1 Introduction

This study is an examination of the prehistoric use of nephrite on the British Columbia Plateau. It was undertaken in order to determine whether nephrite was primarily used by Plateau societies to fulfill utilitarian woodworking requirements or as an item of status, property or wealth. To understand these issues, it will be necessary to evaluate the costs and benefits involved in manufacturing and using implements made of nephrite compared to those for other stone materials available for woodworking in the British Columbia interior. It will also be essential to determine how prehistoric plateau societies exchanged, utilized and disposed of nephrite objects. This study helps to establish how complex hunter-gatherer societies made use of commodities of potentially high value.

The physical characteristics of nephrite endow it with a toughness for woodworking tasks beyond any other stone material available in the interior of British Columbia. This strength, however, also makes nephrite one of the hardest materials to shape into useable implements. When polished, nephrite, being a form of jade[1], is a highly aesthetic gem stone that usually comes in various hues of green. Both the toughness and aesthetic qualities of nephrite, when combined with the amount of labor needed to shape it, made it a highly valued material in Plateau society.

The implicit assumption in Plateau archaeological literature is that nephrite artifacts were the primary heavy duty woodworking tools in the Interior and were part of a tool kit that every family unit possessed (e.g., Sanger 1968:128, 1970; Stryd 1973:65; Richards and Rousseau 1987:50). This view implies that the ownership of such artifacts would have been unrestricted to all members of Plateau society and that nephrite implements would have been used mainly for woodworking functions, as well as possibly being trade items for exchange with coastal groups (Fladmark 1982; Richards and Rousseau 1987:51). These assumptions probably derive from the belief that prehistoric societies on the Fraser and Columbia plateaux were egalitarian and not as complex as coastal groups (Ray 1939). Any cultural traits that suggested non-egalitarian behaviors (e.g., potlatches, totems or crests) arethought to have been the result of Plateau contact with the coast (see Cannon 1992).

Some work on the British Columbia Plateau has demonstrated that social inequities were present in the Interior ethnographic and archaeological records (Stryd 1973; Hayden et al. 1985; Hayden 1992; Hayden and Spafford 1993). These inequities are hypothesized to be the result of an in-situ development of a complex hunter-gatherer lifestyle on the plateau (Hayden et al. 1985; Hayden 1992). Under this model, nephrite use and ownership would have been restricted to wealthier individuals or families as a mechanism to display or retain wealth and to control labor by judicious loaning of costly-woodworking tools (Hayden et al. 1985).

To the present, no empirical evaluation of the significance of the occurrences and distributions of prehistoric nephrite artifacts on the British Columbia Plateau has been undertaken. It is not clear from the present literature whether nephrite artifacts were manufactured because they represented the most cost-effective or efficient tool for Plateau woodworking demands or whether their use went beyond utilitarian needs to fulfill prestige or wealth functions. In order to understand the value placed upon nephrite implements by prehistoric Interior societies, there must be an examination of the economic factors behind the use of nephrite (e.g., manufacturing effort and cost, relative efficiency, and curation) and an interpretation of the distribution of nephrite in the archaeological record.

The following aspects of nephrite technology on the British Columbia Plateau are investigated in this report:

1. What was the energy and time cost-efficiency of the use of nephrite? What were the time and effort factors needed to manufacture nephrite artifacts? Were alternate materials used in lieu of nephrite? What were the costs and benefits of those materials? Were some nephrite implements non-functional? Was there excess energy expenditure on nephrite artifacts when alternate raw materials

1. Unless otherwise stated, the term jade in this study refers only to nephrite. In other areas of the world it may also refer to jadeite.

would have fulfilled the task requirements?

2. Do certain types or sizes of nephrite artifacts occur in select contexts and locations on the British Columbia plateau? How did Interior societies dispose of nephrite implements? Does the distribution of nephrite artifacts suggest a particular exchange pattern? Are artifact contexts indicative of possession by certain individuals or groups in Plateau society? Did the value of nephrite artifacts vary in different regions of the Plateau?

Types of Data

The types of data that can be used to examine the prehistoric use and importance of nephrite in the British Columbia interior include: 1) ethnographic observation; 2) observations from experimental replications on the energy and time costs of prehistoric nephrite manufacturing; 3) archaeological contexts and distributions of different forms of nephrite artifacts; 4) observations of artifact material types, hardness, and manufacturing techniques; and, 5) analogs of nephrite (jade) use by other cultures in the world.

