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Holocene Occupations in the Southern Yukon: New Perspectives from the Annie Lake Site

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Holocene Occupations in the Southern Yukon - New Perspectives from the Annie Lake Site

by

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ABSTRACT

The purpose of this thesis is to examine the archaeological and chronological record of south-central Yukon through detailed excavations and collections analysis of JcUr-3, a well stratified, multi-component site on the shores of Annie Lake in the southern Yukon.

Deeply buried and well stratified cultural remains are a rarity in Subarctic archaeology. Because of reduced precipitation and a short growing season, soil horizons are generally thin and poorly defined. Through good fortune, a new locality of JcUr-3 was discovered in 1991 that contained well buried cultural materials in good stratigraphic context. In 1992, an eight week controlled excavation was carried out at JcUr-3 which resulted in the recovery of a large quantity of lithic artifacts (15476), often in association with datable organics.

The analysis and interpretation of these collections suggests that the Annie Lake site has a history of human occupation extending back to the early Holocene epoch. Based on the 1992 excavations, it appears that the existing prehistoric technological and chronological status quo for southern Yukon, as outlined by Workman (1978:415), should be revised to include an early Holocene Northern Cordilleran tradition. This tradition, characterized at JcUr-3 by a large blade technology, would precede the microlithic Little Arm phase. The data also provide tentative support for the concept of a previously unrecognized technological horizon in southern Yukon, identified as the Annie Lake complex (Greer 1993). Aboriginal use of the Annie Lake site appears to have abruptly ceased with the Euro-canadian invasion of the Yukon during the Klondike Goldrush.

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Chapter One.

Introduction

Chronological and technological sequences for southern Yukon are still in the developmental stages. This is due not to a lack of effort on the part of researchers (cf., Johnson and Raup 1964; MacNeish 1964; Van Dyke 1978; Workman 1978; Greer 1983), but rather to a paucity of well stratified archaeological sites containing datable organic deposits. In southern Yukon, defined as that region south of 62° latitude, there are approximately 1200 documented archaeological sites; however, the prehistoric technological traditions for the area are based on the detailed excavation and analyses of as few as six sites located primarily in the Kluane region of southwest Yukon (Workman 1978).

The Annie Lake site (JcUr-3) in south-central Yukon is one of the few southern Yukon sites to have received close archaeological scrutiny. Discovered during an archaeological survey of the Southern Lakes Region of Yukon by Greer in 1980, JcUr-3 was first excavated in 1982 (Greer 1982). At this time it was shown to be a multi-component site with a history of occupation dating back at least several thousand years, based on the presence of microlithic tool technology. Greer described the Annie Lake archaeological deposits as being "of considerable importance for understanding the record of prehistoric occupations in the Southern Lakes area" (ibid.:10.) However, site excavations and analyses were hampered by thin soil deposits and unreliable stratigraphy. Two subsequent field seasons in the same vicinity (Hare 1990, 1991) met with similar problems. During the course of the 1991 field season, however, a new locality was discovered that contained cultural materials associated with well stratified and deeply buried palaeosols.

This research arose from that discovery. Detailed excavation of this new locality of JcUr-3 was carried out during an eight week field season in the summer of 1992 with a crew composed largely of students from the local Carcross-Tagish First

Nation. While the resulting stone tool assemblage was not large, a number of diagnostic artifacts were recovered in association with datable organics.

The objectives of this research are to record the results of the excavation and the analysis of the data in an effort to reconstruct the history of occupation in the area, and to refine the chronological and technological prehistory of south-central Yukon. Specifically, it is suggested here that the microlithic technology of Workman's (1978) Little Arm Phase does not represent the earliest human occupation in Southern Yukon. Instead, the regional prehistoric record should be revised to include an early Holocene Northern Cordilleran Tradition (cf., Clark 1983, Gotthardt 1990), characterized, in part, by large blade tool technology. It is also argued that data from the 1992 excavations provide tentative support for Greer's suggestion (1993) of a previously unrecognized cultural horizon in the southern Yukon archaeological sequence. Identified as the Annie Lake complex (ibid.), this horizon is characterized by deeply concave-based lanceolate points and, more generally, by an emphasis on thin, well made lithic tools of fine grained raw materials. The Annie Lake complex at JcUr-3 appears to post-date, but is nearly contemporaneous with, the introduction of the Northern Archaic tradition horizon in southern Yukon at about 5000 BP, yet it displays technological characteristics inconsistent with established traits of the Northern Archaic. Various interpretations of these data are presented here.

Chapter Two represents a brief introduction to the study area, including the physical and ethnographic background of the Annie Lake region. Chapter Three presents a summary of previous archaeological investigations in the area and the technological sequences which currently define the prehistory of the region. Chapter Four presents a detailed description of the physical setting of the site, site excavation, recording strategy and site stratigraphy, while Chapter Five deals with lithic assemblages, methods of collections analysis and artifact descriptions. Chapter Six discusses the significance of the Annie Lake data for interpreting current archaeological framework for south-central Yukon and Chapter Seven presents a brief summary and conclusion.

Chapter Two

Environmental and Cultural Background

Physical Setting

Annie Lake (*Désdèlé Méne'* in the Tagish language) is located in the Southern Lakes District of south-central Yukon (see Figure 1:1, Plates 2:1, 2:2). It is a shallow lake, approximately 3.5 km long, situated on the extreme eastern edge of the Coast Mountains, which form a significant orographic barrier between the Pacific Coast, 75 km to the east, and interior Yukon. It is a rugged mountainous terrain frequently bisected by U-shaped valleys (Oswald and Senyk 1977:35). The lake lies at an elevation of 790 m, at the north end of the Corwin Valley and the east end of the Wheaton Valley. It is bounded on the east by Grey Ridge, a steep mountain ridge rising 1725-2000 m ASL, and on the west by the Boundary Ranges of the Coast Mountains with elevations of approximately 1875 m. Regional geology is complex and consists of numerous rock types, including Cretaceous and Jurassic age granites, intrusive bedrock of granodiorite, quartz monzonite, and quartz diorite (ibid.). Locally, volcanoclastic rocks are common, along with limestone, greywacke, feldspar and siltstone (Hart and Radloff 1990:17). Craig Hart (personal communication 1993) also reports recovering black obsidian from Grey Ridge, above Annie Lake.

Glacial History

Southern Yukon was completely glaciated by the Cordilleran ice sheet during the most recent regional glacial advance, known as the McConnell glaciation. There were a number of semi-autonomous regional lobes, with the Coast Mountain lobe occupying the Annie Lake area and flowing northward (Wheeler 1961:9). The ice sheet rose to an elevation of between 1800 and 2000 m with possible erratics being noted as high as 2250 m (ibid. :9). The Cordilleran ice sheet is thought to have withdrawn slowly from this area between 8000 and 10000 years ago (Hart and Radloff 1990:3), although downwasting may not have been uniform throughout the region (Jackson et al. 1991:350). Permanent glaciers sheets are still present on high peaks in the Mount Skukum area, south of Annie Lake.

ANNIE LAKE, SOUTHERN YUKON
STUDY AREA 1992

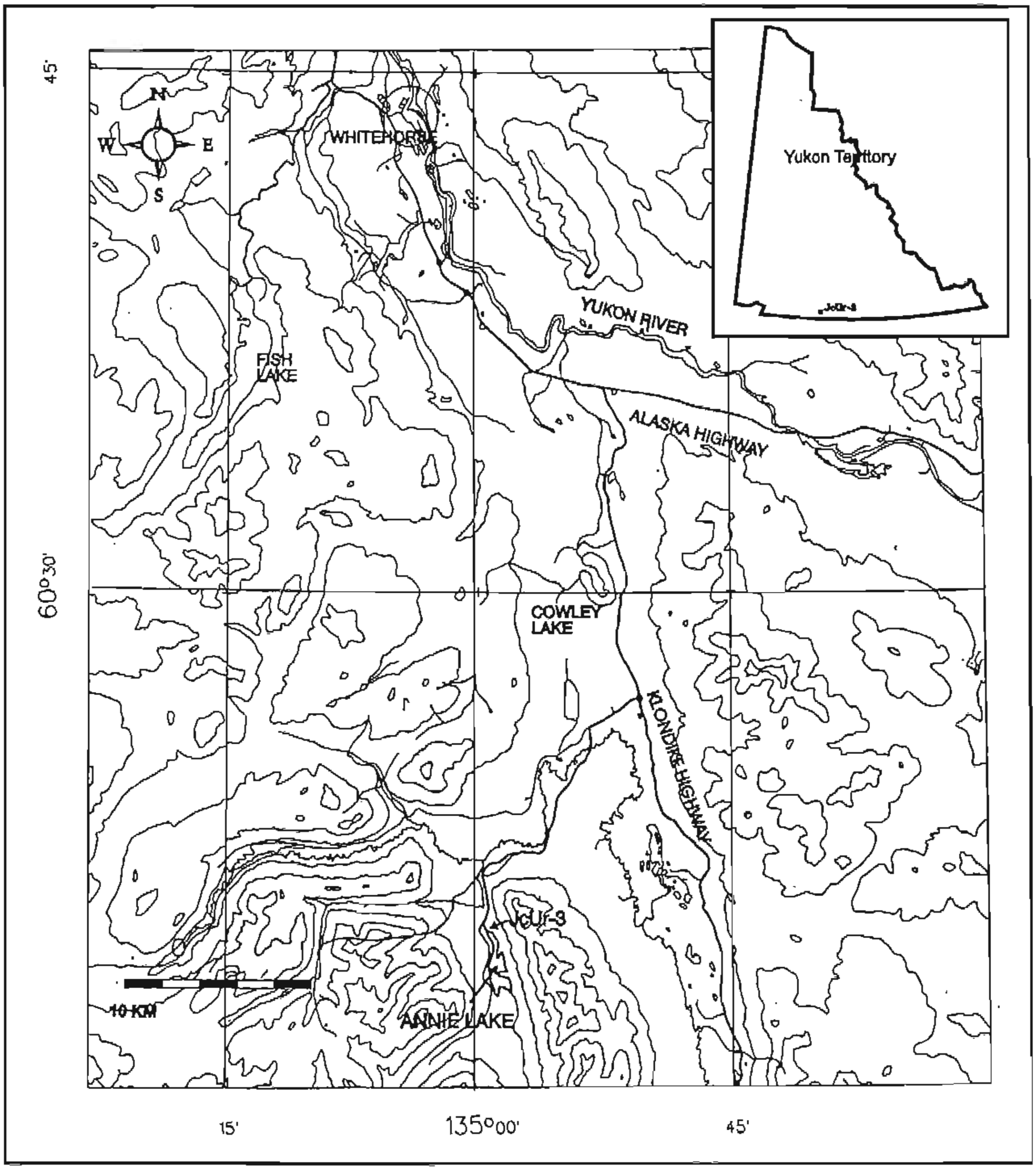


Plate 2:1 Annie Lake, Yukon. View from the north end of the lake looking south. JcUr-3 is located in the left foreground.

