THE EFFECTS OF LANDSCAPE CHANGE ON WOODLAND GROUPS AND THEIR SITES, PUKASKWA NATIONAL PARK, NORTHEAST LAKE SUPERIOR

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ABSTRACT

Water levels along the northeast coast of Lake Superior have dropped roughly 6-7 metres in the last 2,000 years. While this drop was, in human terms, relatively gradual, it had a long-term impact on where people settled and the availability of food and material resources. It also had an impact on the preservation of many coastal sites. Present evidence suggests that a lack of identified coastal habitation sites in the study area may be the result of archaeological misconceptions of environmental stability and sedimentation in boreal environments, rather than a true reflection of seasonal settlement patterns during the Woodland period.

RÉSUMÉ

Durant les derniers 2000 ans, le niveau des eaux le long de la côte nord-est du lac Supérieur est descendu de 6 à 7 mètres. Alors que cette baisse de niveau a été, à l'échelle de l'homme, relativement lente, elle a eu un impact à long terme sur les sites de peuplements et sur la disponibilité de la nourriture et des matières premières. Elle a eu également une influence sur la conservation des sites archéologiques côtiers. Les découvertes actuelles indiquent que le manque de sites côtiers, identifies, d'habitation, dans la zone étudiée, serait plus une interprétation archéologique erronée de la sédimentation et de la stabilité de l'environnement boréal, que le résultat des déplacements saisonniers des peuples du Sylvicole.

INTRODUCTION

A chronological framework of cultural events represented in the archaeological record of the northern Lake Superior basin has been established for over 30 years. This framework has since been refined, and many more sites have been documented. However, our knowledge of the physical processes which came to define the type and content of artifact assemblages from these sites during and after their formation remains limited.

This paper addresses three issues relevant to the archaeology of the northern Lake Superior basin;

1) why are sites located where they are
2) why does the material assemblage look the way it does
3) what can we do to better understand and improve our interpretation of these sites and associated material remains

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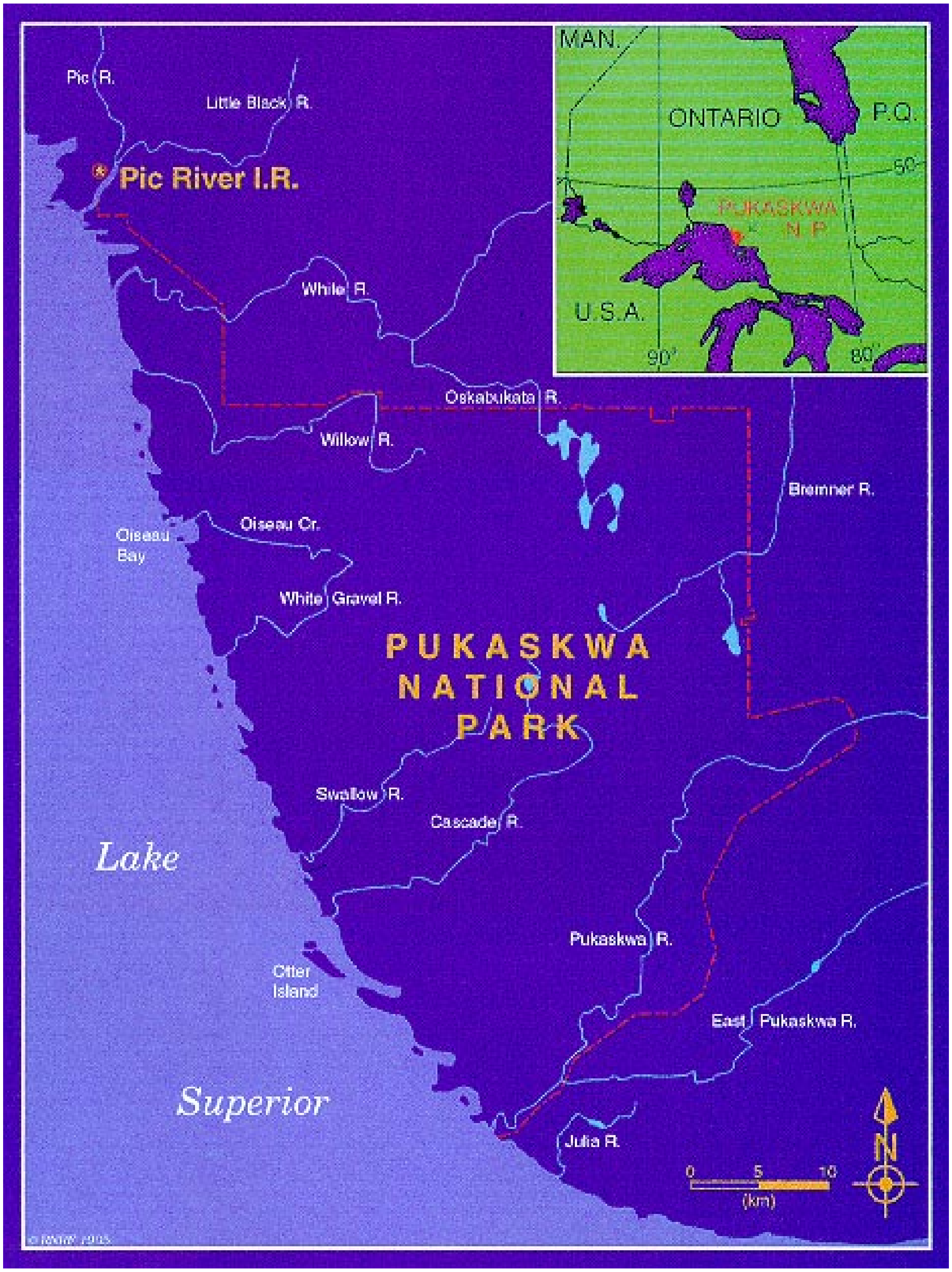

Figure 1 Location of the Pukaskwa region and Pukaskwa National Park, Ontario.

While each of these questions could be the focus of a paper, archaeological contexts from the Woodland cultural period have been selected as examples to ease discussion.

