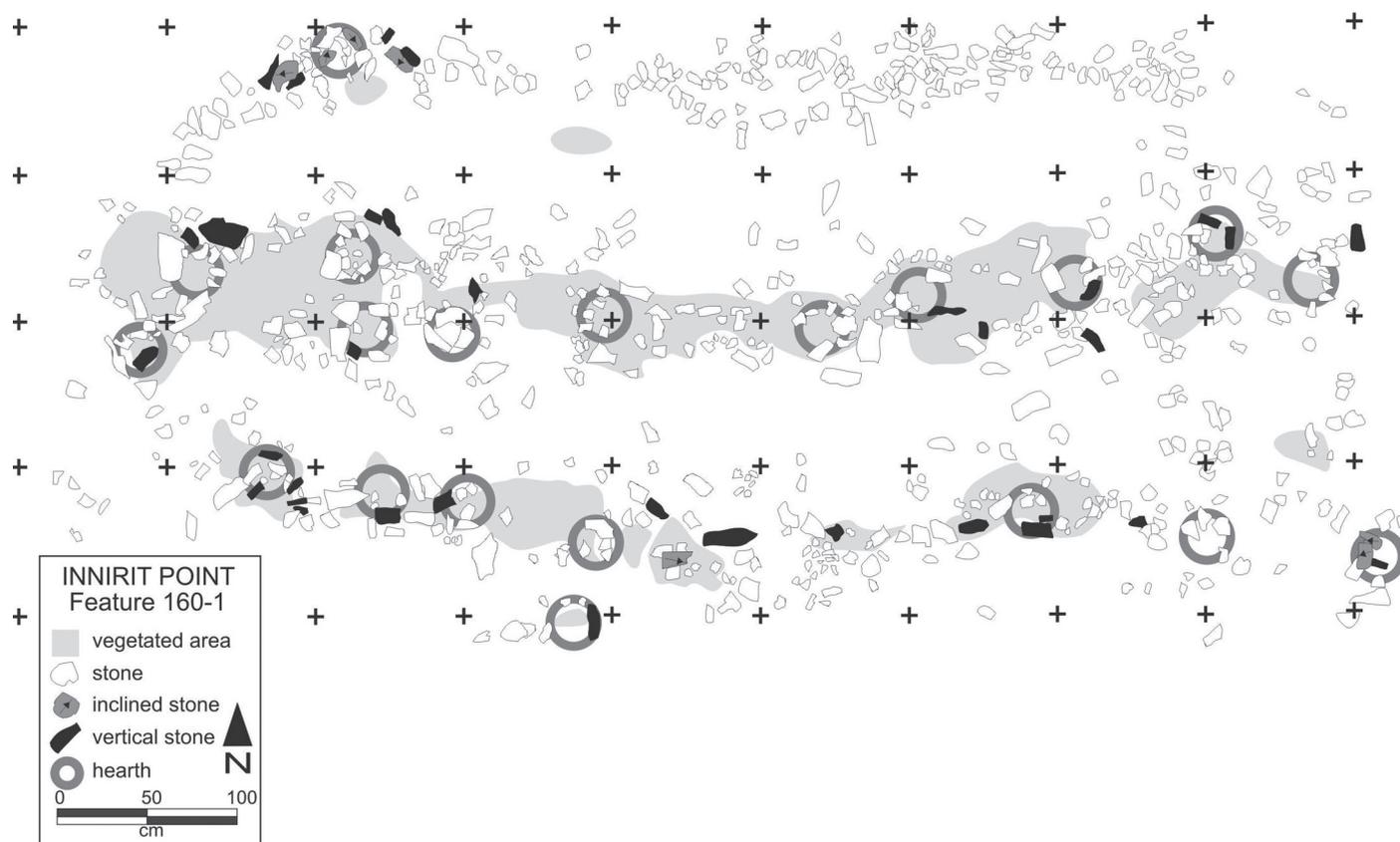


FIG. 7. Field drawing of the Innirit Point longhouse–hearth row set. One-meter grid points are indicated by +.

as well. A weak landward hearth row would be consistent with the pattern noted in the double and triple hearth rows at Woodward Point and Walker Bay.

The faunal remains from this feature (Table 2) are few and small. Identified species are ringed seal, caribou, eider duck, and collared lemming, an assemblage that does not refute the suggestion by Damkjar (2000, 2005) that longhouses and hearth rows probably represent warm-season sites. Given the high proportion of seal, both as number of identified specimens (NISP) and as minimum number of individuals (MNI), and the presence of apparently young as well as adult eider duck, the feature was probably occupied during the early summer. However, surface sites such as this one are subjected to extensive decomposition processes, and the denser seal bones, especially humeri and femora (Lyman, 1994), may be overrepresented.