Plate 2:2 JcUr-3 at the north end of Annie Lake. The site is located on the lower bench in the centre of the photo.

The receding glaciers left behind large stagnant ice masses and an extensive network of proglacial lakes. It has generally been assumed that the distinctive strandlines of raised beaches, common throughout the Carcross area at an elevation of approximately 970 m represent the shoreline of Glacial Lake Carcross at 8000 years ago (Craig Hart personal communication 1993), although evidence presented by Fuller (1986:68) and Hughes (1990:13) suggests that ca. 8000-7100 BP probably represents the latest possible date for drainage of glacial lakes in this region, with an earlier drainage more likely. This interpretation is reinforced by the archaeological data presented here, which established that people were living within the floodplain of Glacial Lake Carcross at an elevation of 790 m by at least 7100 BP.

It is thought that this lake was blocked by stagnant ice masses at Annie and Lewes Lakes and flowed into the Yukon River to the north through the Watson and Wheaton valleys (Hart and Radloff 1990:3). As this proglacial lake drained, numerous palaeoshorelines were formed between 825 m and 730 m (ibid.). It also left behind varved glacial-lacustrine silt deposits notable in the Wheaton and Watson valleys. Other surficial features of the northern Corwin Valley consist mainly of unconsolidated glacial moraines, kames and eskers (ibid. : map - Geological Map of Carcross and part of Robinson Map Areas). Sediment deposits at the Annie Lake site are primarily aeolian sands and silts.

The entire area was blanketed with tephra from the White River Ash fall of ca. 1250 BP (Lerbekmo et al. 1975) but the ash here is thinner thick than other areas of southern Yukon, ranging from 0-7 cm thick, and in some locales may be absent over large areas. At the Annie Lake site, the ash is found 0-5 cm below the surface.

At present, the lake has two drainage outlets, north into the Watson River and south into the Wheaton River. Both of these rivers drain into Bennett Lake, at the headwaters of the Yukon River. The two major inlets are Perkins Creek, at the north end, and Schnabel Creek, on the east side. Water levels at Annie Lake have been fluctuating in recent years due to beaver activities. Water control culverts at the south end of the lake have allowed water levels to rise, expanding the surface area at the north end of the lake.

Climate

The climate of the Yukon is generally noted for long, cold winters and short, warm summers, but there is considerable variation within the Territory. Annie Lake lies in the Upper Yukon-Stikine Basin climatic region, on the leeside of the Coast Mountains, which is characterized by a continental climate of highly variable daily and seasonal temperatures and very low precipitation. Due to the rain shadow effect of the Coast Mountains, there is less than 200 mm of precipitation a year at nearby Carcross (Wahl et al. 1987:36). The proximity to the Pacific Ocean also allows for more frequent mid-winter mild spells than the rest of the Yukon. Average temperatures extremes for the Yukon Basin range from a high of 34°C in summer to -52°C in winter with a mean daily temperature of approximately -1.5°C (ibid. :40).

The general east-west direction of the Wheaton Valley tends to negate the scouring influence of prevailing north-south winter winds, producing colder winter temperatures in the Annie Lake vicinity but with less wind chill (Don Watt personal communication 1990). There is no permafrost in the immediate area of the lake, although permafrost may be encountered locally within 1 m of the surface (map - Carcross Valley Soil Survey 1989).

Vegetation

Regional vegetation is a dry boreal forest cordilleran type, dominated by white spruce (*Picea glauca*), lodgepole pine (*Pinus contorta*), willow (*Salix*) and aspen (*Populus tremuloides*). Terraces and lower slopes typically support open stands of white spruce and lodgepole pine while valley bottoms are characterized by closed stands of white spruce, balsam poplar (*Populus balsamifera*) and willow (Oswald and Senyk 1977: 37). Shrub birch (*Betula sp.*)and willow are commonly found in the sub-alpine, extending well above treeline. Mosses, herbs and ericaceous shrubs are present throughout the region (ibid.). The altitude of treeline in the vicinity is approximately 850 m.

Fauna

The study area is home to most of the same mammals which occupy the rest of the Subarctic cordillera, although Dall's sheep (*Ovis dalli*), along Gray Ridge, and caribou (*Rangifer tarandus*) were likely the most important big-game species in the traditional economies. Dall's sheep are reported to have been abundant along Gray Ridge (Greer 1990:2) and the study region was formerly within the home range of a large herd of woodland caribou (David Mossop personal communication 1991). Sheep continue to inhabit the area, along with moose (*Alces alces*), grizzly (*Ursus arctos*) and black bears (*Ursus americanus*), wolf (*Canis lupus*), coyote (*Canis latrans*), fox (*Vulpes vulpes*), lynx (*Felis canadensis*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), martin (*Martes americana*), ground squirrel (*Spermophilus parryii*), red squirrel (*Tamiasciurus hudsonicus preblei*), porcupine (*Erithizon dorsatum*), varying hare (*Lepus americanus*), marmot (*Marmota monax ochracea*), pika (*Ochotona princeps collaris*) and other small game. However, game populations have been depleted in recent years and today much of the Annie Lake region falls within a "no hunting" corridor. Economically important bird species include grouse and ptarmigan (*Tetraonidae*).

Désdélé Méne', means red lake, after a small red sucker fish that is found there; however, fish are not an abundant resource at Annie Lake. This is due in part to the shallow nature of the lake (less than 3 m), which during severe winters could freeze almost to the bottom. The species present are limited to those which can survive near-anaerobic conditions, such as long nose suckers (*Catostomus catostomus*), sculpin (*Cottus cognatus*), lake chub (*Couesius plumbeus*) and arctic grayling (*Thymallus arcticus*) (Susan Thompson personal communication 1990). There is no evidence of salmon spawning in this area.

Traditional Land Use

Annie Lake lies within the traditional territory of the Tagish people, of the Carcross-Tagish First Nation, who today reside primarily in Carcross and Whitehorse. The Tagish language is an Athapaskan dialect; however, extensive trade and intermarriage with inland Tlingit resulted in the large scale adoption of the Tlingit language by Tagish people earlier in this century (McClellan 1975:39-40). The traditional Tagish territory encompasses approximately 10,000 square kilometres of the upper Yukon River Basin, including the Southern Lakes Region of southern Yukon and the Wheaton and Watson River valleys (ibid. :35). They were known to have traded extensively with coastal Chilkats and travelled widely through interior Yukon for purposes of trade. Tagish people had access to European trade goods but little contact with Europeans until near the end of the 19th century, as the Chilkat Tlingits jealously guarded access routes to interior Yukon to maintain their trading monopoly. By the 1880s, prospectors began entering the Yukon in small numbers, and it was two Tagish men, Skookum Jim (*Keish*) and Dawson Charlie, along with American George Carmacks who are credited with the discovery which led to the Klondike Goldrush of 1898 (Wilkie 1992). Prior to the influx of Europeans, Frederick Schwatka estimated total Tagish population at 50 people in 1883, while George Dawson estimated 70-80 Tagish in 1887 (see McClellan 1975:38). It is unlikely, however, that either man would have seen the entire population of the area during their travels.

It is possible to comment only generally about traditional land use in the Annie Lake vicinity, as little documentation exists for land use patterns or activities in the area. Extrapolating from regional data, it is known that in southern Yukon "the aboriginal pattern was a semi-nomadic existence primarily dictated by seasonal sources of food" (McClellan 1975:95). Usually one or two extended families lived and travelled together. Summer and fall were times of intense activity when it was vital to set up and fill caches with fish at one location; sheep, caribou or moose at another location; and perhaps groundhogs (marmots) at another (ibid. :97). These staples, along with other dried and preserved stores, were critical to surviving the long Yukon winters.

> But there was never enough preserved food to last the entire winter. The able bodied hunters also looked continuously for moose and caribou, and when a kill had been made, the families who were travelling together all moved to the fresh meat supply.
> (McClellan 1975:97)

Given insignificant fishery resources of Annie Lake and the absence of migrating salmon in the Watson and Wheaton River drainage, it is unlikely that Tagish people were often present in the study area during late summer while salmon were running up other rivers within their traditional territory. Sidney (1980) reports that McClintock River, 40 km to the northeast of Annie Lake, was the site of a major Tagish fishcamp in late summer.

The Watson and Wheaton valleys, however, were important resource areas for sheep, caribou and moose (Greer 1990:2), which were traditionally harvested in summer, fall and early winter with snares and bow and arrow (McClellan 1975:110, 120). Greer documented two sheep hunting blinds in alpine regions of the Watson Valley (Greer 1987: appendix). Seasonal activity patterns underwent considerable change during this century with the introduction of firearms, dog sleds and commercial fur trapping to the Yukon.

Chapter Three

Archaeological Typology and Traditions of Southern Yukon

Previous Archaeological Investigations

While there has been considerable archaeological activity in the Watson-Wheaton valleys, there has been little systematic testing and few site excavations. Since the 1940s, a number of archaeologists have visited the Carcross area, including D. Leechman, W.N. Irving, R. Morlan, F. Johnson and H. Raup, R. MacNeish and C. McClellan and S. Greer. Greer (1987:4) reports 117 sites within the Watson-Wheaton study area. The majority of these (65 percent) were surface scatters of lithics, and most of these have been collected in their entirety. The most comprehensive archaeological study of the area was conducted by Greer as part of a 1980 Southern Lakes Resource Inventory (Greer 1981).

Archaeological investigations in the immediate vicinity of Annie Lake were first carried out by R.S. MacNeish in 1957, but the Annie Lake site (JcUr-3) was discovered by Greer in 1980 during a survey of the Southern Lakes district. In 1982, Greer conducted excavations at JcUr-3 (Greer 1982, 1993). Gotthardt and Hare returned to the site in 1990 and 1991 and carried out further testing on a nearby knoll (Hare 1990, 1991). During the 1991 field season, a new locality, the subject of this thesis, was discovered.