Ethnographic Observation

Optimally, direct historical evidence surrounding the use of nephrite would be the most ideal form of data. If direct observations of Interior nephrite manufacturing and the subsequent use and ownership of such artifacts were available, they would minimally form a starting point from which to interpret the archaeological record. Unfortunately, there is only a limited amount of ethnographic data available surrounding the use of nephrite in the Interior. The information that does exist (Dawson 1887; Teit 1900, 1906, 1909b, 1930; Emmons 1923) alludes mainly to manufacturing processes. There are also a few references to a special value placed on at least some types of nephrite artifacts (Emmons 1923).

In addition to the shortage of ethnographic data, there are problems with directly applying ethnographic analogy to the past. As Gould points out (Gould and Watson 1982:375), analogues based on resemblances, either from a direct historical or comparative origin, cannot always account for variability in the past and thus become self-fulfilling in nature. In building analogies for nephrite use in the Interior of British Columbia, a large problem exists due to the fact that nephrite artifacts ceased to be made at least a generation before serious ethnographical research was undertaken (see Emmons 1923:20-21). It is thus possible that the ethnographically recorded information about nephrite use may be biased due to European influences on Plateau society and due to both ethnographers and informants embellishing their descriptions of nephrite utilization to fill in details lost over time.

In this study, I review the ethnographic information surrounding the prehistoric use of nephrite to create a synopsis of Interior Plateau jade working. There will be an attempt to critically evaluate the ethnographic information to create a model from which to make interpretations on nephrite use.

Experimental Reconstruction

Most archaeological studies completed on ground stone tools have been stylistic or typological. For example, Roger Duff (1970) created a typology for ground stone axes in the South Pacific; Mackie (1992) attempted a classification of nephrite celts for the Northwest Coast; and many typologies have been completed for groundstone axes in Britain (e.g., Manby 1975; Wooley et al 1975). The other usual type of research on groundstone tools is petrological analysis. For instance, Leighton (1989, 1992) performed petrological analysis on jadeite from Sicily, Wolley et al. (1975) examined both typology and mineralogy of European jade implements, and attention has been paid in Mesoamerica to sourcing jade objects used in the region (Foshag 1957; Lange 1993). What have largely been ignored, however, are the manufacturing processes involved in producing ground stone tools. This is particularly the case with nephrite.

Most experimental work on ground stone tools has focused on factors of time and effort needed to shape pecked and ground implements (e.g.,, Beck 1970; Dickson 1981; Johnson 1975; M'Guire 1892; Olausson 1983; Pond 1930; Steensberg 1980). From the results of these experiments, it has been demonstrated that there is a great variation in the amounts of time needed to shape different rock types. The overall results of these tests, however, are not very extensive and, with a few exceptions

(Dickson 1981 and Olausson 1983), are not very rigorous in their data collection methods. Some experimental studies have been performed on nephrite (M'Guire 1892; Beck 1970; Johnson 1975), but the results are limited and do not really explore the full range of prehistoric methods likely to have been used to manufacture nephrite implements.

Considerable discussion in lithic technology has been devoted to issues surrounding technological efficiency (e.g., Bamforth 1986; Hayden 1987; Jeske 1992; Torrence 1983, 1989). Some attention has also been given to evaluating the cost-effectiveness of groundstone edges for various material types (Dickson 1981; Olausson 1983; Boydston 1989). Comparisons in these studies usually relate to the *speed* at which edges made of various raw materials will chop through wood, versus the time needed to make the tool. Very little attention, however, is given to the *endurance* of different material types, which is an important factor in tool curation and replacement time.

During this study, I use data from experiments designed to quantify the effort needed to cut nephrite, and estimate the life expectancy of nephrite tools. The results derived for nephrite are compared to other types of raw materials that have been ground in the same experimental regime. Of key importance in this study is the determination of whether the effort needed to manufacture nephrite implements was 'excessive' in comparison to the cost-efficiency of other material types.

Context and Distribution

The study of artifact distribution and context has long been part of the archaeological discipline. Through the observation of artifact distributions, one can address issues surrounding exchange or trade patterns in an area (e.g., Renfrew 1975; Cummins 1975; Sherratt 1976; Elliott et al. 1978; Hodder and Lane 1982; Chappell 1987). Contextual information is important to understanding questions surrounding artifact ownership, manufacturing locations, modes of disposal, utilization areas and artifact value (Hodder 1982).

