CHAPTER 10

SUMMARY AND CONCLUSIONS

A study sample of 129 prehistoric "key-shaped" formed unifaces selected from excavated assemblages and surface collections from ten archaeological regions in British Columbia were examined in this study. The primary research objectives were: (1) to determine the approximate geographic extent and chronological distribution of key-shaped formed unifaces in northwestern North America; (2) to determine the primary function of this tool type on the Interior Plateau by undertaking a detailed research design that included design theory, microwear analyses, residue analyses, experimental tool replication and use; and (3) to interpret and discuss the cultural and technological ramifications of these results with respect to the later prehistoric period on the Interior Plateau.

The results have made several important contributions to our present understanding of Interior Plateau later prehistory from culture-historical, technological, and behavioural perspectives. The nature and implications of these contributions are briefly summarized and discussed below.

Current data suggest that chipped stone tools fitting the description of "key-shaped formed unifaces" as outlined in this study are commonly found in two environmentally different and non-adjacent culture areas: the Interior Plateau and some of its neighboring regions; and most of the Arctic.

On the Interior Plateau the northern geographic extent of key-shaped formed unifaces is not presently known due to a relative paucity of archaeological data from north-central and northern B.C., although they have been found in central British Columbia at Punchaw Lake near Prince George, and at Tezli Lake on the Blackwater River. Their western geographic extent is marked by the Coast Mountain range in B.C. and Cascade Mountains in Washington, the southern boundary appears to correspond approximately with the Washington/Oregon border, and the eastern limit corresponds with the western slopes of the Rocky Mountains in both Canada and the United States.

The known geographic distribution of key-shaped formed unifaces on the Plateau corresponds primarily with territories historically occupied by Interior Salish groups in the north, and several Sahaptin-speaking groups to the south. This indicates that these tools were used predominantly by people participating in typical "Plateau" adaptive patterns. It may eventually be determined that this tool type represents a culture trait unique to Salish-speaking groups. If this is so, it may have some interesting implications for group interaction and territorial displacement between 4000 and 1000 BP on the southern Columbia Plateau.

In the Arctic, tools morphologically similar to key-shaped formed unifaces have been found in components from Alaska to Labrador where they are known as "concave side-scrapers". It has been loosely inferred that they were used to work bone, antler, ivory, and wood. The high incidence of burination on the "opposite" margins on Arctic specimens is a salient feature that is lacking on the Plateau tools. It is possible that the Arctic analogues may have functioned in the same capacity as they did on the Plateau. However, I caution that this can only be corroborated by conducting a detailed study similar to that undertaken here, as it is potentially dangerous to infer functional parity simply on the basis of general morphological and technological similarity.

The chronological duration (i.e., temporal distribution) for the use of key-shaped formed unifaces on the Plateau was determined by documenting their association with radiocarbon dated components. Dates for the Canadian Plateau suggest that they appeared around 3000 years BP, and their use was discontinued after about 1000 BP. On the Columbia Plateau, the majority of key-shaped formed unifaces have been found in contexts dating to the same temporal range, but at least two dated components attest to their use around 4000 BP. They can now be formally recognized as being diagnostic temporal horizon markers that can be used to provide relative age estimates for Plateau components lacking other types of temporally diagnostic artifact types or datable organic materials. Eventually, it may be shown that they also appeared on the Canadian Plateau around 4000 BP (or shortly thereafter), but at present there are very few investigated components dated between 3000 and 4000 BP.

Arctic "concave side-scrapers" date between about 4500 and 1000 BP in both western and eastern sub-areas. They have been found in components belonging to the Arctic Small Tool tradition, and the later Norton and Dorset cultural complexes of the Paleo-Eskimo tradition.

The present spatial and temporal data allow that two models be advanced regarding the appearance and distribution of key-shaped formed unifaces in the Northwest. The first model suggests this tool type was initially invented in the Arctic around 4500 BP, and then their use spread rapidly southward via inland hunting groups to appear on the Plateau by about 4000 BP. The second model suggests that these tools may have been independently invented in two centers; first in the Arctic around 4500 BP, and again on the Columbia Plateau around 4000 BP. Parsimony and the current data suggest that the latter scenario is more likely. Adequate resolution of either model will require: (1) confirmation that the Arctic and Plateau tools functioned in the same general capacity; (2) determining if they are represented in late prehistoric components lying between the Plateau and the Arctic, thus indicating geographic contiguity; and (3) detailed investigation of a greater sample of components dating between ca. 4000 and 3000 BP on the Canadian Plateau.

Several theoretical and methodological approaches were used to determine the primary function of Interior Plateau key-shaped formed unifaces. They included design theory, residue analysis, microwear analysis, and experimental tool replication and use. This study provided an opportunity to assess the relevance, efficacy, drawbacks, and future potential of these approaches for solving a problem related to lithic tool function.