Regional Archaeological Sequences

The archaeological sequences for south-central Yukon are largely borrowed from the southwestern region of the Territory, following Workman (1978). Based on the excavation and re-evaluation of six southwestern Yukon sites and a survey of other previously excavated sites in the region, Workman outlined a technological sequence which supplanted MacNeish's earlier interpretations (MacNeish 1964) and remains today the most widely followed reference to the prehistory of southern Yukon.

Workman recognized two major and distinct lithic technologies in Southwest Yukon, the Little Arm phase of an unnamed tradition and the Northern Archaic Tradition, with the boundary between the two occurring at approximately 5000 BP. In Workman's scheme, the Yukon's Little Arm phase is a hybrid Paleoindian/microlithic technological phase characterized by microblades, burins, round-based projectile points, delicate flake gravers and unifaces and heavy, thick endscrapers (Workman 1978:415). He identified this as the first technological tradition present in southwest Yukon, basing this interpretation on a date of 7195±100 BP (SI-1117) for the Canyon site, which he classified as a microlithic Little Arm component. It is worth noting that this component, from the basal level of the Canyon site, was represented by a round-based lanceolate point; however, no microblades were recovered from here. Workman suggested that this Little Arm phase combined elements of lately arrived Northern Plano technology, as manifested by large, round-based projectile points, and Asiatic microlithic industries, represented by microblades and burins (ibid. :427). Others, however, consider Little Arm to be a late, local variant of the Paleoarctic Tradition rather than a hybrid (Clark 1992:78).

At approximately 5000 years ago, Workman notes a marked technological discontinuity in Southwest Yukon. As Workman describes it, "if ever the research area experienced an influx of peoples of truly alien technology on a large scale, it was at the time of the appearance of the Taye Lake phase" (Workman 1978:416). The Taye Lake phase was the earliest of three phases into which Workman divided the Northern Archaic Tradition. Over most of the region microlithic technology disappeared and side-notched points became common. Diagnostic artifacts of the Northern Archaic are somewhat ambiguous, but Workman defined the early Taye Lake phase as characterized by notched, straight and concave-based projectile points, heavy bifaces, endscrapers, unifaces and a lack of microblades or microcores (ibid. : 414). Workman suggested that the Taye Lake technology was firmly rooted in the Northern Archaic of Northwest Alaska (cf., Anderson 1968:31), but that its origins ultimately lay in the northern Plains. To fit the chronological framework of the known Northern Archaic sites, he proposed a circuitous population migration from the Plains along the eastern flank of the Mackenzie Mountains, westward to the Brooks Range, south through Central Alaska, eventually arriving in southwest Yukon at about 5000 years ago. The exception to this supposed population replacement was the Tanana Valley in central Alaska. Here, microblades persisted until the first millennium AD (Shinkwin 1979), and Workman suggested that the route of these migrating Archaic people probably bypassed the Tanana valley (ibid. :428).

From the introduction of the Northern Archaic Tradition at approximately 5000 years ago, Workman sees technological continuity in Southwest Yukon until the arrival of Europeans. While he divided the tradition into three phases, they are considered to represent technological variations within a continuum rather than variations due to population movements. According to Workman, Taye Lake was succeeded by the Aishihik phase (a designation borrowed from MacNeish 1964), dating from approximately 1250 BP until the arrival of European trade goods, which in turn was followed by the Bennett phase (Workman 1978), dating from that point until early in this century. Diagnostic artifacts of the Aishihik phase are diminutive side-notched points, small stemmed Kavik points, artifacts of native copper, multi-barbed bone points and stone wedges. The inventory of the Bennett Phase is similar, with the addition of European trade goods.

Comparative Regional Syntheses

Northern Cordilleran

When compared with other regional syntheses for the North American Northwest, there has been broad general agreement with Workman's sequence, with a few notable variations. Primarily, there is an increasing body of evidence for an early Paleoindian presence in the far northwest which may precede the introduction of microblade technology characteristic of the Paleoarctic or Denali complexes. Recent research by Alaskan archaeologists (Goebel et al. 1991, Kunz 1992) has identified two distinctly different lithic assemblages which both may predate 11000 BP. The diagnostic tool type of the 11000 year old Mesa site is large unfluted lanceolate points (Kunz 1992) while the equally ancient Nenana Complex is defined largely on the presence of a large blade and core technology which the authors feel is closely related to the Clovis Tradition of the American Great Plains and Southwest (Goebel et al. 1991:53).

The concept of a Paleoindian presence in extreme northwestern North America (i.e., Alaska and the Yukon) was first put forward by MacNeish (1959, 1964) in one of the early attempts to reconstruct the prehistoric sequences of the Yukon. He identified this technology as the Cordilleran Tradition, which unfortunately contained somewhat of a grab-bag of diagnostic artifacts. At one site in Southwest Yukon, he described a Cordilleran (Kluane Complex) component comprised of Lerma points, pebble choppers, a scraping plane, large blades and microblades (MacNeish 1964:285). Workman was skeptical about several of the artifact identifications and considered the Cordilleran Tradition a "shadowy entity" (Workman 1978:125).

Although the Cordilleran Tradition as defined by MacNeish has fallen into disuse, there is now widespread acceptance of some kind of pre-microblade lithic technology in the far Northwest. Morlan and Cinq-Mars (1982:376) suggested that these early distinctive lithic assemblages, characterized by large core and flake tools, bifaces, burins and occasional large blades may ultimately be linked to the Late Pleistocene bone tool assemblages, such as those recovered at Bluefish Cave. In 1983, Clark resurrected MacNeish's Cordilleran Tradition in order to explain lithic assemblages from a number of Late Pleistocene/Early Holocene Alaskan sites that lacked microblade industries (Clark 1983). Although he has since revised this theory (Clark 1992), Clark originally proposed that prior to spread of the microblade tradition, a population existed in Alaska and the Yukon which carried a toolkit characterized by large, bifacially produced projectile points. He termed this Paleoindian complex the Northern Cordilleran Tradition and suggested that it was subsequently influenced or replaced by groups of newcomers from Asia equipped with microblade technology, and by Plano people from the south who moved north as continental glaciers retreated. Other elements of MacNeish's original Cordilleran assemblage were maintained in Clark's somewhat ubiquitous trait list for the Northern Cordilleran, which includes a variety of bifacial projectile points including lanceolate and fluted points, large bifaces, blades from informal blade cores, and transverse notched burins on blades (ibid. :34). Subsequent work by Gotthardt (1990:263) led her to identify large blade technology as a critical index trait of the Northern Cordilleran.

Microblade Complexes

Despite the variety of early- to mid-Holocene microblade complexes that have been proposed for the region, there is little disagreement that by approximately 10500 years ago Asiatic people bearing toolkits characterized by microblades and microcores and were present over most of Alaska and central and northern Yukon (Clark 1983:36). The earliest appearance of microblades in the region is somewhat uncertain however, as excavations at Bluefish Cave, in Northern Yukon, have placed microblades at that site prior to 12000 BP (Cinq Mars 1985), indicating that microlithic technology may, in fact, predate the Paleoindian sites discussed above.

The lithic assemblages used to define the different complexes vary both temporally and spatially, depending on many factors, including amalgamation with both indigenous populations and Plano populations moving into the area from south of the ice sheets. These temporal and spatial variations in assemblages have given rise to a plethora of cultural/technological designations, including Denali, Paleoarctic, American/Siberian Paleoarctic, Northwest Microblade and Little Arm, which, despite their described variety, are still essentially defined by the presence of a technology emphasizing microblade production.

Northern Archaic/Middle Prehistoric

The transition between microblade traditions and the subsequent Northern Archaic Tradition has generated considerable debate among northern archaeologists. As outlined here, Workman (1978, 1974) sees a clear and abrupt technological transformation in Southwest Yukon at approximately 5000 B.P. Anderson (1968:30) was equally convinced that the boundary of the Northern Archaic at Onion Portage represented the arrival of an entirely new cultural tradition, characterized by notched, bifacial points, and lacking microblades. He argued that the new tradition had not developed indigenously and hypothesized an ecological correlation for the fundamental change in technology. Anderson proposed that the Northern Archaic Tradition moved northward with the advancing boreal forest, which was able to colonize the Beringian steppe/tundra environment in the wake of ameliorating climatic conditions (Anderson 1968b:28).

Workman was more tentative in embracing this theory of ecological change to account for the spread of the Northern Archaic, but his reasons for doing so were rooted in his conviction that the environment of southwest Yukon was primarily grassland, rather than boreal forest, until well after the onset of the Northern Archaic (Workman 1978:428). More recent palaeoecological studies (cf., Keenan and Cwynar 1992, Cwynar 1988), however, indicate that grasslands in Southwest Yukon during the mid-Holocene were no more extensive than they are today, undermining Workman's initial assumption.

In more recent years, other authors have challenged the concept of a large-scale population migration following the northward advance of boreal forests. At issue is the totality of technological change from microblade assemblages to the Northern Archaic, reported by Anderson at Onion Portage and Workman in Southwest Yukon to be dramatic and complete. Clark (1992) argues that there is considerably more regional diversity in the Northern Archaic than commonly recognized, and that in addition to "pure" Northern Archaic assemblages there are numerous examples of assemblages that amalgamate microblade technology with the Northern Archaic. He also challenges the assumption that the Northern Archaic is directly traceable to the Archaic Tradition of the Plains.

> Most Northern Archaic characteristics developed locally and then spread within the region with differing degrees of acceptance and persistence. Early within this ongoing development the attribute of notched points was added to what was, at that time, a base of cultures in the northern cordilleran region. That possibly was the only trait for which southern or plains origin need be sought, and even the possibility of stimulus or wholly independent development cannot be ruled out. (Clark 1992:95)

Clark and Morlan (1982:36) recognized considerable technological amalgamation and trait diffusion throughout the mid-Holocene, including the co-occurrence of microblades and notched points, and they characterized the Northern Archaic as a late phase of the Northwest Microblade Tradition. Within this context, certain localities simply lacked the characteristic microblade technology.

Morrison (1987:67) also found the population migration hypothesis untenable and argues that the archaeological evidence from the Mackenzie Valley does not support the claim that the region was an integral corridor of migration from the Plains to the

Northwest. Rather, he states, the regional archaeological sequence suggests that there was a long established tradition of boreal forest adaptation in the Mackenzie Valley into which diffused a few isolated technological traits such as notched points. He argues that the diffusion of these few traits does not represent the introduction of a new economic way of life, as suggested by the term Northern Archaic Tradition, and instead prefers the designation of Middle Prehistoric period (ibid. :74).