STUDY AREA

The Pukaskwa region covers about 3,000 square kilometres of the northeastern Lake Superior basin (Figure 1). As defined here, it encompasses that area from the Pic River in the west to the Dog River in the south-east, to the headwaters of the Pukaskwa River in the north-east. Pukaskwa National Park, which will be the focus of much of this paper, covers 1,878 km^2 of this area and fronts on 128 km of Lake Superior shoreline, exclusive of the many small islands and reefs which are spread along its length (Rivard *et al*. 1989). Lake Superior is at its deepest off of the Pukaskwa coast, reaching depths in excess of 300 m (around 120 m below sea level). The highest point in the region is Tip Top Mountain, which also lies near the Lake Superior coast within the park. Its peak is approximately 580 m above sea level.

Much of the park is rugged. Steep granitic hills rise above deeply dissected river valleys along the coast. Sand and gravel beaches represent 17 % of this land-water interface, wetlands less than 1 %, and bedrock the remainder (~82 %) (Rivard *et al*. 1989). In contrast to the rest of the region, however, the northernmost portion of the park is rather flat. There, a thick cover of glaciolacustrine, lacustrine, and deltaic sediments overlies a mix of granitic and metavolcanic rocks. The Pic River cuts through much of this area, and fluvial erosion of unconsolidated sediments is pronounced. A plateau-like topography characterizes the inland portion of the Pukaskwa region, which has led to the formation of numerous wetlands such as bogs, ponds, and underfit streams in that area. Vegetation is particularly dense, and is best described as ‘typical’ of the southern boreal forest. The coastal area, while botanically very similar, is more complex in the variety of forest types present. This is due in large part to the many microenvironmental conditions associated with, and the moderating effects of, Lake Superior. Only in the extreme south of the park is the forest distinctly different. There, elements of the Great Lakes-St. Lawrence forest dominate.

The landscape of the Pukaskwa region is not static. Although the ecological and geological elements which characterize the region have been present for at least 7,500 and 9,500 years respectively (Farvacque in prep.), their presence on the land has been extensively influenced by Lake Superior. This is most evident in the coastal area. Even today, Lake Superior is the predominant geomorphic and climatic force of landscape change in the Pukaskwa region. Not too surprisingly, it is therefore suggested that Lake Superior has been the primary environmental factor to affect the composition and preservation of the material archaeological record in the Pukaskwa region.

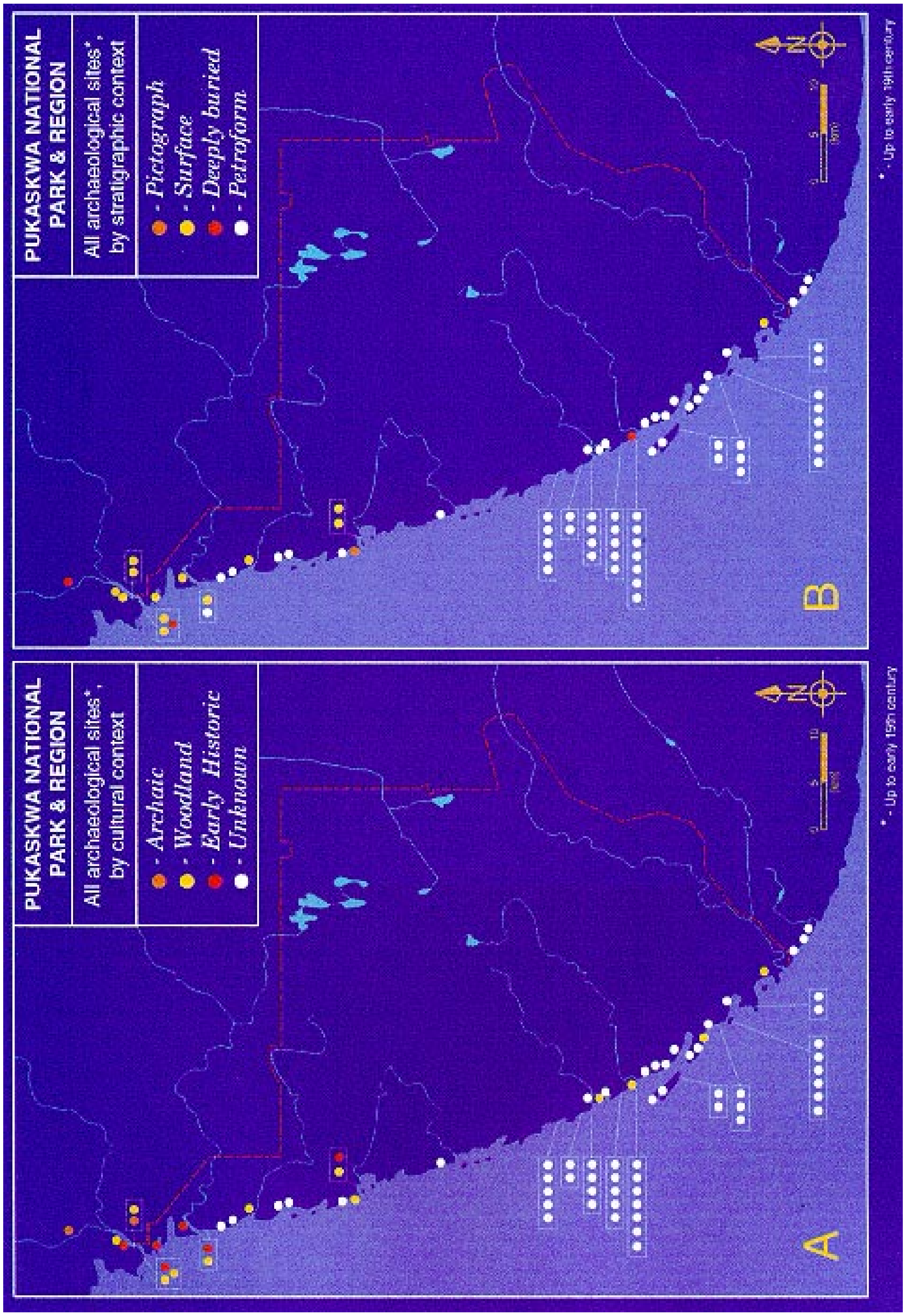

Figure 2 Distribution of archaeological sites in and near Pukaskwa National Park, by cultural context (A) and by situational context (B).