The design theory analysis was considered to be one of the more powerful approaches used in the study. It permitted several "primary" and "secondary" potential functions for key-shaped formed unifaces to be realized and subsequently explored. Design analysis should always be a component of any study aimed at

assessing stone tool function(s).

The residue analysis was relatively cheap, easy to undertake, and provided very clear and useful results. I conclude that all three methods employed in this study appear to have good potential for assisting in determining the function(s) of some stone tools. However, I warn that conclusions regarding tool function(s) should not be drawn on the basis of residue analysis results alone, rather, residue analysis should be conducted as an adjunct inquiry to compliment several other analytic procedures. Best results were obtained for artifacts that had been washed poorly, or not at all. As some researchers have already emphasized, the common practice of thoroughly washing lithic artifacts should be strictly avoided in situations where residue analyses may be useful for solving specific functional problems.

Although very time consuming, microwear analyses of the prehistoric microwear sub-sample specimens and the experimentally used tools were extremely important and useful components of this study. They helped to reconstruct the motor patterns associated with the primary use of prehistoric Plateau key-shaped formed unifaces, and assisted in disclosing the general nature of the contact material being worked. Most importantly, the microwear analyses permitted the primary function of these tools to be inferred through a judgemental comparison of microwear traces observed on the prehistoric microwear sub-sample specimens with those on the experimental tools. The power, advantages, and benefits of microwear studies are numerous, and they need not be recounted here.

Replication and experimental use of ten key-shaped formed unifaces provided a great deal of important information and many valuable insights regarding the functional potential of this tool type, and contributed to the development of "middle range" theory on the Plateau. The experimental component of the study allowed the efficiency and motor patterns associated with this tool type to be realized while working three different categories of contact materials. It also permitted several different types of lithic raw materials to be evaluated with respect to how their physical properties were related to functional efficiency and tool-use longevity, and how they responded to microwear trace pattern development. This enabled the lithic material types to be ranked according to their relative overall functional and technological superiority. This ranking allowed a critical assessment of the hypothesis that the obvious prehistoric preferential selection of durable cryptocrystalline silicates for the production of key-shaped formed unifaces represented a decision to exploit their superior hardness and durability. The experimental component also allowed the effects and advantages of traditional hafting methods to be examined.

The statistical analyses were most important for providing measures used to generate the descriptions presented in this study, and they were also useful for quantifying data which revealed several significant behavioural patterns that might have otherwise not been realized.

The microwear and experimental analyses also indicated that most Plateau key-shaped formed unifaces were hafted. The experimental tool-use results suggests that hafted tools afforded greater overall tool manipulability, permitted heavy loads of pressure to be accurately applied during tool-use, and they reduced hand straining that is commonly associated with unhafted (i.e., hand-held) tools.

Key-shaped formed unifaces were also probably highly curated, as suggested by several important facts. Reasonable amounts of time were invested to produce these tools, and their recurrent formal outline indicates they were intended to be task-specific. Also, almost 90% are made from hard, resilient, and durable (tough) cryptocrystalline silicates that demonstrate exceptional functional use-life potential and resharpening capabilities. This indicates that they were designed to be highly efficient, reliable, maintainable, and they were also intended to have long use-lives. These characteristics are typical of most curated tools. Basalt, although commonly available, was rarely employed to make key-shaped formed unifaces because of its inferior hardness and durability, and much greater brittleness. Basalt dulls very rapidly compared to silicates when used on moderately hard and hard contact materials, and thus has much shorter tool use-life potential. Also, because basalt is quite brittle, it is more prone to breaking while being used or resharpened. Overall, basalt is less efficient, less reliable, and less maintainable, and these are highly undesirable characteristics for a lithic material intended to be employed to produce curated tools.

Use of key-shaped formed unifaces and other curated tools during the late prehistoric period on the Plateau is consistent with the established interpetation that people participated in primarily a "collector" or "logistical" subsistence and settlement system at that time. Use of task-specific curated tools, such as key-shaped formed unifaces, would have helped to attenuate time-stress problems created by mutually conflicting resource procurement and processing activities, which were further compounded by the time required to secure lithic raw materials and produce tools.

These scheduling problems would have been particularly prominent during the non-winter months (notably late spring and summer) when logistically organized subsistence activities were most intense. That many of the key-shaped formed unifaces examined in this study exhibit moderate to pronounced striation intensities lends support to this hypothesis, since mobile abrasive particles (i.e., sand, silt, dust, etc.) are most abundant in the environment during the drier non-winter months of the year. This suspected pattern is also evidenced by the observation that these tools are found in comparatively low frequencies at winter pithouse villages. An examination of the available excavation data, and my previous field experience, leads me to conclude that key-shaped formed unifaces are probably most commonly represented at non-winter residential base camp sites dating between ca. 3500 and 1200 BP. Unfortunately, only a few sites of this type have been investigated, and the scant data from them does not permit this hypothesis to be adequately assessed at this time. I believe that the apparent perception that these tools are relatively rare on the Canadian Plateau is due to past researcher and heritage resource management policy emphasis on investigating primarily pithouse sites.