Late Prehistoric

As outlined by Workman, most researchers agree that the Northern Archaic and Northwest Microblade traditions gradually evolved into the Late Prehistoric Athapaskan Tradition (Anderson 1968b:28), and while there was considerable regional variability there is evidence for continuity in terms of technology, settlement and subsistence patterns. Characteristic elements of the Late Prehistoric period include increased emphasis on bone and antler tools, including multi-barbed bone points, as well as *pièces esquillées*, native copper tools, and small stemmed lithic arrow points, known as Klo-kut points (for discussion of tool types see Clark 1981:117, Greer and Le Blanc 1984:33).

In southern Yukon, the beginning of the Late Prehistoric Tradition is rather arbitrarily defined by the eruption of Mount Bona, resulting in the White River ash fall about 1250 BP (Lerbekmo et al. 1975). While there is no evidence that the volcanic event contributed directly to a change in technology, it may have affected the population base of the area. Workman was convinced that there was cultural continuity before and after the ashfall; however, he agreed with MacNeish's interpretation of the archaeological data (1964:383-386) that suggested a sparser population in southern and central Yukon after the ashfall (Workman 1978:126).

Chapter 4

The Physical Setting of the Annie Lake Site

The Annie Lake Site (JcUr-3) is located at the northwest end of Annie Lake, on the Annie Lake Road, approximately 40 km south of Whitehorse and 35 km north of Carcross (see Fig. 1:1, Plate 4:1). It is situated on a glacio-lacustrine bench, approximately 10 m above the lake (see Plates 2:1, 2:2). The bench appears to be the third and lowest of a series of glacio-lacustrine shorelines at the north end of the Corwin Valley; similar palaeo-shorelines are evident on the west side of the lake valley. At its eastern end the terrace is approximately 80 m long and 10-15 m wide with a gradual rise. It terminates abruptly to the east of JcUr-3 as it becomes incorporated into the steep slope of a higher terrace (see Fig. 4:1). The excavations discussed in this report were concentrated within a shallow gully immediately to the west, and in the leeside, of the higher hill. These excavations were located 70 m east of the site datum for 1982 excavations. The locality does not provide the panoramic view available from nearby, higher knolls, but is slightly more protected from the prevailing southern winds.

It appears that throughout the Holocene era, aeolian sand and silt sediments from the Wheaton and Corwin valleys were regularly deposited at the north end of the lake, and within the protection of this shallow gully they have accumulated to depths often in excess of 1.5 m. Within this area it appears that the most intensive deposition is localized in an area of approximately 8 x 8 m, with aeolian deposits becoming markedly thinner outside of this perimeter.

The vegetation in the vicinity of the site consists of open stands of lodgepole pine, white spruce and stunted poplar. The understory is almost completely open with occasional shrub birch, grasses and herbs. Excavations were carried out around several large spruce and pine trees and it was necessary to cut down several small poplars.

Previous excavations and testing indicated that most of the northwest corner of the lake, even that only marginally suitable, was at one time occupied or utilized by humans.

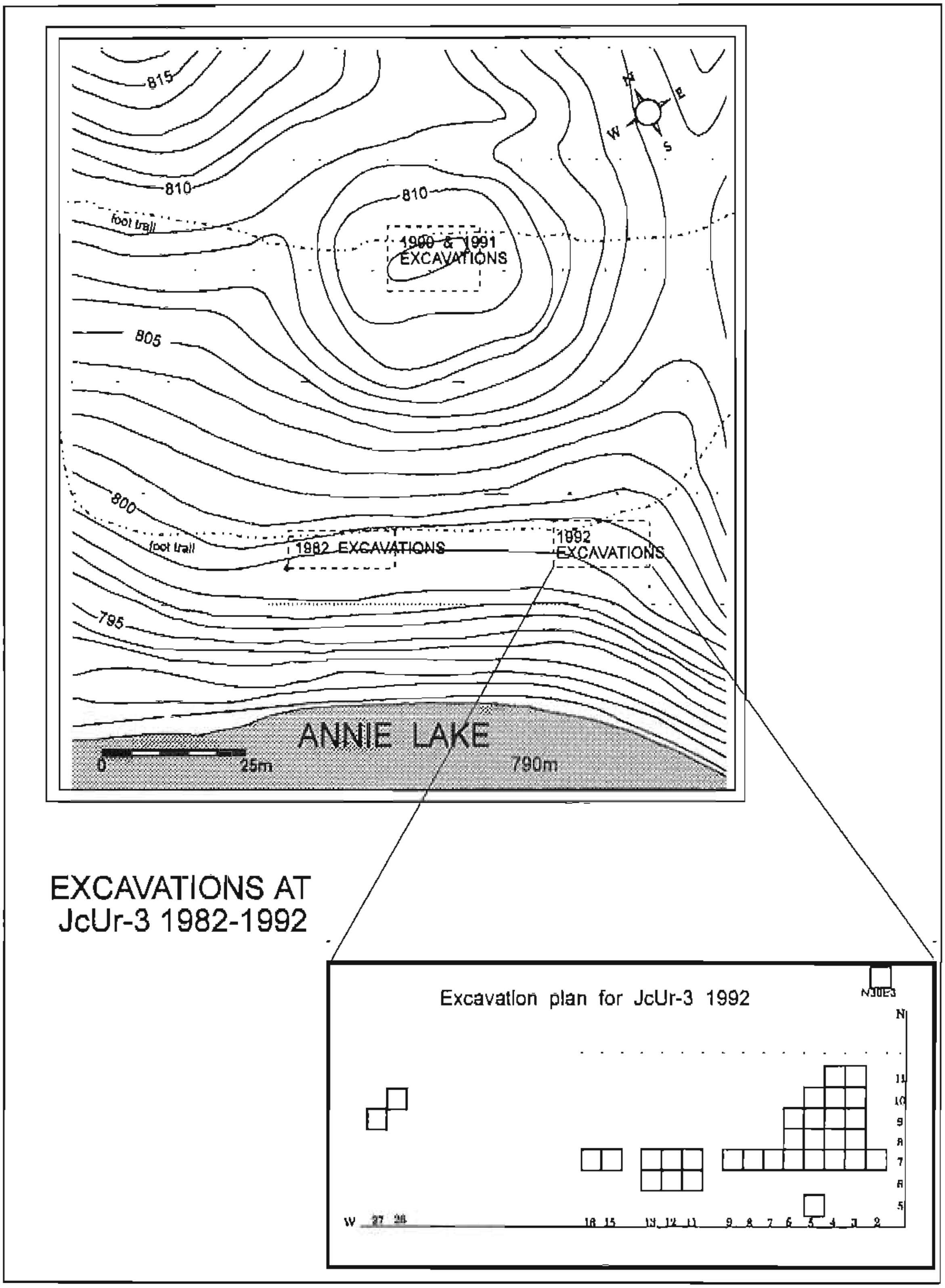


Figure 4:1 Excavations at Annie Lake 1982-1992

Plate 4:1 Annie Lake, Yukon.General view of Annie Lake from the north end of the lake looking south.

Plate 4:2 View of well stratified aeolian deposits at JcUr-3.

Over the course of the 1990, 1991 and 1992 field seasons, every test hole dug in the broad vicinity of JcUr-3 contained buried cultural material. Testing to the east was constrained by the presence of a dwelling and private property; however, lithic debitage was evident around the base of the cabin and to the east of the property line.

Excavation Procedure

The new locality of JcUr-3 was discovered through good fortune rather than design. During the 1991 field season, a development application was received by the Government of Yukon to construct an access road across JcUr-3 to the neighbouring cabin. It was while testing for an acceptable route that the new locality was discovered in a small gully within the shelter of a high knoll. The discovery of cultural material in association with well stratified and deeply buried palaeosols formed the basis for the 1992 excavation strategy.

The primary reason for focusing on this locality was the well defined stratigraphy that allowed precise determination of cultural associations with various soil horizons. It was possible to identify continuous palaeosols over many metres, and while there was frequent merging and bifurcation of some palaeosols, the area nonetheless provided a far more reliable environment for archaeological interpretation than all other previously tested localities on the terrace.

The area of deep soil deposits had been identified by two shovel tests in 1991. These tests had been placed near the central, level area of the eastern edge of the terrace (see Plate 4:3). A grid system of one metre units was laid out over an area measuring 20 x 20 m. The grid was oriented along a magnetic north-south axis, tied in to a legal land survey marker at the southwest corner of an adjacent titled property, 15 m west of the excavation. The datum was inserted at the North 0 East 0 point (i.e., the southeast corner of N1W1) and all site measurements were taken from this point. Distances to previous excavations at JcUr-3 and JcUr-3a were measured but no attempt was made to use a common datum.

An exploratory series of 1x1 m units, one metre apart, were excavated across the front of the bench for a distance of 15 m, in an east-west orientation. After soil depths and artifact distribution patterns were determined, greater emphasis was placed on excavations within the small gully, on the eastern quadrant of the site, on the lee side of a high knoll. Within this gully, soil deposits were considerably deeper (> 100 cm) and palaeosols were better defined than in peripheral areas. From a total of 33 units excavated at the site in 1992, approximately 14 were located within the gully area (see Plate 4:3). Several other localities in the immediate vicinity were also tested to determine site activity areas. The general layout of the site and unit excavations are shown on the accompanying sketch map (see Fig. 4:1).

The site was excavated by trowel in 1x1 m units. All backdirt was screened through 3 mm utility screen. Lithic artifacts larger than 1x1 cm in size, including fire-cracked rock, were plotted three dimensionally on floor plan sheets. In several squares with extreme artifact density, artifacts were bagged and given lot numbers. Similarly, small lithic pieces and bone were recorded and bagged collectively by level and square. String and line levels were used to record the vertical provenience of artifacts. No site vertical datum was established as all vertical measurements were taken with reference to both the surface and the White River ash lens that was present throughout the site. These reference points provided relatively stable and reliable points of comparison for adjacent squares, but over greater distances the thickness of soil deposits varied considerably, ranging from approximately 35 cm to 135 cm, making comparisons difficult. Palaeosols were identified, numbered (B1- B6) and used as an additional point of reference. This proved effective for adjacent or nearby squares; however, palaeosols occasionally bifurcated or merged, making comparisons unreliable over long distances.