THE SITES: TYPES AND LOCATIONS

The great majority of archaeological sites in the Pukaskwa region are located in or near Pukaskwa National Park (PNP). With the exception of early 20th century logging camps, all known archaeological sites are located within several kilometres of the Lake Superior shoreline. This likely represents a survey bias. Based on field work I carried out in 1993 and 1994, sites listed in the Canadian Heritage Information Network up to 1994, and Parks Canada records up to 1996, 78 archaeological sites contain material elements of pre-19th century Native occupations. Seventy-seven of these are identified in Figure 2A, and will constitute the body of evidence discussed: the remaining site (the Dog River Pictographs (ClIh-2)) lies half way between the Pukaskwa River and the Michipicoten River to the east, near the mouth of the Dog River.

The only time period not represented by an artifact assemblage in the Pukaskwa region–and unlikely to be identified in the future–is the Palaeoindian (see Farvacque in prep.). Two sites are believed to have Archaic components (pre-1900 B.P.), although the antiquity of one site is questionable; its geological context likely post-dates the Archaic period. Ten sites have assemblages diagnostic of the Woodland period (1900-350 B.P.), while six sites have contemporaneous Native and European artifact assemblages (350-150 B.P.). Within the Woodland period, only the well documented Heron Bay site (DdIn-1) has been identified as having a Laurel component (1900-1100 B.P.). The Blackduck tradition (1200-350 B.P.) is found on seven Woodland sites, while two sites have Woodland material which is undifferentiable to tradition. Fifty-seven sites cannot be assigned to a cultural period on the basis of artifacts alone, as no artifacts have been found on these sites. It is interesting to note that sites with identified cultural components cluster in the north of PNP, while sites with unidentified components cluster in the south (see Figure 2A).

Table 1Contexts of pre-19th century Native archaeological sites, Pukaskwa region.

Context	Archaic	Woodland (early)	Woodland (undiff.)	Woodland (late)	Protohistoric
Pictograph	0	0	0	1	0
Near-surface	1	1	2	3	6
Deeply buried	1	0	0	2	0
Petroform	?	?	59	1	?

As illustrated in Figure 2B, cultural remains in the Pukaskwa region are found in four 'situational' contexts: as pictographs (one site), near the ground surface (‘near’ defined here as less than 25 cm below ground surface; 13 sites), deeply buried (materials found greater than 25-

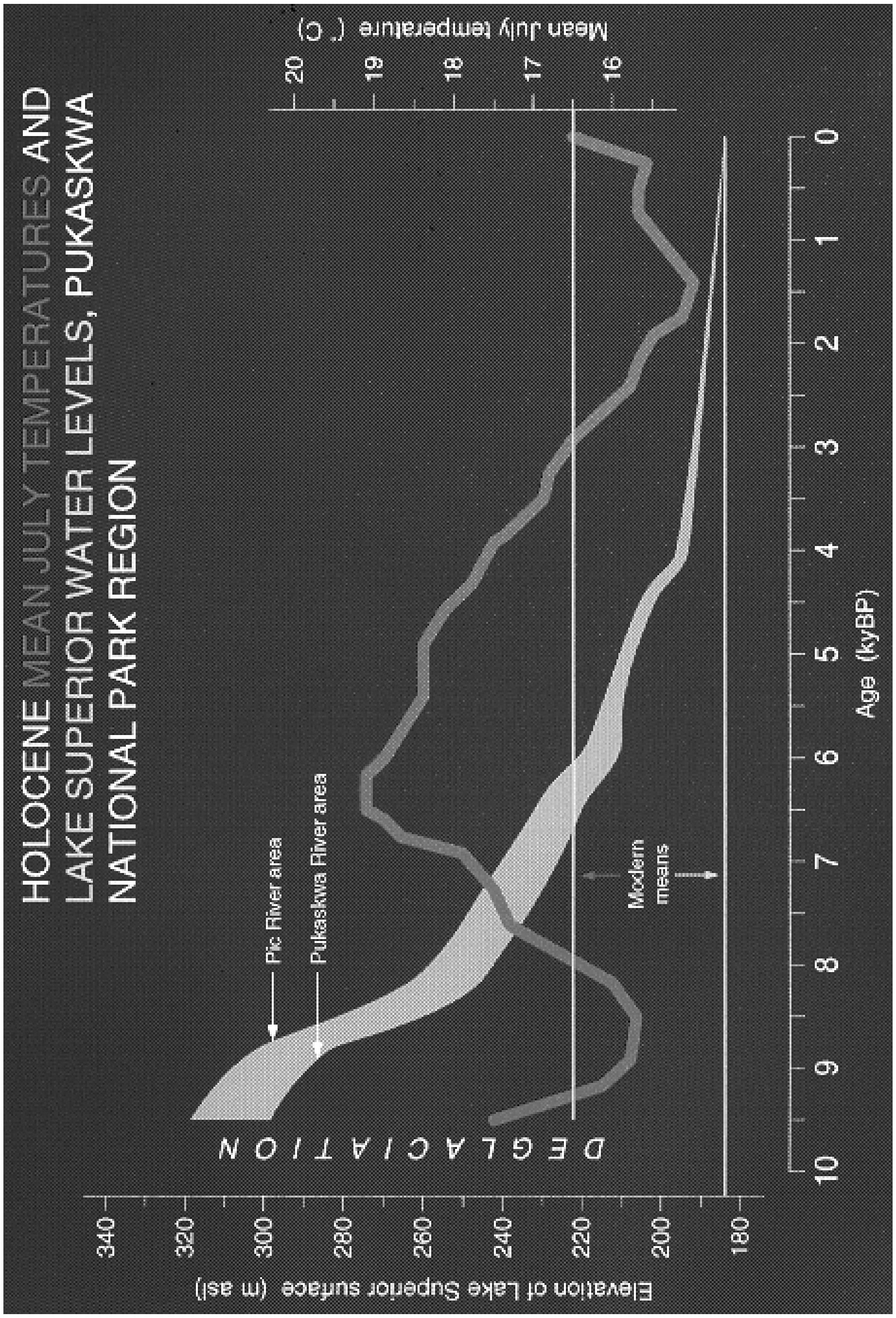

Figure 3 Holocene mean July temperatures and Lake Superior water levels for the Pukaskwa National Park region.