#### LONGHOUSES, HEARTH-ROW SETS, AND LATE DORSET SOCIAL STRUCTURE

The consistent number of hearths within hearth rows (or row sets) and longhouses at each site cannot be mere happenstance. Rather, it suggests a consistent purpose behind their construction and use, unlike the presumed relatively flexible fission-fusion behaviour of earlier Paleoeskimo groups and of many historic Arctic Inuit societies. Given that we can expect macro-bands to

have fluctuated annually in size, as they did historically, it is highly unlikely that the social groups using the longhouses and hearth rows were simply residential nuclear or extended family units. Rather the bands using these sites appear to have been more highly socially structured than were earlier Paleoeskimo groups.

Others have also noted consistent numbers of hearths amongst hearth-row sets and between longhouses and hearth rows. Appelt and Gulløv (1999) noted a consistency of 8–10 hearths or hearth pairs amongst the eight hearth rows at the Hatherton Bay longhouse site in north-west Greenland. In the longhouse itself are eight central hearth pits, but “one or two pits are missing in the southern half” (Appelt and Gulløv, 1999:153). Similarly, at the longhouse site at Brooman Point, Park (2002:19) illustrates three hearth rows. Two are single rows, each containing 7 hearths (Park numbers only 6 in hearth-row 2, but there appears to be a seventh at the east end). The other is a double hearth row, containing eight hearth pairs, with the southern (seaward) row consisting of small hearths and the northern row of large hearths. The longhouse at that site is considerably disturbed, as later Thule occupants used many of the heavier stones to construct a grave, which precludes discerning internal compartments. Finally, Schleder mann (1996:98) noted similar associations of large and small hearths in hearth-row sets on Ellesmere Island.

The change from individual tents characteristic of the earlier Paleoeskimo periods to longhouses and hearth rows

TABLE 2. Faunal remains, Innirit Point longhouse–hearth row set.

Species	NISP <sup>1</sup>	MNI <sup>2</sup>		MNI	% MNI
		% NISP	/Age Group		
Ringed seal	108		8		
Ringed seal?	3				
Ringed seal infant	1		1		
Ringed seal total	112	45.2		9	60
Caribou	33		1		
Caribou or muskox	44				
Caribou-muskox total	77	31.1		1	6.7
Eider duck	15		2		
Eider duck chick	2		1		
Eider duck total	17	6.8		3	20
Bird	25	10.1			
Collared lemming	14		2		
Lemming?	3				
Lemming total	17	6.8		2	13.3
Total	248	100		15	100
Unidentified bones	167				
Mollusc shell fragments	4				

<sup>1</sup> Number of identified specimens.

<sup>2</sup> Minimum number of individuals.

represents a change from use of private spaces to use of one large public space during macro-band aggregations. According to Whitridge et al. (2001), these new public features represented a physical agency for ensuring coordinated social action, which previously had to be coordinated and negotiated during each aggregation. In addition, if the longhouse builders were the first to live in snow-house communities on the sea ice, then they were also the first that had to come ashore in the spring. Accumulated seal meat may have allowed them to enjoy the transition from spring to summer as a group. Alternatively, or additionally, these sites may have been occupied during a waiting period prior to fall sea ice freeze-up.

In the case of double and triple hearth-row sets, there is also a strong consistency between sites in hearth structure. Specifically the pairing of strongly built and lightly built hearths in row sets prevalent on Victoria Island is also seen at the Hather-ton Bay and Brooman Point sites. At Hather-ton Bay, two of the hearth-row sets (1a and b, 5a and b) are nearly identical to the Victoria Island large and small sets (Appelt and Gullov, 1999:33), and at Brooman Point, the double hearth-row set also contains noticeably large and small pairs. Understanding the significance of this patterning requires a much more thorough investigation than ours, but given the widespread distribution of these structures (throughout Arctic Canada and northwestern Greenland), a strong element of symbolism and extensive inter-regional contact must have been involved.

As noted by Damkjar (2000:178), “we will be rethinking the development of Dorset longhouses...for many years to come.” There are many directions future studies could take, but the evidence from Victoria Island suggests that longhouses heralded important changes in social behaviour during macro-band amalgamations. Regardless of where these changes may have originated, the nature of the changes

suggests that Dorset social organization was probably far more complex than previously realized.