Problems

The principal problem encountered was that of cultural association with specific palaeosols. For the reasons given, it was occasionally difficult to determine precisely an artifact's relationship to a previously identified and numbered soil horizon. This was not generally a problem in the main area of excavation, where five palaeosols were noted in most squares, but rather in the peripheral areas where the number of identifiable soil horizons was often reduced to three and even two buried soils.

Minimal cryoturbation was observed at the site, although lithic artifacts were occasionally recovered on edge, indicating some frost movement. Refitting of fragmented tools indicated that horizontal movement of up to three metres occurred, but vertical separation was usually confined to a few centimeters, and only in two observed cases were refitted tools recovered from two different palaeosols. Bioturbation, usually from arctic ground squirrels, was observed and noted in several squares, but it appears to have had little consequence on artifact provenience. Significant soil disturbance of unknown origin was noted in the lower levels of squares N6W11 and N6W12, seriously impairing the archaeological value of several important tools recovered there (see Plate 4:4).

Natural and Cultural Stratigraphy

Sediment composition at JcUr-3 is primarily aeolian sand and loess. Particle analysis conducted by A.E.S. Smith, soil scientist with Agriculture Canada, indicated that only the basal sands, immediately on top of glacial gravels, were water-laid; the rest were wind-blown deposits (see Table 2). It appears that since the time of deglaciation, prevailing southerly winds have deposited sand and loess from the Wheaton and Corwin valley at the north end of Annie Lake. This deposition is especially pronounced within the shelter of the shallow gully at JcUr-3.

At the main excavation area there were as many as five identifiable buried Brunisols with a poorly defined sixth palaeosol in some of the squares. Moving away from the central area, several of the Brunisols coalesce as soil deposits become thinner. The Brunisols, in most cases, were separated by broad bands of beige loess, quite distinct from the rich, red/brown organic colour of the palaeosols. Based on the multiple horizons evident in the stratigraphic profile, it is evident that throughout the Holocene, environmental conditions conducive to the development of organic soils were periodically interrupted by events that initiated large-scale loess deposition (see Fig. 4:3). North and east wall profiles are shown in Figures 4:4 and 4:5.

Plate 4:3 Excavations at JcUr-3, Annie Lake, Yukon.

Plate 4:4 Bioturbated soil horizons at N6W11, JcUr-3.

From top to bottom, the natural and cultural stratigraphy consisted of eight levels, including six Brunisols. Level 1 was a thin dark humus layer, usually less than 5 cm thick. During the field season this humus was very dry and fine, and was held together by a thin net of surface roots. Minimal surface disturbance often exposed Level 2 - the White River ash lens. This ash layer, a ubiquitous stratigraphic feature throughout southern and central Yukon, is dated to approximately 1250 years ago (Lerbekmo et al. 1975). The ash is discontinuous but present over most of the site, varying in thickness from 0 to 8 cm. Culturally, the White River ash marks the beginning of the Late Prehistoric period of southern Yukon prehistory. Lithics, fire-cracked rock, burned bone and charcoal were recovered from Level 1 and the top of Level 2. Artifacts from near the base of the ash were usually attributed to the third level, depending on raw material and association.

Levels 3 through 8 were the Brunisols identified stratigraphically below the White River ash. Each Brunisol was given its own designation B1 to B6 in the field, and this was the primary basis for cultural association.

Level 3 (B1) was located immediately below the White River ash, with no intervening loess horizon. It was composed of red/brown sandy silt, varying in thickness from 4-8 cm. Culturally, this level represented the most substantial material assemblage, containing more than 90 percent of all lithics, several hearths, charcoal, burned bone and other enigmatic cultural features. It was present throughout the site.

Level 4 (B2) was separated from Level 3 by a 3-8 cm band of beige loess in most of the squares. It was composed of red/brown sandy silt and was distinct from Level 5 (B3) in only a few squares in the centre of the gully. In adjacent squares the two levels coalesced. This level contained lithics, several possible hearths, charcoal and very little preserved bone.

Level 6 (B4) was separated from Level 4 and 5 by an at times broad band of beige loess, as much as 20 cm thick. Its colouration was less distinct than the other palaeosols, and was typically a light brown sandy silt, approximately 5 cm thick. Culturally, this

Profile from north wall of N7W4

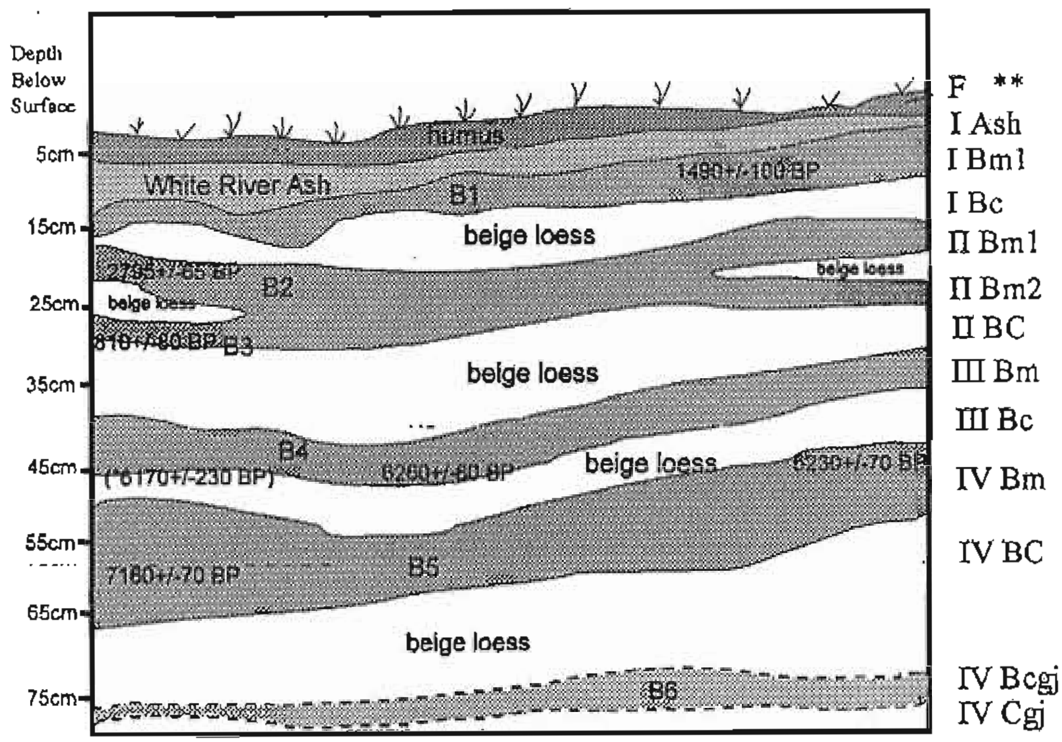


Figure 4:2 Schematic Representation of JcUr-3 Stratigraphy and Chronology

dates obtained from 14C samples
* from disturbed stratigraphy
** see Table 2

horizon was virtually sterile, except for a few lithics recovered near the base.

Stratigraphically and techologically, Level 7 (B5) was the most distinct Brunisol. It was a deep red/brown sandy silt, 8-16 cm thick and was present throughout the site. It was separated from Level 6 by a 7-10 cm band of beige loess and was underlain by a similar soil. Culturally, this horizon contained distinctive microlithic tool technology.

Level 8 (B6) was almost indiscernible as a Brunisol. Located 15-20 cm below B5, it showed only faint traces of rust-coloured organic staining. However, during soils analysis, it was established that this was a weakly developed Brunisol (see discussion in following section). Only one artifact was clearly associated with this horizon, a large blade tool.

Chronology

The stratigraphy of the Annie Lake site revealed multiple organic soil horizons developed since the time of deglaciation. In order to establish the chronology of the soil development and refine chronological understanding of the prehistoric record of southern Yukon, seven charcoal or bone samples were submitted to Beta Analytic Laboratories for processing and radiocarbon dating. All but one of these were selected from the main area of the excavation, within the gully, and were associated with a diagnostic artifact or a cultural feature. The seventh sample came from an outlying square N6W12, in association with a enigmatic lithic artifact.

Below the White River ash, there was very little organic preservation at the Annie Lake site. Faunal remains were rare and charcoal samples were usually small and heavily decomposed; however, discernible charcoal was present in most palaeosols. Such hearths as could be identified usually consisted of bright orange sands with black staining. Of the seven samples submitted, it was necessary to process four through accelerator mass spectrometry and give extended counting time to a fifth.

The radiometric dates are listed stratigraphically in the following table as C-14 age years B.P. ± 1δ, as provided by the laboratory (see Table 1). The calibrated dates (one sigma) follow the radiocarbon dates. Calibrations are derived using the calibration program (ver. 3.0.3) of Stuiver and Riemer (1993).

It should be noted that many of the calibrated dates given here are substantially older than the conventional radiocarbon dates presented; this is especially the case with the more ancient dates. This non-correspondence is related to fluctuations in ^{14}C in atmospheric CO_2 that has been shown to vary over time (Stuiver and Riemer 1993). By comparing radiocarbon ages with tree rings of known ages, a calibration dataset had been developed which converts conventional radiocarbon dates into calibrated years within the range of dendrochronologic records; however, recent advances in radiocarbon calibration (see Stuiver and Riemer 1993) have now made it possible to calibrate conventional radiocarbon dates back to approximately 20000 years. These new techniques have also shown that there was greater variation in early Holocene and Pleistocene atmospheric ^{14}C than previously estimated (Stuiver and Riemer 1993). While allowing for more accurate dating, new calibrations have resulted in a certain degree of confusion in presenting radiocarbon dates. From the Annie Lake data, it can be observed that ^{14}C dates of approximately 2800 BP correspond well with calendar dates, while radiocarbon dates of approximately 6000 to 7000 BP underestimate calendric age by about 900 years. Consequently, an obtained ^{14}C date of 6260±80 BP has a one sigma calibrated range of 7320-6940 BP with a probable calendar date (at the intercept) of 7175 BP. The calibrated date is expressed as "calibrated years BP" (cal yr BP) and is roughly equivalent to a "years ago" date. Recently published results from the Mesa site in Alaska (Kunz and Reanier 1994) indicate that conventional radiocarbon dates of approximately 12000 BP from that site underestimate calendric age by almost 2000 years. This would place the earliest evidence of human occupation in Alaska at about 14000 years ago, but would also mean that early sites in the mid-continent must be recalibrated to reflect new understandings of ^{14}C atmospheric fluctuations. According to Darden Hood, of Beta Analytic, there are numerous problems inherent in calibrating or re-calibrating existing radiocarbon dates to make them comparable with recently obtained dates. If previous laboratory methods or controls are not known, proper calibrations cannot be performed, and such radiocarbon dates can only be discussed rather than compared (Darden Hood personal communication 1994).