The small number of specimens determined to belong to the Shuswap horizon (ca. 3500 to 2400 BP) is also attributed to sampling bias. There is little doubt that the proportion of investigated Shuswap horizon components relative to the number of excavated components belonging to the later Plateau and Kamloops horizons is underrepresented with respect to the actual (i.e., true existing) proportions of components belonging to each of these three horizons. This is because Shuswap horizon components are associated with less archaeological visibility than those belonging to the later two horizons. Once a larger sample of Shuswap horizon components have been investigated (notably non-winter lithic scatters), it will probably be revealed these tools were more commonly used during this period than is suggested by the results of this study.

Regardless of sampling problems, use of key-shaped formed unifaces appears to have been most intense during the Plateau horizon (ca. 2400 to 1200 BP). This corresponds with a period when it seems that logistically organized subsistence and settlement practices were significantly intensifed relative to the previous Shuswap horizon. As mentioned above, curated task-specific tools would have been advantageous in such adaptive contexts, and this is supported by the high frequency of key-shaped formed unifaces and other types of well-made curated tools used during this time (see Richards and Rousseau 1987:34-36).

Collectively assessed, the results of the analyses and approaches used in this study strongly suggest that the primary function of key-shaped formed unifaces on the Plateau involved working stalks and branches of small woody shrubs and trees. Specific tasks included bark stripping, removal of secondary branch nodes, and smoothing and significantly altering the primary stalk/branch shafts by scraping, shaving, planing, whittling, carving, and/or engraving actions.

This supports Fladmark's (1978) initial contention concerning the probable primary function of these tools. Henceforth, I suggest that transpiration of woodworking activities can, and should be, directly inferred for prehistoric Plateau occuptions where these tools are commonly represented. Henceforth, an appropriate functional moniker such as "key-shaped woodworking tools" should be used to refer to this tool category. However, I must caution that inferring that these tools were used *exclusively* to work wood may not always be entirely correct, as the experimental and microwear analyses provide sufficient data and reason to suggest that it is quite possible that they could have also been occasionally used in a secondary functional capacity to scrape soaked or boiled deer antler. Nevertheless, I am quite confident that unsoaked antler, unsoaked bone, or soaked bone were very rarely, if ever, worked with these tools.

Ethnographic accounts indicate that modified stalks and branches of small trees and woody shrubs were used to manufacture projectile shafts, fish traps and weirs, basketry, wooden handles, and snowshoes. I suggest that key-shaped formed unifaces would have functioned well for working wood used to produce any of these items.

It is intriguing that there is an apparent decline in the frequency of key-shaped formed unifaces after about 1500 BP, and that their use was completely discontinued by about 1000 BP. The begining of this decline is coincident with the appearance of bow and arrow technology around 1500 BP (Richards and Rousseau 1987:34), and is also concurrent with the 500-year period when it was used along with atlatl and spear technology. After 1000 BP, bow and arrow technology appears to have functionally replaced the atlatl, thereby becoming the dominant hunting weapon.

The experimental component of this study indicated that key-shaped formed unifaces function very effectively for removing bark and working stalks and branches of woody plants ranging between about 1 and 3 cm in diameter. I maintain that it is not unrealistic to speculate that key-shaped formed unifaces may have been used very commonly to manufacture and maintain wooden elements of hunting weaponry; notably spear and atlatl dart shafts, and perhaps even atlatls themselves.

Because arrow shaft diameters are estimated to have been typically between about .7 and 1 cm in diameter (Richards and Rousseau 1987:86), prehistoric technicians may have observed that stalks and branches of these

diameters could be more easily and effectively worked using sandstone arrowshaft smoothers and/or simple notched flakes, or "spokeshaves" (see Teit 1930:218). These latter artifact types are argued to have been less efficient for working stalks and branches having diameters greater than 1 cm owing to greater edge and surface contact with bark and wood, producing high levels of frictional drag that would have required very heavy force loads to effectively overcome. This scenario is supported by the fact that I have observed simple notched flakes to be far more common in Kamloops horizon components than those belonging to the previous Plateau and Shuswap horizons, and arrow-sized sandstone shaft smoothers are restricted almost exclusively to the Kamloops horizon.

Finally, I submit that on the Plateau, saskatoon was probably one of the most common types of wood used prehistorically to produce atlatl and spear weaponry, and for manufacturing many other types of implements. Ethnographic accounts indicate that it was the preferred wood used for production of arrow shafts by Native groups on the Plateau. Moreover, its physical properties are ideal for this purpose (i.e., straightness, durability, inertial mass), and it was most probabably as ubiquitous throughout the Plateau culture area during the late prehistoric period as it is today.