50 cm below ground surface; three sites), and as petroforms (60 sites). Table 1 provides a further break-down of these contexts according to cultural period. Coincidentally, the 57 petroform sites which have no Woodland material are the same 57 sites with no artifact assemblages. For reasons discussed elsewhere, these petroform sites are considered to be of Woodland age (Farvacque 1994; in prep.). Nevertheless, it should be noted that some cobble structures are known to be less than 100 years old, and there is potential for entire petroform sites to be Archaic or Early Historic.

For the purposes of this discussion, reference will only be made hereafter to archaeological sites in the study area that are known or believed to be of Woodland age. This includes all petroform sites identified in Figure 2B.

WHY ARE THE SITES LOCATED WHERE THEY ARE?

The elevation of a site above lake level has been used for some time now, in the northern Lake Superior basin, to identify either the location of sites of a specific age, or to assess the maximum age of a site (Phillips 1993). This method has been particularly effective for early and middle Holocene sites, when changes in water levels were more dramatic over short periods of time. Within the Lake Superior basin, the Pukaskwa region is unique in that Lake Superior water levels were regressive throughout the late Holocene. Very slight trangressive events may have occurred around times of standstills, but these are not evident in the geological record. Nevertheless, the rate of regression has not been equal throughout the study area (Figure 3). Whereas water levels dropped approximately 4.5 to 5 metres in the vicinity of the Pic River between 2,300 and 1,100 B.P., at the mouth of the Pukaskwa River this drop was only around 3.5 to 4 metres. During the second half of the Woodland period, water levels dropped an additional 3 metres in the north, but only 2.5 metres in the south (Farvacque in prep.). Note that the drop in lake levels was probably not as smooth as is portrayed in Figure 3, and fluctuations in excess of a metre did occur over short periods (Larsen 1994). As a result, there are discrepancies with regards to where Woodland sites may be found. That is, contemporaneous sites on contemporaneous strandlines, but in different locations, will not be found at the same elevation.

While the temporal resolution of the late Holocene lake level record remains poor, the identification of minimum ages for occupations is becoming more reliable. It is interesting to apply Woodland period lake level values to coastal Woodland sites described in the 1960's, when knowledge of late Holocene lake levels was relatively limited. Some sites could not have been occupied at the times that were originally proposed. For instance, a radiocarbon date of 1,340±170 B.P. (GSC-208) from the Heron Bay site, originally considered unacceptable (Wright 1967:8) and late in the Laurel-aged suite of dates for the site, is a more appropriate estimate of Laurel occupations there if lake levels are considered. Similarly, an accepted date of 1,630±100

B.P. (M-1507) for the Laurel component of the Sand River site (CiIe-1) (Wright 1967:69), in the eastern Lake Superior basin, is far too old to conform with established lake levels. The Sand River site would have been under at least 1 to 1.5 metres of water at that time, and current evidence does not indicate the site was submerged even if temporarily (low water levels could have allowed for a brief occupation). While not all coastal sites in the northern and eastern Lake Superior basin have been analyzed in this manner, results so far are intriguing.

Climatic conditions may have played a role in the locations selected for certain activities by Woodland people. Present palynological evidence suggests the Pukaskwa region was significantly cooler during the early Woodland (Figure 3) (Farvacque in prep.; McAndrews and Campbell 1993). Mean July temperatures were 1.5 to 2° C lower than at present (~16.5° C) along the Lake Superior shoreline. Because climatic conditions are more extreme inland (warmer summers, colder winters), generally lower temperatures along the coast suggest inland areas may have suffered harsher winters than at present. The result of such different climatic conditions have yet to be explored. Did populations shift their rounds to include more inland habitats as temperatures warmed? Did a reduction in the length of the growing season affect berry crops? Were woodland caribou more plentiful? The implications of climate change and associated environmental change on Woodland groups in the Lake Superior basin are potentially far-reaching. Unfortunately, the issue cannot be tackled until we start to recover and *analyze* material with palaeoenvironmental significance (*i.e*. plant and animal remains, sediments).

WHY DOES THE MATERIAL ASSEMBLAGE LOOK THE WAY IT DOES?

In the northern Lake Superior basin, morphological differences between artifact assemblages of the Laurel and Blackduck traditions are limited to changes in ceramic vessel construction and decoration, and slight variations in stone projectile point styles. Otherwise, the material composition and inferred functions of artifact types in the assemblages do not vary. Despite differences in site use and length of occupation, which invariably led to variations in the types and numbers of artifacts disposed of or lost at a site, items of stone, clay, animals, plants, and, to a lesser extent, metals, would have been present and available to enter the archaeological record on most sites. Nevertheless, post-depositional taphonomic processes, which include archaeological methods of inquiry, have ultimately been responsible for the completeness of the material assemblage and the types of materials recovered from the Pukaskwa region.