#### HISTORY OF LONGHOUSE–HEARTH ROW SET COMPLEX

The early dates for the hearth-row set at Innirit Point (Savelle and Dyke, 2002; Table 1) have implications for the history of development of the longhouse–hearth row complex. The place of origin of the Dorset longhouses is still in doubt. Damkjar (2000:178) suggests they may have originated in Ungava, where they are particularly abundant (Plumet, 1982), although with semisubterranean precursors in Foxe Basin, and Murray (1999:476–477) likewise suggests a Foxe Basin origin from semisubterranean precursors. McGhee (1996:176, 210) has listed a number of possibilities, including borrowing of the concept from the Cree of the northeastern forests (see however, Plumet, 1982) or independent invention. The style is believed to have spread subsequently to the Canadian Arctic Archipelago during Late Dorset time, approximately 1200–1300 BP (Schledermann, 1990). The dates available prior to this study (Damkjar, 2000:175) support that chronology. Most of our dates from the Woodward Point site, specifically all three dates on the hearth row sets at 4.5–5.5 m, and the dates on the Walker Bay hearth-row sets are also consistent with that chronology (Table 1). However, the three Innirit Point hearth-row dates (1893 ± 42 BP (AA-41517), 1925 ± 71 BP (AA-41516), 2100 ± 60 BP (TO-8532)) based on a caribou or muskox long bone fragment, willow charcoal, and a willow-spruce charcoal mixture, respectively, and a date of 1575 ± 40 BP (AA-41503) on burnt moss from a hearth beside the Woodward Point longhouse at 8.5 m, indicate an earlier development. We have no reason to suspect that at least the first two dates from Innirit Point and the Woodward Point date are not valid measures of the occupation dates. Accordingly, we suggest that by the approximate beginning of the Middle Dorset period (ca. 2000–1500 BP), the longhouse–hearth row complex was already present in the western part of the Canadian Arctic Archipelago. The hearth rows at Woodward point are apparently several centuries younger than the longhouse and are not within sight of it.

Savelle and Dyke (2009) discussed exceptionally large Paleoeskimo dwellings on western Boothia Peninsula as possible precursors of the longhouses. Of the 481 dwelling features there, the five largest—ranging from 32.0 to 48.7 m<sup>2</sup>—occur at small sites within elevations corresponding to the Early Dorset period. Two of these features are isolated, one occurs with a smaller dwelling, and the remaining two with two other small dwellings. In addition, at the Dorset site of Alarnerk in Foxe Basin, Savelle and Dyke (unpubl. data) re-examined Meldgaard’s (1960, 1962) “large houses.” These rectangular, semisubterranean features occur at 19 m elevation and measure 15 × 8 m and 12.3 × 7.8 m. The sizes and dug-in nature

indicate communal winter dwellings, and they are presumably the possible longhouse precursors referred to by Damkjar and Murray cited above. Our date of  $1690 \pm 15$  BP (UCIAMS-53038) on caribou bone from the floor of the larger dwelling suggests that dwellings comparable in size to longhouses in other regions were also in use in the Foxe Basin region by Middle Dorset time. The difference in season of occupation may reflect winter surpluses based on walrus in Foxe Basin, whereas in other regions the communal occupations were short-lived and presumably based on less abundant resources. Nevertheless, warm-season (i.e., morphologically typical) longhouses are unknown in the Foxe Basin region, and Dorset winter communal houses are unknown on western Victoria Island.

The new dates reported here may simply indicate an earlier spread of the “Dorset communal dwelling” complex out of Foxe Basin or significant influences on its development much farther west.

#### LATE DORSET-THULE INUIT CONTACT

Several radiocarbon dates resulting from our research have implications for the question of contact between Late Dorset and eastward migrating Thule Inuit. Until recently, little beyond circumstantial evidence suggested contact. This evidence includes overlapping radiocarbon dates between Thule and Late Dorset, similarities in some artifact forms, and the stratigraphic context of several Thule artifacts within Dorset features. Although some argued against this evidence, ancient DNA studies (Hayes et al., 2005) have now conclusively established that the Sadlermiut Inuit of Southampton Island, who became extinct as a result of introduced disease at the beginning of the 20th century, were a product of interbreeding between Dorset and Thule populations (see Rowley [1994] for a detailed summary of the history of research on the Sadlermiut).