These limitations must be kept in mind while reviewing following sections where radiocarbon dates from JcUr-3 are compared or discussed in relation to existing dates for the Northwest and the Yukon. For the sake of clarity, all dates expressed with a BP designation will be uncalibrated dates and calibrated dates will be expressed as cal yr BP. Estimated ages, not based on radiocarbon dating, will be expressed as "years ago" or "years old."

Discussion of Chronological Sequence

When viewed in stratigraphic sequence, there appear to be several inconsistencies with the radiocarbon dates that require clarification. The date of 810±80 BP for B3 must be considered spurious, as this soil horizon underlies the White River ash, dated at 1250 BP (Lerbekmo et al. 1975), and two other samples with greater antiquity. The date was obtained from a 12 gm sample of highly fragmented, small mammal bone, and while these were originally thought to be burned, they must now be considered as *in situ* remains of a burrowing rodent, probably ground squirrel.

Three other dates from two soil horizons cluster around 6200 BP. The first was taken from N6W12 at a depth of 36 cm below the surface. The stratigraphy of this, and neighbouring squares was truncated when compared with those within the gully area, and was heavily disturbed at the lower levels in this particular unit. The date was obtained from a small charcoal sample within a red/brown palaeosol remnant, overlying the distinctive red Brunisol identified as B5. While the overall stratigraphy of the unit is not reliable, this date can reasonably be assumed to relate to the B4 palaeosol.

A date of 6260±80 BP was obtained from an apparent hearth at the base of B4 in square N8W4. A large charcoal sample was taken from bright orange soil about 42 cm below surface, in association with a fragment of a large utilized flake; however, the rest of the horizon contained very little cultural material. Two other fragments of the same tool were recovered from N9W6 in the B5 horizon.

Table 1: Radiometric Dates from JcUr-3

Lab Number	^{14}C Date	Calibrated Ages	Provenience
Beta-57943	**1490±100 BP**	1562-1194 BP probable intercept **1350 cal yr BP**	Charcoal from bottom of B1 in association with a large boulder feature.
Beta-57948 ETH-10034	**2795±65**	3069-2760 BP probable intercept **2868 cal yr BP**	Pooled sample from near top of B2, 15-20 cm below surface.
Beta-57942 CAMS-4559	**810±80 BP**	919-577 BP probable intercept **705 cal yr BP**	Small mammal bones in association with B3.
Beta-57945	**6170±230 BP**	7516-6485 BP probable intercept **7079 cal yr BP**	Small charcoal sample from 36 cm below surface N6W12. Stratigraphy disturbed.
Beta-58947	**6260±80 BP**	7320-6940 BP probable intercept **7175 cal yr BP**	Bottom of B4. 42 cm below surface.
Beta-57946 CAMS-4561	**6230±70 BP**	7235-6911 BP probable intercept **7105 cal yr BP**	Pooled sample from B5, 35 cm below surface.
Beta-57944 CAMS-4560	**7160±70 BP**	8103-7802 BP probable intercept **7930 cal yr BP**	Charcoal from B5, 55-60 cm below surface.

A third date of 6230±70 BP was obtained from a pooled sample of charcoal in direct association with a microblade in square N7W3, 35 cm below surface. In this square, only four palaeosols were evident, and from the longitudinal wall profile (see Figure 4) it is clear that this is the same horizon as B5 in N7W4. While these last two dates are out of sequence, the difference in ages is smaller than the error associated with either date.

A charcoal sample from a probable hearth in horizon B5 of N7W4 provided a date of 7160±70 BP. Several microblade fragments were recovered in the vicinity in the same square, and although the overall microblade assemblage of the site was small (n=7), all were recovered from the distinctive red/brown horizon identified as B5. A range of 7100 BP to 6200 BP has been obtained for B5. Horizon B4, which contained very little cultural material, also provided two dates of ca. 6200 BP. It must be inferred, therefore, that there was significant loess deposition event at this time which provided the separation between the two palaeosols.

Soil Chemistry Analysis

Chemical analysis of the Annie Lake sediments was conducted by A.E.S. Smith, soil scientist with Agriculture Canada. The analysis provided a valuable scientific counterbalance to the traditional, and at times subjective, archaeological practice of identifying palaeosols on the basis of soil colouration. Smith reported that each of six Brunisols identified had distinctive chemical signatures when compared to the loess horizons. Specifically, there was increased carbon with reduced pH levels within the Brunisols (see Table 2 and Appendix II), which he attributed to increased organic activity and increased weathering (Scott Smith personal communication 1993). He suggested that an increase in grasses was the probable agent for elevated carbon levels.

Smith noted that B2 and B3 displayed intense weathering, significantly more than the other palaeosols. Brunisol B4, despite moderate colouration, was only weakly developed, and B5, which had appeared to be the most distinctive palaeosol, was less developed than B1, B2 or B3. At the time of Smith's site visit, a sixth Brunisol (B6) had yet to be identified, either culturally or by colouration; however, his analysis revealed a weakly developed palaeosol at 78-83 cm below surface.

Figure 4:3 Excavation Trench N7W2-N7W5

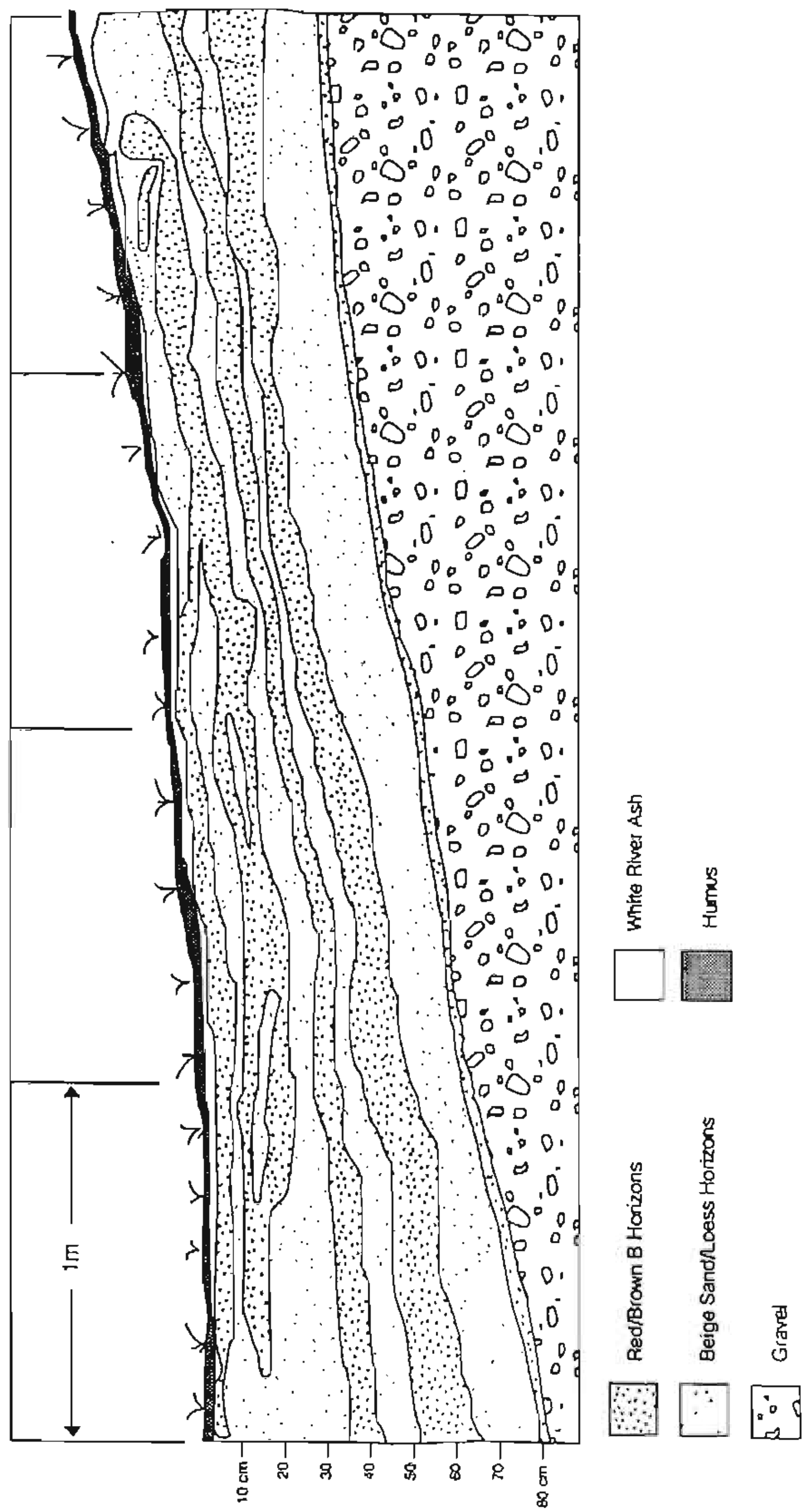
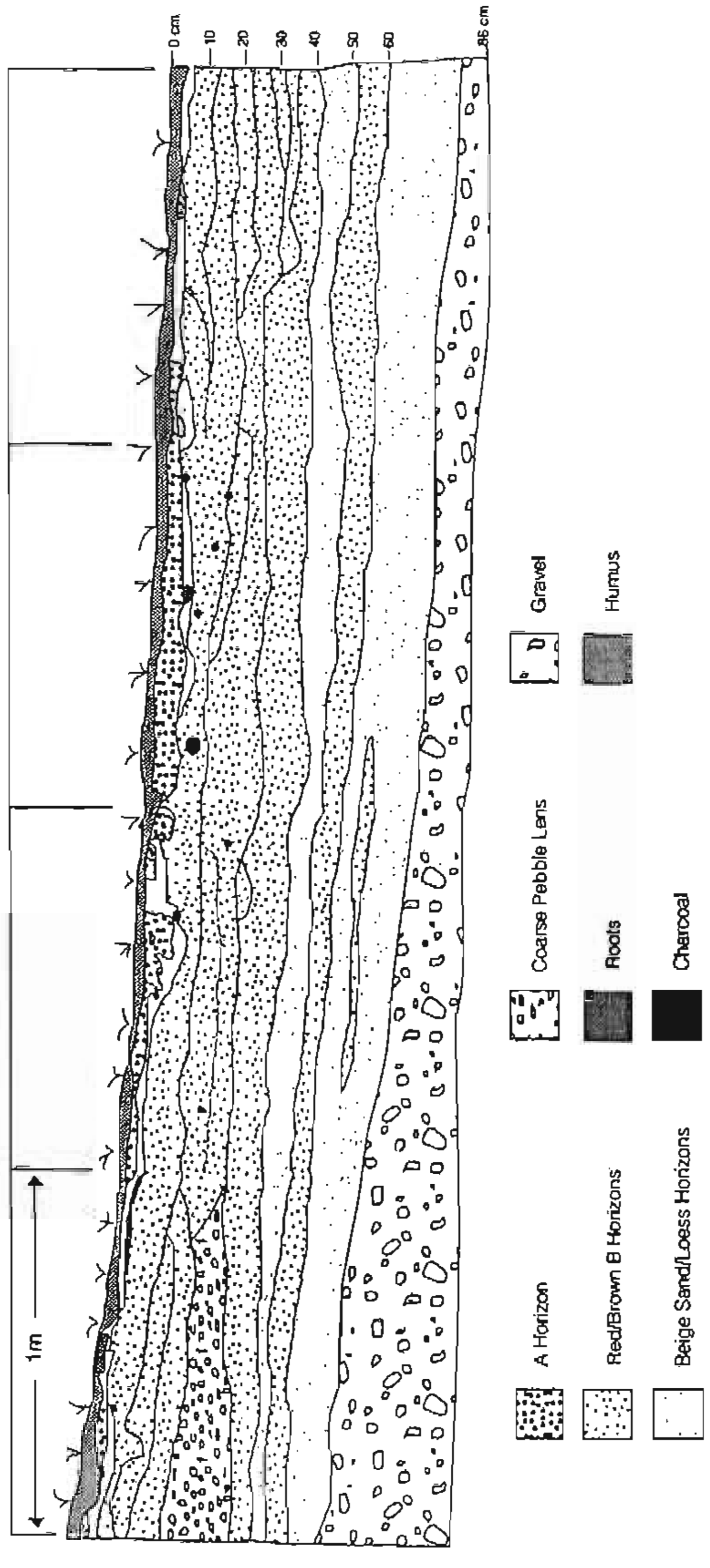