Archaeological reports on sites located in the boreal forest of northern Ontario frequently point to acidic and shallow soils as explanations for the nature of recovered assemblages (*i.e*. Reid 1988). While these factors are partially responsible for preservation biases, the issue of post-depositional taphonomy in boreal contexts is much more complex. For the Pukaskwa region, it is suggested that physical and chemical factors have differentially influenced materials

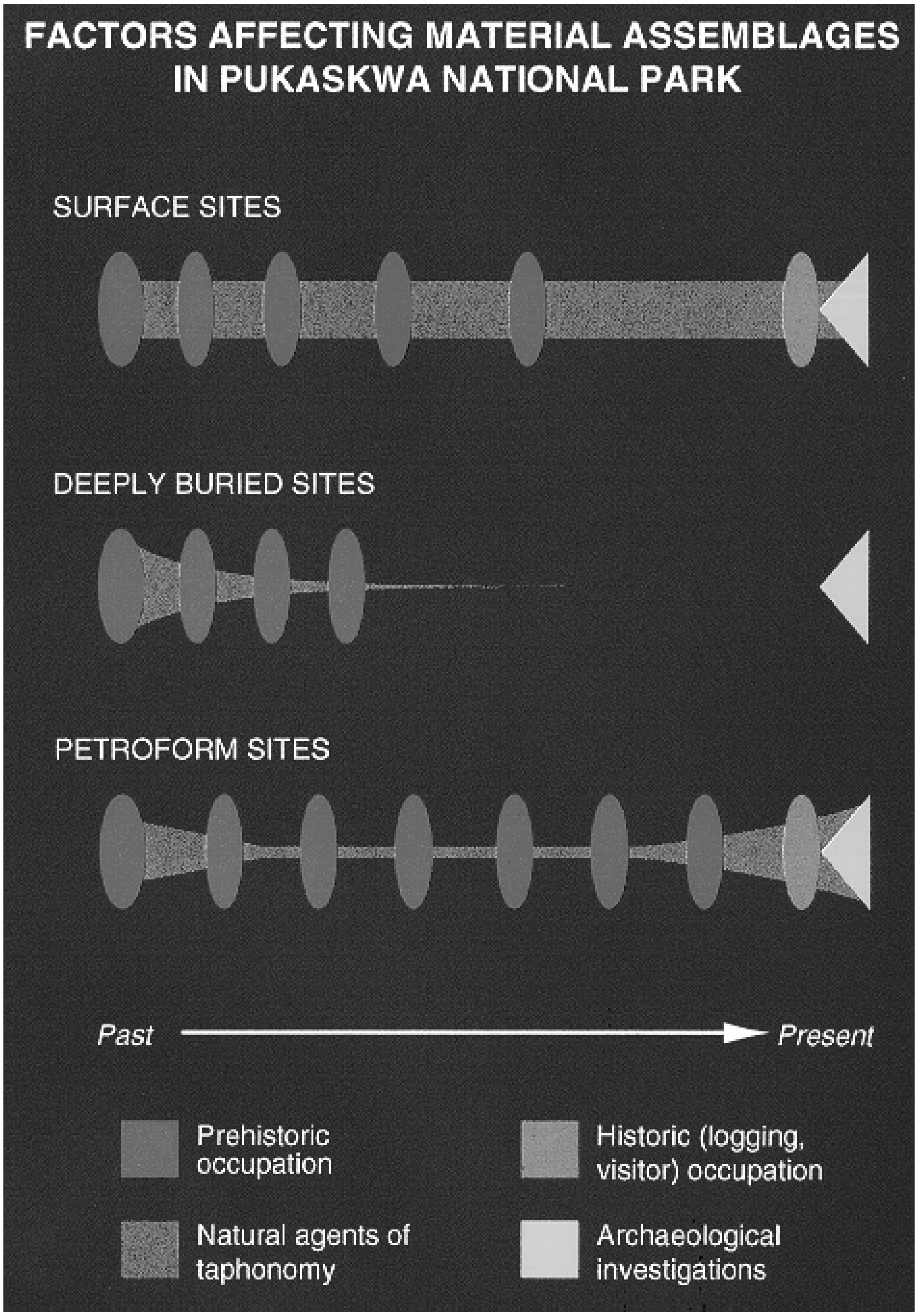

Figure 4 Hypothesized taphonomic histories of artifacts according to their situational contexts, Pukaskwa region. Symbol shapes and sizes are for illustrative purposes only, except for 'Natural agents of taphonomy'. Thickness of the latter represents the relative influence of such agents on artifact assemblages.

through time according to the type of context they lie in. Consequently, the resultant material diversity of artifact assemblages is also different. Pictograph, near-surface, deeply-buried, and petroform sites comprise the four principle situational contexts within which cultural remains are found in the study area. Major post-depositional taphonomic processes affecting each of these contexts are discussed below.

Physical and chemical processes thought to affect cultural remains at pictograph sites (the pictographs) are relatively few and simple: exposure to the elements and burial are the biggest threats, and damage starts from the time a symbol is composed. For the other three situational contexts, the sequence and types of processes affecting artifact assemblages are more complicated (Figure 4). Surface sites, which are defined here as deposits less than 25 centimetres from the ground surface, are subject to the most disturbance over time. Repeated occupations, either prehistoric or historic, may result in the unintentional displacement of artifacts across the site and through the deposit. Anthropogenic disturbance can occur at any time. Natural agents of disturbance, such as tree falls, animal activity, and aeolian or water erosion, can also occur, but at different rates and scales. For instance, a tree fall might be considered a rapid and relatively non-destructive macro-disturbance, given the area or volume of a site involved and the short duration of the disturbance event. Frost heave, on the other hand, is a much longer process through which artifacts are displaced and destroyed. A third process of disturbance particularly common to surface sites, wherein material remains are not displaced but merely destroyed, is dissolution. Again, this can be a long-term process depending on the type of material and the size of the artifact involved. Materials most likely to disappear from a surface site over time are uncarbonized plant matter, metal, bone (charred or uncharred), and ceramics, in that order. Items of stone and carbonized plant remains are most likely to endure, although the latter is prone to fragmentation through disturbance (Miksicek 1987).

The artifact assemblage of a deeply-buried site, defined here as an occupation surface lying more than 25-50 centimetres below the surface, faces its greatest threats soon after deposition. Many physical disturbances arising from site reoccupations and natural agents have a decreasing impact as the site gets buried progressively deeper. However, the chemical destruction of artifacts can continue despite a deep burial, stopping only when the affected materials have been completely eliminated or if there is a change in sub-surface environments. This could arise from a drop (or rise) in the water-table, or a change in soil acidity. Organic components of the archaeological record, such as bone (charred and uncharred), and metals are particularly susceptible to early destruction in deeply-buried sites. A fluctuating water table appears to be an important factor in the fragmentation and eventual destruction of bone, ceramic artifacts, and carbonized plant material. Dry soils lead to better artifact preservation, while waterlogged conditions can enhance either preservation or destruction, depending on the acidity of the water flowing through the site and its oxygen content. Bacteria no doubt play a role under wet conditions as well. Again, stone and carbonized plant matter appear to best resist decay.