The context and distribution studies that are most relevant for the issues at hand are those that have been undertaken in Europe for stone axes (i.e., Hodder and Lane 1982; Bradley 1990; Elliott et al. 1978; Sherratt 1976; Chappell 1987). These studies predominantly examine the distributional changes in size and functionality of stone axes over space (and time) in relation to their source. The derived correlations are used to interpret the types of exchange patterns that existed in Neolithic societies. Although good contextual data is lacking for many of the stone axes recovered in Britain (and therefore Hodder and Lane [1982] and others do not address it), it has been demonstrated that such information can strengthen the interpretations made about their use (see Bradley 1990:ch.2; Hodder and Lane 1982).

For the purposes of this investigation, I will analyze the distribution and contexts of nephrite artifacts from archaeological excavations and surveys done in the interior of British Columbia and, in some cases, from the Columbia Plateau of Washington. The research focuses on the type, form and size of nephrite artifacts recovered; the types of sites (i.e. burial, housepits, campsites, etc.) and features where nephrite implements are found; and the distance of nephrite items in relation to the source area. To compliment this data, attention is also paid to sites where nephrite does not occur and to artifacts of similar form not made of nephrite.

Artifact Observations

In order to fully understand manufacturing techniques and choices in raw material, it is vital to directly observe artifacts reported to be nephrite from the Interior. Nephrite is a very difficult mineral to identify (Leaming 1978:7) and it is probable that some mis-identification of the material has occurred in the archaeological literature. Other rock types, such as serpentine and vesuvianite, can mimic nephrite in appearance but are appreciably inferior in hardness or toughness (Holland 1962; Leaming 1978). Even nephrite itself ranges in quality (Leaming 1978:18). Since raw material influences the time and effort needed to make ground stone tools, it is thus critical to determine the types of materials used in the Interior.

In addition to raw material determination, observations on nephrite artifacts can be used to help clarify manufacturing techniques used to make nephrite implements. Ground stone technology, unlike chipped stone, does not

leave a considerable amount of debitage. However, when remnant debris from the manufacturing process is found it is very useful for understanding groundstone reduction processes. Examination of nephrite products can also provide insight into the techniques and amount of care used to make the implement. Although much of the manufacturing evidence on a ground stone tool can be abraded away in the completion process, there often remains some evidence of the original blank, the number of cuts performed to make the implement, and the finesse with which it was finished.

In this thesis I provide a synopsis of the results from an examination of a number of ground stone artifacts from the interior of British Columbia. The analysis of these artifacts is focused on raw material identification, hardness determination and investigating manufacturing techniques or processes. This information is used to expand upon the results from the context and distribution analysis and to guide the experimental procedures.

Analog Information

Information about the use of nephrite (or jade) from other areas of the world can also be used as a means of understanding the use of nephrite in the Interior of British Columbia. Because of the lack of ethnographic data in British Columbia, jade use by other cultures, especially those of a similar cultural complexity, can be important to providing some possible alternative explanations. For example, there is good ethnographic information on how the New Zealand Maori manufactured a variety of greenstone (nephrite) implements (e.g., Chapman 1892). Besides this, archaeological sequences from other areas of the world, where jade manufacturing evolved, may also provide good analogs for the development of nephrite use in the British Columbia interior. The development of jade working in New Zealand is particularly relevant to this analysis (e.g., Best 1974; Duff 1950), along with information from other areas of the world, such as China (Huang 1992), Sicily (Leighton 1989), and Mesoamerica (Digby 1972).

The Study Area

The main geographical focus of this study is the Canadian Plateau cultural sub area. As defined by Richards and Rousseau (1987:3-4), this region extends from central British Columbia to approximately the Canadian - USA border (Figure 1). The Coastal and Rocky Mountain Ranges comprise the western and eastern boundaries of the area. There will also be some examination of archaeological sites along the Columbia River in Washington where recovered nephrite artifacts have been attributed to British Columbia sources (e.g., Collier et al. 1942:70-2; Galm 1994; Grabert 1968; Nelson 1973:384). There will be no attempt to analyze nephrite utilization by coastal groups, including the lower Fraser River region around Hope. Any mention of the *Plateau*, the *Interior*, or the *Fraser Plateau*. throughout the study will be referring to the main study area, unless otherwise indicated.