Figure 4:4 Excavation Trench N8W3-N11W3



Particle size analysis also provided much useful information. Smith reported that the majority of the sediment deposits at the site were aeolian in nature, with fluvial sands being encountered only at depths in excess of 94 cm. However, subtle differences were noted within the aeolian regime that distinguished the Brunisols. Each Brunisol displayed decreased percentages of sand and increased percentages of silt, compared to the overlying and underlying soil horizons (see Table 2). Smith indicated that these particle differences could be linked to fluctuating environmental conditions, with increased sands indicating periods of high energy wind deposition and increased silts indicating less wind and a more stable environment.

In comparing the Brunisols, Smith noted that particle signatures of B2 and B3 were similar enough to suggest that they constitute a single soil. The weakly developed B4 horizon contained a higher percentage of sand, suggesting that moderate sand deposition may have continued throughout the soil weathering process. The other Brunisols were distinctive only in that they represented periods of environmental stability when compared with the sand-dominated horizons. (For information on methodology and interpretation of Table 2 see Appendix II.)

Palaeoenvironmental Reconstructions

The nature of the environmental change that initiated these major depositional events at the site is uncertain. During the past 8000 years, it appears that stable vegetative regimes and soil weathering processes were interrupted at least four times by significant depositional loess events. While such loess accumulations should be the result of aeolian activity within a region having abundant surface exposures, such as conditions associated with a periglacial environment and the subsequent exposure of glacio-lacustrine sands, there is no evidence to support recurring glacial advances throughout the Holocene in south-central Yukon. Another possible explanation for large scale surface exposures is one of climatic conditions with substantially reduced effective moisture, eventually leading to minimal vegetative cover. Pollen studies were conducted at JcUr-3 in an attempt to assess changing environmental conditions.

Table 2: Chemical and physical properties of site JcUr-3 (N7W4) at Annie Lake, YT. The roman numerals placed before the horizon designators signifies discrete soil formation sequences. Within this profile there are four formation sequences which represent three buried palaeosols and the surface contemporary soil.

Horizon	Depth (cm)	pH ($CaCl_2$)	%C	%N	Oxalate-ext		Total CEC (me/110g)	% Sand	% Silt	%Clay	Class
					Fe%	Al%					
F	4-0	5.6	20.9	0.72	-[1]	-	61.0	-	-	-	na[2]
I Ash	0-2	5.1	2.01	0.09	0.17	0.10	5.75	48.3	45.5	6.2	Sandy Loam
I Bm1	2-8	5.0	0.38	0.03	0.28	0.13	1.88	89.6	6.1	4.3	Sand
1 BC	8-14	5.0	0.19	0.02	0.21	0.11	1.75	90.7	5.3	4.3	Sand
II Bm1	14-19	4.8	0.42	0.04	0.45	0.20	2.75	88.1	8.5	3.4	Sand
II Bm2	22-25	4.9	0.23	0.01	0.40	0.14	2.50	88.2	8.8	3.1	Sand
II BC	25-39	5.0	0.09	0.06	0.25	0.08	1.63	89.6	7.3	3.1	Sand
III Bm	39-43	4.8	0.13	0.02	0.25	0.12	1.25	93.0	3.9	3.1	Sand
III BC	43-50	5.2	0.07	0.01	0.11	0.10	1.00	95.6	2.6	1.8	Sand
IV Bm	50-63	5.1	0.16	0.01	0.29	0.17	1.38	89.5	8.2	2.3	Sand/L.sand
IV BC	63-78	5.2	0.05	0.01	0.11	0.12	0.50	94.8	3.4	1.8	Sand
IV Bcgj	78-83	5.3	0.07	0.01	0.11	0.13	0.75	92.1	6.1	1.8	Sand
IV Cgj	83-106	5.2	0.06	0.01	0.06	0.12	0.50	96.9	1.7	1.4	Sand

[1] - not determined; [2] - not applicable.

Soil samples from the Annie Lake site were processed for palynological data by Dr. L. Cwynar, University of New Brunswick (see Plate 4:5), but they contained so little pollen as to be of no palaeoecological value. Cwynar suggested that high sand content of the soil caused water to percolate rapidly through, oxidizing pollen and plant macrofossils (Les Cwynar, 1993 personal communication).

The nearest palynological data come from Kettlehole Pond, 80 km to the southeast of Annie Lake (Cwynar 1988), and provide a history of vegetation at that location dating back to 11300±100 BP. The pollen diagram indicates that in the late Pleistocene, southwestern Yukon supported a *Populus* woodland with an understory of *Shepherdia canadensis*, and *Artemesia* dominating extensive open areas. This community persisted from 11300 to 9250 BP. Cwynar interprets this as a period of aridity, when summer warmth was greater than that of the modern climate. Beginning at 9700 BP, *Juniper* populations expanded with *Picea glauca* populations increasing 450 years later and becoming the dominant vegetation. This appears to indicate a period of increased effective moisture (ibid. :1270), which increased still more from 6100 to 4100 BP when *Picea glauca* was replaced by *Picea mariana*. Beginning at 4100 BP, the area became more arid, and *Picea glauca* and *Juniper* became prevalent once again, eventually culminating in the modern semi-arid climate, dominated by *Pinus contorta* by 1900 BP (ibid.).

If these data accurately reflect the regional patterns of vegetation and climate in south-central Yukon during the Holocene, they do little to explain the stratigraphy of JcUr-3. While there may be some correlation between the regime of increased moisture at 9100 to 6100 BP and the distinctly weathered B5, the further increase in moisture from 6100 to 4100 BP correlates poorly with two broad loess horizons and a weakly developed B4 palaeosol. Indeed, the most weathered soil horizon, B2/3, had a particle signature suggesting the most quiescent environmental conditions of the Holocene; yet this occurs within the period identified at Kettlehole Pond as one of increasing aridity, which should have reduced vegetative cover and increased loess accumulation.

Plate 4:5 Dr. Les Cwynar, on right, sampling pollen at JcUr-3, with G. Hare.

Plate 4:6 Flake cluster and large boulder feature at JcUr-3. White River ash can be seen in the background wall profile.

Perhaps a more likely explanation lies in local, short-term ecological fluctuations rather than the long-term climatic fluctuations reflected in the pollen record. Scott Smith (personal communication 1992) suggested the possibility of large scale forest fires which may have episodically burned through the Watson/Wheaton valleys, denuding the landscape and initiating periods of extensive loess deposition. While it is difficult, from the limited suite of radiocarbon dates, to determine the rate of loess deposition, there are indications that depositions may have been rapid and short-term events. Only the loess horizon between B4 and B5 has been chronologically bracketed; and here the bottom of B4 is virtually contemporaneous with the top of B5, despite a 7 to 10 cm band of loess separating the two.

Cultural Features at JcUr-3

As is somewhat typical of southern Yukon archaeology, the acidic soil conditions at JcUr-3 were not conducive to the long-term preservation of organic materials. This resulted in the recovery or identification of only a limited scope of cultural and biophysical features—principally lithic materials resulting from tool manufacture/maintenance and some hearth features. Such faunal remains as were recovered were almost entirely limited to the post-ash strata (less than 1250 BP) and were primarily concentrated near two hearth features at N30E3 and N6W12. Here, approximately 325 fragments of burned and heavily decomposed bone were recovered, of predominantly small- and medium-sized mammals. Below the White River ash, faunal remains were very rare. As previously stated, the one attempt to date faunal remains radiometically from below the White River ash resulted in a spurious date of 810±80 BP for small mammal bones, indicating the bones were those of a rodent that had died in its burrow. No other identifiable faunal remains were recovered below the ash. The results of faunal analysis fall outside the scope of this work; however, in the absence of faunal remains beneath the White River ash, three stone tools from the lower horizons of JcUr-3 were submitted for blood residue analysis at the University of Calgary. A projectile point (JcUr-3:2788) and a hammerstone (JcUr-3:2852) both produced non-specific reactions (possibly false positives) while a biface from the 1982 excavations (JcUr-3:852) tested positive to *Lagomorpha* antiserum, indicating the presence of hare or pika blood (Newman 1994).