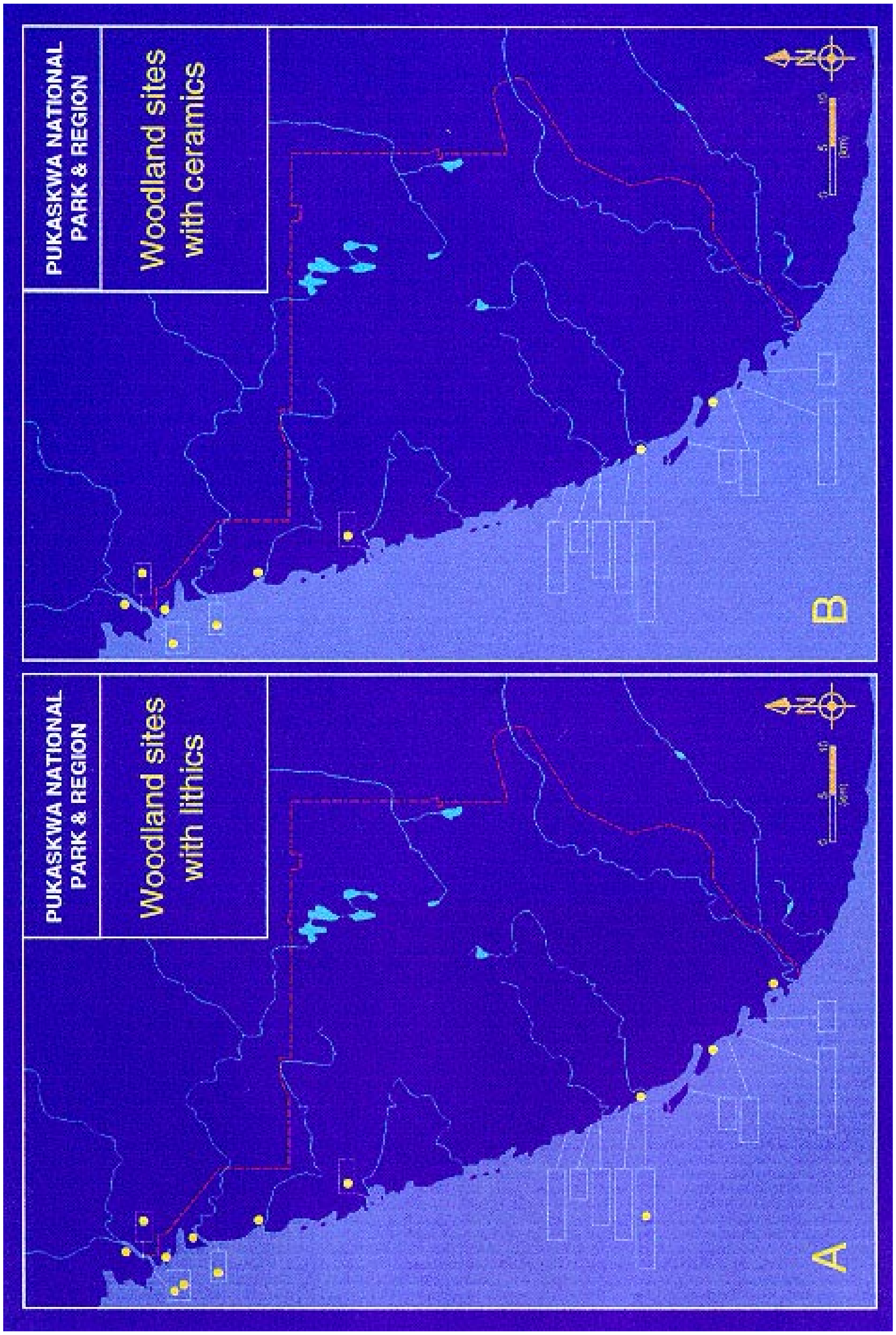

Figure 5 Distribution of Woodland period archaeological sites in and near Pukaskwa National Park with lithic (A) and ceramic (B) artifacts.