The question, then, is not whether Dorset-Thule contact occurred, but when and where, outside of Southampton Island, it may also have taken place. Three of our Paleoeskimo dates, all on willow from Woodward Point (Table 1), are relevant in this context. Dates of  $619 \pm 54$  BP (AA-41504) and  $816 \pm 37$  BP (AA-40860) were obtained from hearths at 4.0–4.5 m elevation (Savelle and Dyke, 2002). Both hearths were similar in shape and size (about  $1.0 \times 0.5$  m), and the hearth producing the earlier of the two dates had 14 chert cores and 5 large chert flakes in association. The third date,  $806 \pm 39$  BP (AA-41506), is from a hearth located between two tent rings, one containing a probable midpassage, with chert flakes in association (Savelle and Dyke, 2002). In addition, we have previously reported a date of  $650 \pm 50$  BP (GSC-6346) on driftwood and willow charcoal from a Paleoeskimo midpassage near Cape Baring on the northwest corner of Wollaston Peninsula (Dyke and Savelle, 2000).

Whether one accepts that the initial Thule migration into the area dates to the 11th century (e.g., Morrison, 2000)

or that it occurred as late as the 13th century (McGhee, 2000; Friesen, 2004), these dates suggest that a remnant Dorset population existed on western Victoria Island during the Thule migration. Our dates on Thule sites in the area (Table 3), supplemented with dates from Woodward Point mentioned in Outridge et al. (2009), also indicate that there may have been temporal and geographic overlap in the region between Thule and Paleoeskimo. Overlap is less easy to demonstrate in the northern part of the region, where the older dates are on driftwood used as structural members in Thule semisubterranean dwellings. However, several of the dates on terrestrial mammal bones from the Thule houses at Woodward Point are earlier than the youngest Dorset date mentioned above.

The dates from the large Thule site at Lady Franklin Point, southwestern Victoria Island, may be significant in this regard. The dated materials derive from a group of 19 semisubterranean dwellings at the 4 m level and two semisubterranean dwellings at the 5 m level. The site has been badly disturbed, and the dated material from the 4 m houses, except for the structural wood post, was collected from surface debris, although the whale rib fragment may have originally been structural as well. For the 5 m houses, the wood post was structural, and probably also the whale rib, judging by Taylor’s (1972) diagram of the dwellings. We dated a range of materials (caribou, bear, dog, and whale bone, and wood) in part to assess what the local reservoir effects might be. Although these effects are evident, the caribou antler date (CAMS-66369) is again earlier than our latest Dorset dates. This site remains poorly dated, and its large size and location at a regionally important caribou crossing indicate that further dating is warranted to see if its earliest occupation dates to earliest Thule time.

Overall, the study region represents the first point in Canada of Paleoeskimo-Thule contact for which the full archaeological record during the contact period is extant, because coastal areas farther west have been submerging throughout the middle and late Holocene. Accordingly, Victoria Island has high potential for the testing of various models of the nature of this contact (see e.g., Friesen, 2000).

#### COMMENT AND CONCLUSIONS

Because our study is primarily based on regional surveys and radiocarbon dating, our interpretations have necessarily focused on regional expressions of Paleoeskimo occupation and demographic history. Accordingly, the conclusions summarized below might best be considered as a preliminary framework, or connected hypotheses, to be tested through additional surveys and site-specific studies.

1. During periods of high population levels, the fission-fusion settlement cycle emphasized variously sized macro-band aggregations, presumably as a response to abundant muskoxen or other resources. In contrast,

TABLE 3. New radiocarbon dates on Thule sites, western Victoria Island. Only terrestrial dates are calibrated. The last column gives the fractional area under the calibration curve for the stated range.