Organization

There are six chapters in this report. The first chapter is the problem statement and the background introduction. The second chapter deals with the physical characteristics of nephrite and the sources of the material in the Pacific Northwest. The third chapter is an ethnographic and archaeological review of the introduction of nephrite into the British Columbia interior. This chapter summarizes the ethnographic pattern or model of nephrite utilization. The fourth chapter is concerned with establishing the cost-efficiency of nephrite implements in relation to other material types. In it there is a summary of the experimental procedures undertaken for this study and a discussion of what constitutes value in stone tool technology. The fifth chapter of the thesis deals with the context and distribution of nephrite artifacts on the Plateau. This chapter reviews theoretical aspects surrounding the deposition of artifacts and details several different explanatory models to interpret the patterning of nephrite distribution. The sixth and final chapter consists of a discussion of the experimental and archaeological results.

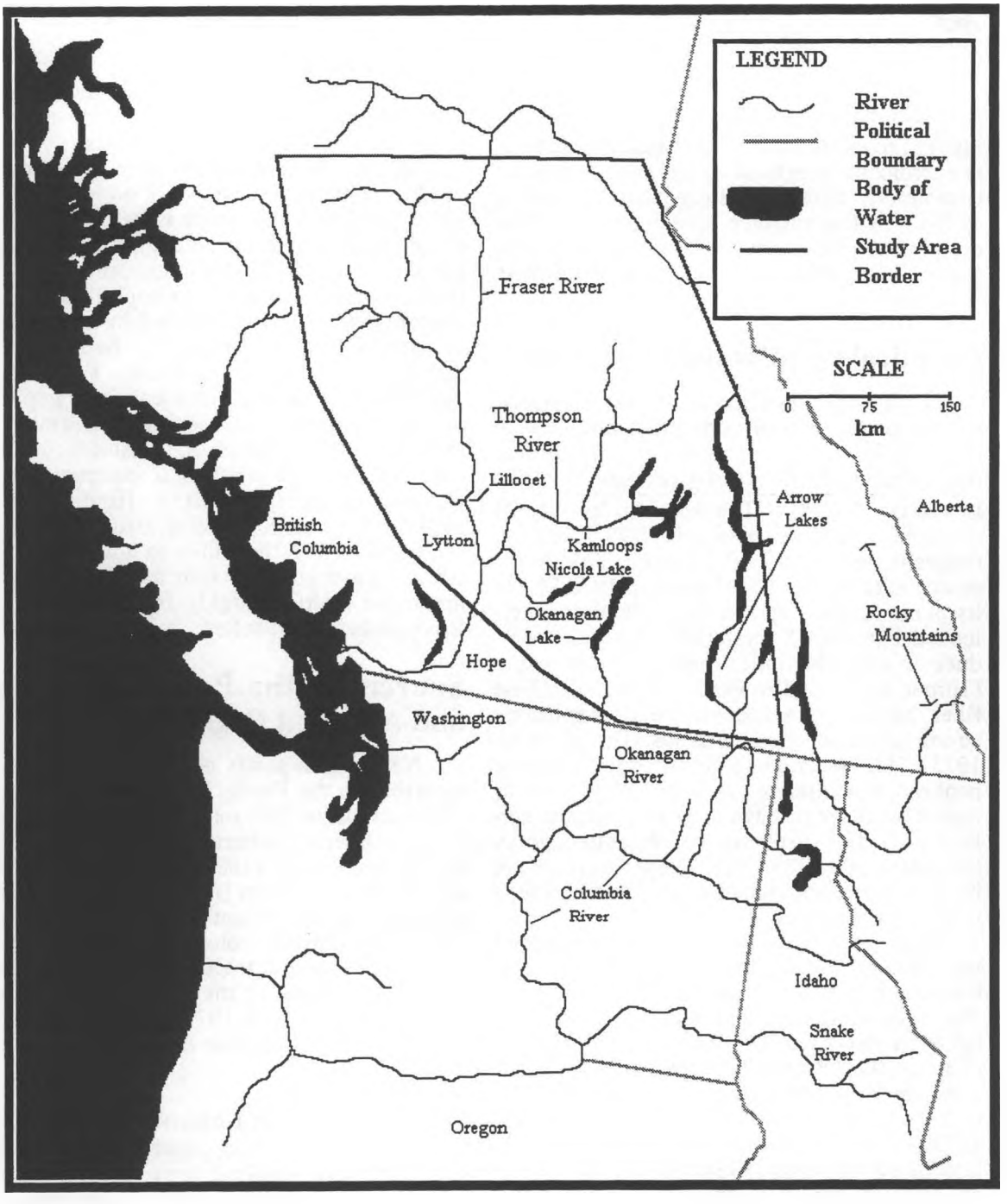

Figure 1.1. The Study Area.