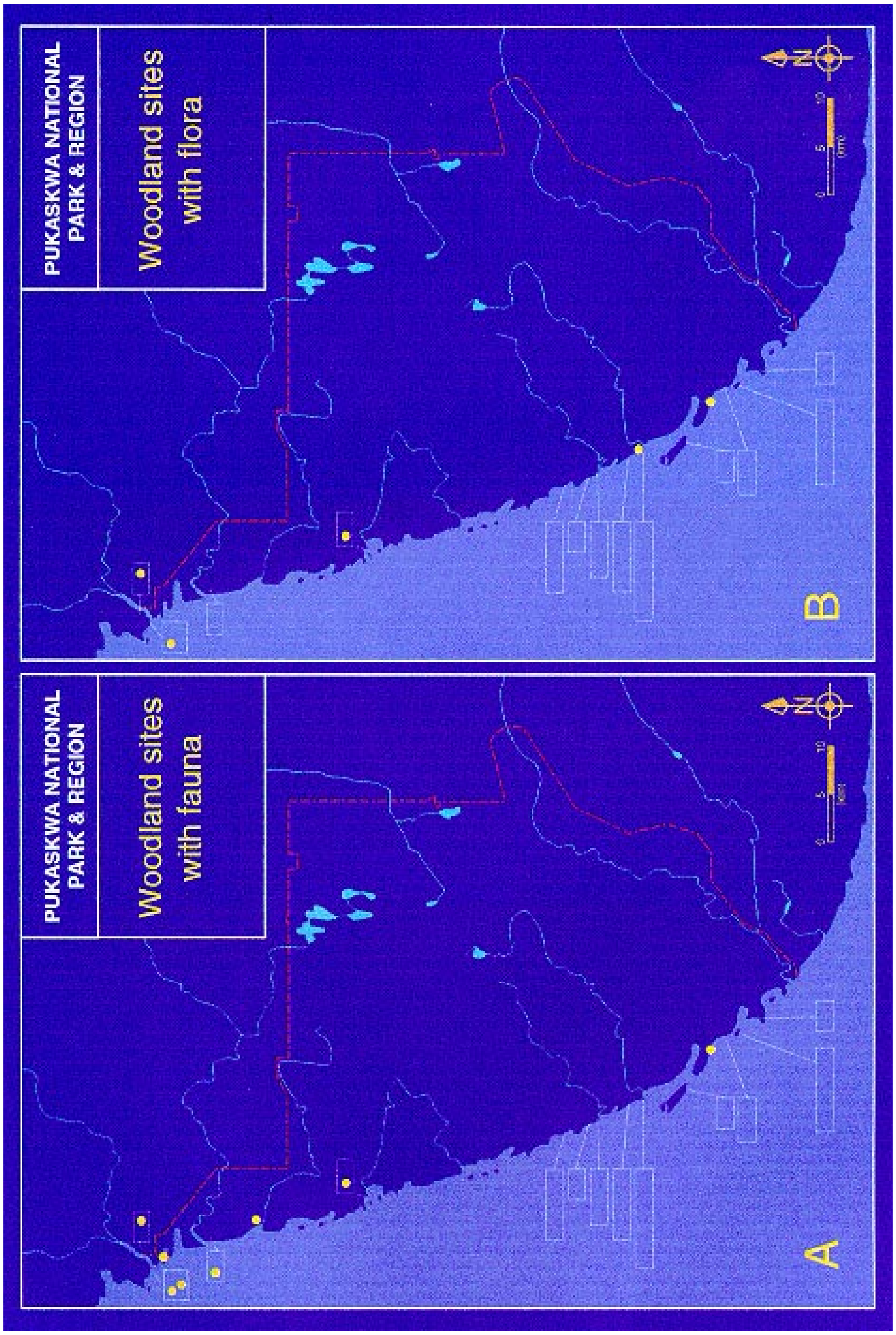

Figure 6 Distribution of Woodland period archaeological sites in and near Pukaskwa National Park with faunal (A) and floral (B) remains.

Cultural remains found on petroform sites are unique in that their largest constituent are the cobble structures which give these sites their name. The structures, like artifacts, can also be subject to destruction or alteration through time. Initially, the long-term visibility of a structure depends on its proximity to the lake shore. Wave action and ice push may bury or destroy the structure if it lies too close to the lake level, or if a short-term (*i.e*. storm or seasonal) transgressive lake event occurs. As the structure gets lifted above and away from the lake, fewer natural agents of disturbance can affect its integrity. Animals and reoccupation by humans are the most plausible factors of disturbance at this time. However, as vegetation begins to colonize the cobble beaches, a new set of natural agents of disturbance arises. Bioturbation from tree fall and root disturbance becomes common, and the visibility of features is reduced with the formation of soils. Archaeological investigations have some impact on petroform sites, although the current nature of petroform archaeology stresses low-impact investigations that avoid excavations or clearing (*i.e*. Farvacque 1994; Ross 1994).

In addition to the various agents of disturbance which affect petroforms, preservation of the few artifacts found in association with these structures is jeopardized by the exposed nature of this type of site. Combined, the 'Hudson Bay' chert debitage, Blackduck ceramics, and faunal remains that have been found on the 60 petroform sites under study here would easily fit on the cover of *Ontario Archaeology*. As with pictograph sites, the surface context of these sites is not conducive to the preservation of organic matter. Exposure also promotes the fragmentation of ceramics through repeated wetting and drying. The greatest threat to most small cultural remains at petroform sites, however, lies in the open packing of the beach cobbles. The base of these cobble accumulations has frequently been hypothesized to be the resting place of all artifacts which once lay around the petroforms. McIlwraith (1959) spurred on this idea by excavating a limited assemblage of ceramic sherds, lithic debitage, and faunal remains from the Red Sucker Point site (DeIo-2), just west of the study area. Helped by wind, frost, and rain, artifacts are believed to fall into gaps between cobbles, and 'disappear'. While the gravity-only transport of artifacts on petroform sites remains poorly documented, it is certainly not a taphonomic process popularly associated by archaeologists with boreal environments.

The post-deposition durability of a material depends on its burial context. The previous discussion illustrates the variability of factors which affect this durability. However, an examination of the artifact assemblages from Woodland sites in the Pukaskwa region shows the relative durability of certain materials: stone artifacts are the most resistant, followed by ceramics (Figure 5A,B). Faunal material is reported more frequently than (unidentified) floral remains, but significantly less often than ceramics (Figure 6A,B). Given the known durability of charcoal and other carbonized plant remains (Miksicek 1987), however, this latter statistic is believed to be an oversight arising from excavation and research methodologies, and not a reflection of preservation. Lastly, copper is poorly represented in the archaeological record (Figure 7A). While this likely stems from its more limited availability and use, the fragility and low durability of