Lab code	Field site (Borden code)	Material	Elevation (m asl)	<sup>14</sup> C Age (δ <sup>13</sup> C)	Calib 6.0 2-sigma range BP	Area
<b>Berkeley Point Area:</b>						
AA-46729	01-68 (OjPt-5)	<i>Salix</i> charcoal	3	1995 ± 60 (-26.7)	1734–2043	1
GSC-6603	01-30 H. 2 (OjPu-2)	<i>Picea</i> wood	2	600 ± 50 (-25.92)	543–652	1
GSC-6599	01-30 H. 3 (OjPu-2)	Driftwood	2	900 ± 90 (-25.99)	732–920	1
GSC-6601	01-41 H. 1 (OkPv-2)	<i>Larix</i> wood	3	1010 ± 50 (-25.29)	905–969	0.939
AA-46723	01-42 (OkPv-3)	<i>Salix</i> charcoal	15	392 ± 54 (-28.5)	315–516	1
AA-46726	01-52 (OIPv-1)	<i>Salix</i> charcoal	2.5	164 ± 42 (-25.9)	0–289	1
<b>Cape Ptarmigan:</b>						
GSC-6605	01-12 (OgPt-2)	<i>Picea</i> wood	5	570 ± 50 (-24.18)	531–642	1
<b>Woodward Point:</b>						
GSC-6534	00-133 (OdPc-16)	<i>Picea</i> wood	10–10.5	960 ± 50 (-26.27)	795–929	1
AA-58937	00-133 (OdPc-16)	<i>Ovibos moschatus</i> bone	10–10.5	663 ± 46 (-21.33)	552–679	1
AA-58938	00-133 (OdPc-16)	<i>Rangifer tarandus</i> bone	10–10.5	644 ± 43 (-20.88)	551–670	1
AA-58939	00-133 (OdPc-16)	<i>Rangifer tarandus</i> bone	10–10.5	649 ± 43 (-20.73)	552–672	1
AA-58940	00-133 (OdPc-16)	<i>Ovibos moschatus</i> bone	10–10.5	589 ± 42 (-22.80)	533–655	1
AA-58941	00-133 (OdPc-16)	Terrestrial mammal bone	10–10.5	654 ± 41	552–674	1
<b>Innirit Hills:</b>						
TO-8536	99-181 (NhPk-2)	<i>Picea</i> charcoal	3.5	1100 ± 60	925–1172	1
CAMS-65201	99-210 (NhPl-11)	Charcoal	2	870 ± 40	695–907	1
<b>Lady Franklin Point:</b>						
CAMS-66369	99-225 H. 21 (NcPd-2)	<i>Rangifer tarandus</i> antler	5	660 ± 30 (-19.3)	558–672	1
GSC-6422	99-225 H. 21 (NcPd-2)	<i>Picea</i> wood post	5	1420 ± 60 (-23.20)	1290–1369	1
TO-8510	99-225 H. 21 (NcPd-2)	<i>Balaena mysticetus</i> rib	5	1990 ± 100		
CAMS-66368	99-225 H. 19 (NcPd-2)	<i>Ursus maritimus</i> humerus	4	1510 ± 30 (-14.6)		
TO-8509	99-225 H. 17 (NcPd-2)	<i>Balaena mysticetus</i> rib	4	1540 ± 70		
GSC-6429	99-225 H. 17 (NcPd-2)	<i>Picea</i> wood post	4	1210 ± 60 (-25.35)	1059–1185	0.874
TO-8542	99-225 H. 12 (NcPd-2)	<i>Canis familiaris</i> tooth	4	1350 ± 60		

during periods of low population levels, micro-bands appear to have been the largest social units, presumably as a response to fewer resources.

- As in other areas of the Canadian Arctic and Greenland, the longhouse–hearth row set complex appeared during the Dorset period. However, it apparently appeared earlier on western Victoria Island than in other regions from which dates are reported. This pattern indicates that there may have been significant influences on the development of this complex farther west than previously recognized. Alternatively, early Dorset communal features on western Boothia Peninsula and at Alarnerk in Foxe Basin may represent the precursors of the more familiar Late Dorset longhouses.
- The number of hearths within hearth-row sets and compartments within longhouses is consistent at each site at which multiple hearth-row sets or longhouses occur. This suggests a fundamentally different, more highly structured, social system in operation than was operating in earlier Paleoeskimo societies. Furthermore, the pairings of large and small hearths within hearth-row sets suggest a heightened degree of symbolism at the communal feasting level, one not seen in Pre-Dorset or early Dorset societies.
- Our radiocarbon dates indicate a terminal Dorset occupation on western Victoria Island extending to about 600 BP, thus overlapping by at least a century with Thule occupations in the area. This suggestion is consistent with that of Friesen (2007) for sites on southeastern Victoria Island and with the youngest Dorset dates from King William Island, Boothia Peninsula, and Somerset Island (Damkjar, 2000; Dyke and Savelle, 2009; Dyke et al., 2011).

#### ACKNOWLEDGEMENTS

Field work in 1999–2001 was supported by the Geological Survey of Canada (GSC), the Climate Change Action Fund (Natural Resources Canada), the Polar Continental Shelf Program (Natural Resources Canada), and the Social Sciences and Humanities Research Council of Canada. Donald Johnson, now at Lakehead University, and Tony Alanak and Aaron Kimiksana of Holman assisted Peter Whitridge in excavating at Innirit Point. Roger McNeely (GSC), Tim Jull (University of Arizona), Rolf Beukens (University of Toronto), and John Southon (then at the Lawrence Livermore National Laboratory, California) measured the radiocarbon ages, and Bob Mott (GSC) identified wood and charcoal samples. Stephen Wolfe reviewed the manuscript for GSC and three anonymous reviewers for the journal. All provided comments that led to corrections and better clarity.

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