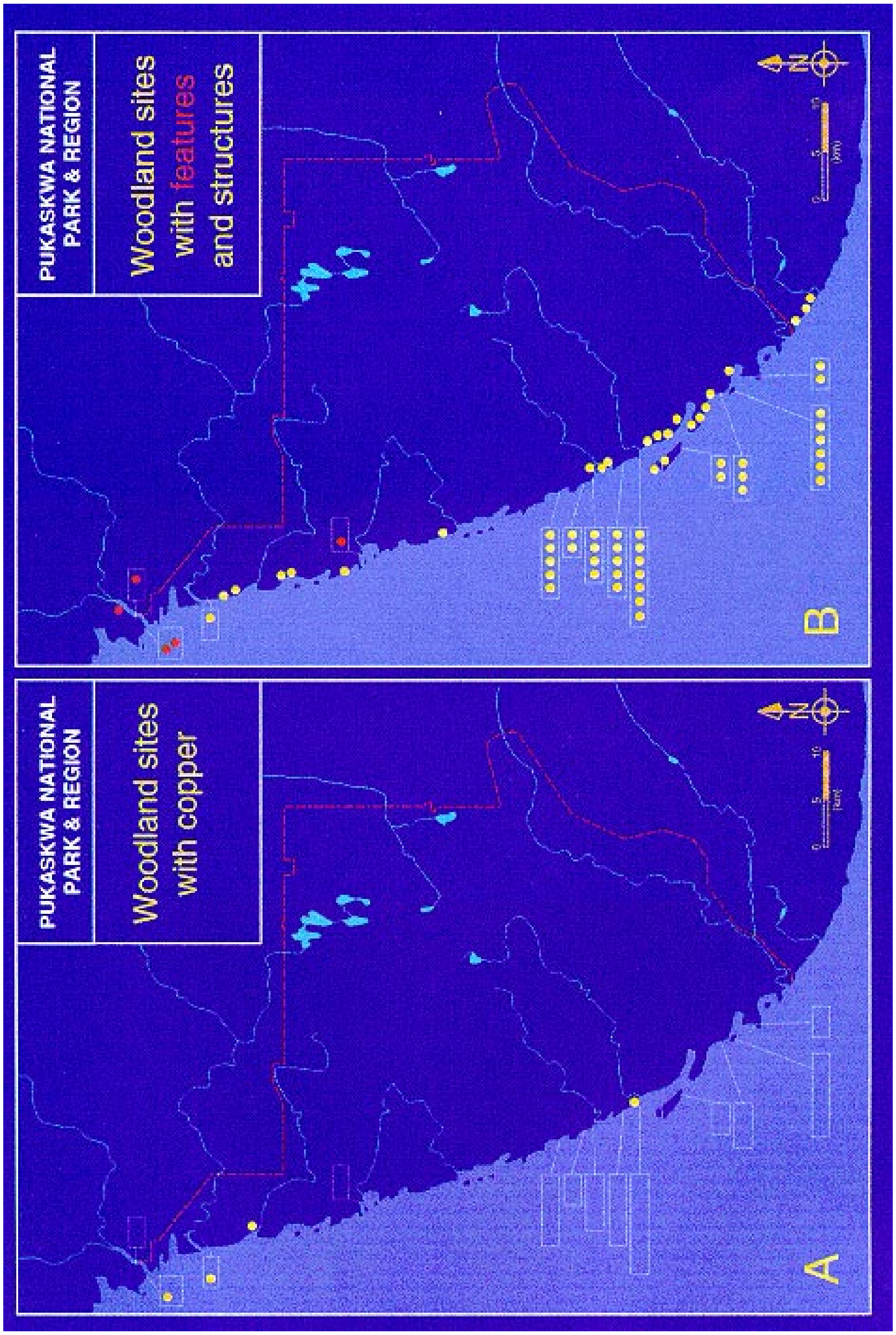

Figure 7 Distribution of Woodland period archaeological sites in and near Pukaskwa National Park with copper artifacts (A) and structural remains (B)

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copper in environments other than very dry or anaerobic conditions has also likely affected its distribution.

While the above observations of relative abundance mirror what would be expected given the materials considered–assuming some typological homogeneity in the original artifact assemblage–it is also interesting to compare the distribution of materials to the types of structural remains found at the same sites (Figure 7B). Whereas artifacts are rarely found in association with the remnants of structures or recognizable architectural elements (*i.e.* walls, defined living floors), they are commonly associated with singular features such as hearths or post moulds.

RESEARCH METHODS

Archaeological investigations in the Pukaskwa region require different methods of research than have been traditionally used for the area. As most sites are relatively small, reflecting single or a limited number of occupations, their visibility tends to be low. Petroforms sites are the exception, as they are relatively easy to locate and access. I suspect that numerous sites have been overlooked, either because of an assumption that cultural remains in the boreal forest occur close to the surface, and/or that they are located in static environments. Beaches, while they have always been good places to camp, are also continually evolving. If the remains of an occupation are preserved within a beach, it should be expected that it will have been deeply buried to survive. The high visibility of surface sites in some environments, such as at the mouth of rivers, has led to their over-representation in the archaeological record. This has skewed our understanding of seasonal rounds and subsistence patterns. Other types of sites need to be examined before we can begin to understand the Woodland period in PNP.

CONCLUSIONS

Archaeological sites in the Pukaskwa region of the northeastern Lake Superior basin are poorly understood. While we have a general understanding of the material remains associated with these sites, little is known about the events which led to the formation and preservation of such material assemblages. Using information from Woodland period sites, it is suggested that physical and chemical differences in burial contexts between sites have led to variations in what might have originally been a relatively homogenous artifact assemblage. Lithic artifacts are the most stable remains in all burial contexts, but the preservation of ceramics, faunal remains, and copper may vary enough to create a false sense of relative importance within an assemblage.

Landscape change, as it relates to the interpretation of site function, location, and material remains, continues to be poorly documented. Woodland sites are greatly over-represented in the regional site record, partly because of their location on young and highly visible landscape features near the modern Lake Superior shoreline. While lake level changes for the Superior basin are increasingly being considered by archaeologists in site reports and published literature, spatial and temporal relationships between sites and water levels remain poorly documented. Lake-to-site relationships discussed in older texts need to be reviewed, as more accurate lake level reconstructions become available. The integration of palaeoenvironmental information (*i.e.* lacustrine geomorphology, plant and animal ecologies) with material culture evidence must be made, if assemblages are to be compared and settlement-subistence patterns or subsistence-ecologies are to be understood. The 6-7 metre change in Lake Superior levels of the Pukaskwa region during the Woodland period would have certainly affected the location, availability, and accessability of some resources.

Our perception of Woodland populations in the Pukaskwa region has relied extensively over the past 30 years on the analysis and interpretation of artifact assemblages. However, this knowledge must now be re-evaluated in light of new evidence for Holocene palaeoenvironmental conditions in the region. Whereas in the past cultural remains were viewed as the mark of people on the landscape, it is now imperative that researchers understand how the land leaves its mark on the material assemblage.

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