Even general hearth features were often difficult to distinguish in strata under the White River ash. As discussed in Chapter 6, fire-cracked rock (FCR), often associated with hearths and cooking fires in the Late Prehistoric period, was rare below the ash. Such hearths as were recognized were identified principally on the basis of burned red/orange soils with black smudges of charcoal and carbon.

The largest and most enigmatic cultural feature at JcUr-3 was a large concentration of boulders located immediately below the ash in the centre of the gully area (see Fig. 4:5, Plate 4:6). While spanning both the B1 and B2 cultural horizons, this feature appears most likely associated with the B1 horizon, which contained the densest accumulation of cultural material at the site. Here, more than 100 large rounded cobbles have been piled together in a rough circle with the densest concentration near the centre (approximately N9W4). Most are rounded river cobbles, often roughly the size of small grapefruit. A minority appear to have been heated or burned and there is charcoal in association with some areas of the feature. Charcoal submitted from here provided a date of 1490±100 BP. Carcross-Tagish elder Mrs. Dora Wedge suggested the feature may be the remains of a sweat lodge. Given the proximity to water and the circular arrangement of the stones, this idea is feasible; however, the abundance of nearby debitage indicates the area was also used extensively as a lithic work station. Furthermore a number of tools located in the area show evidence of thermal fracture.

Several other small cultural features were observed during the 1992 excavations. These include two ochre deposits and two small nuggets of molybdenite. A small concentration of powdered red/brown ochre was noted in the humus around N9W4, adjacent to a presumed hearth. According to McClellan, people used ochre for many purposes in southern Yukon including the dressing and staining of hides (McClellan 1975:256).

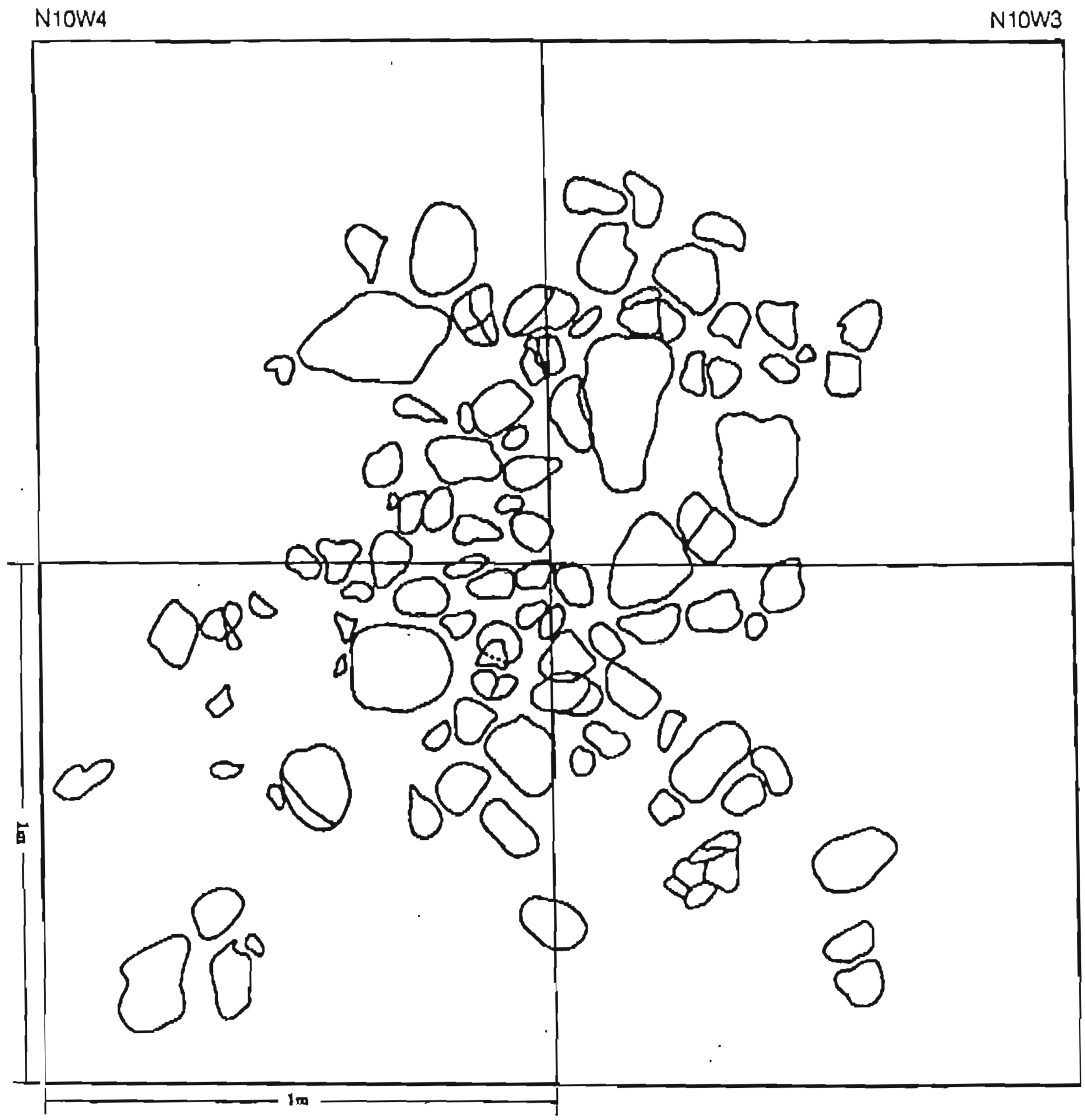


Figure 4:5 Boulder Feature from JcUr-3

Chapter Five
Lithic Industries

The lithic assemblage of JcUr-3 consisted of 15,476 artifacts. At first glance this would appear to be a robust and informative sample size; however, more than 90 percent of the artifacts were of a single, coarse-grained raw material, largely confined to the uppermost two horizons and probably representing a single, or short term, flaking episode. These and the remaining approximately 1000 flakes were recovered from 33 excavation units, that ranged in depth from 35 to 150 cm below surface before glacial gravels were encountered. Furthermore, only 76 tools or utilized flakes were identified in the entire assemblage, with many having no diagnostic significance. Two approaches were employed in analysis of the lithic assemblage of JcUr-3—technological and typological, or descriptive. All debitage was analyzed technologically, with tools being described and classed according to type.

Raw Materials

Twenty raw material types were recognized at JcUr-3, comprised primarily of varieties of chert. Inter-level comparisons indicate that the debitage assemblages of the two uppermost horizons, Humus and B1 were dominated by coarse-grained cherts, while fine-grained cherts and other silicates were best represented at lower levels. For a list of major raw materials see Table 3; distribution of raw material for each level is shown in Fig. 5:1.

Coarse black chert, located almost exclusively in the top two horizons, accounts for approximately 94 percent of the entire site assemblage (14,512 flakes). The large number and large size of flakes suggests that the material was probably quarried locally in tabular blocks and transported to the site for further reduction. However, only 13 of 76 artifacts in the tool/utilized category (mainly crude biface fragments) are of this raw material, suggesting that the material was not as well-suited for stone tool manufacture as the more siliceous cherts. Numerous high quality raw materials were present in small numbers in the upper two horizons, including various cherts and quartzite.

Table 3: Summary of Raw Material at JcUr-3
For All Excavated Squares and for 10 Squares Selected for Analyses

Raw Material/All Sq.	**Quantity/All Sq.**	**Weight/All Sq.** (grams)	**Quantity/10 Sq.**	**Weight/ 10 Sq,** (grams)
Black Chert	52	17.52	39	5.13
Black Obsidian	32	13.29	23	7.33
Brown Chert	11	10.32	4	5.1
Brown Siliceous Material	50	118.46	8	24.72
Coarse Black Chert	8212	6436.51	303	676.62
Dark Grey Chert	176	27.79	166	17.63
Fine Grained Quartzite	108	6.61	108	6.61
Fine Black Chert	46	142.04		
Granite	4	2.40	3	2.38
Grey Chalcedony	2	2.24		
Grey Chert	163	71.64	131	30.17
Grey Siliceous Material	224	76.87	173	13.63
Grey/Green Chert	19	16.04	7	7.42
Miscellaneous Flakes	6300	1249.65	1833	340.83
Quartz	1	0.14	1	0.14
Quartz Crystal	4	2.42	2	.19
Quartzite	11	69.47	6	31.19
Red Chert	2	0.14		
Translucent Grey Chert	1	0.02		
Vitreous Black Chert	53	48.98	35	14.88
Vitreous Grey/White Chert	4	0.07		
White Quartz	1	1.02		
Totals	**15,476**	**8313.65**	**2842**	**1183.97**

It is noteworthy that the only obsidian recovered at JcUr-3 was from the Humus and B1 horizons, despite reports of natural obsidian finds on adjacent Grey Ridge to the east. (Craig Hart 1993 personal communication).

Levels B2, B3, B4 and B5 were characterized by small assemblages of siliceous materials and fine-grained cherts, notably dark grey chert in B2 and grey and brown silicates in B3 (see Fig. 5:1). Several large concentrations of coarse-grained black chert were recorded as coming from B2, but in these squares the stratigraphy is considered unreliable and it is likely that these artifacts properly should be considered part of the B1 component. As there is a correlation between raw material and the lower soil horizons, the majority of high quality raw materials observed were concentrated within those dozen squares at the east end of the site, which contained deeper deposits and more palaeosols. Figures 5:3-5:7 summarize the distribution of artifacts for each level at the site that indicate differential clustering at lower levels, compared to upper levels.

Debitage Analysis

All artifacts greater than 2 cm in size were piece-plotted with the exception of several large flake "pavements" or concentrations which were bagged and given lot numbers. All artifacts were cleaned and examined, but only those that had been piece plotted were included in the original analysis. Following initial analysis, it became clear that the stratigraphic provenience of only ten squares in the gully area of JcUr-3 could be considered reliable and comparable. Therefore, all artifacts from these ten squares were included in the analysis, with the exception of the two dense flake pavements of poor quality black chert. This represents 2,299 artifacts that were included in the debitage analysis (see Figure 5:2 for site plan of units included in analysis). Debitage analysis was conducted within the framework of a general lithic reduction model as outlined by Collins (1975:17). His model identifies a linear relationship between five generalized steps for the manufacture of any chipped stone tool. The five steps are:

- acquisition of raw material
- core preparation and initial reduction

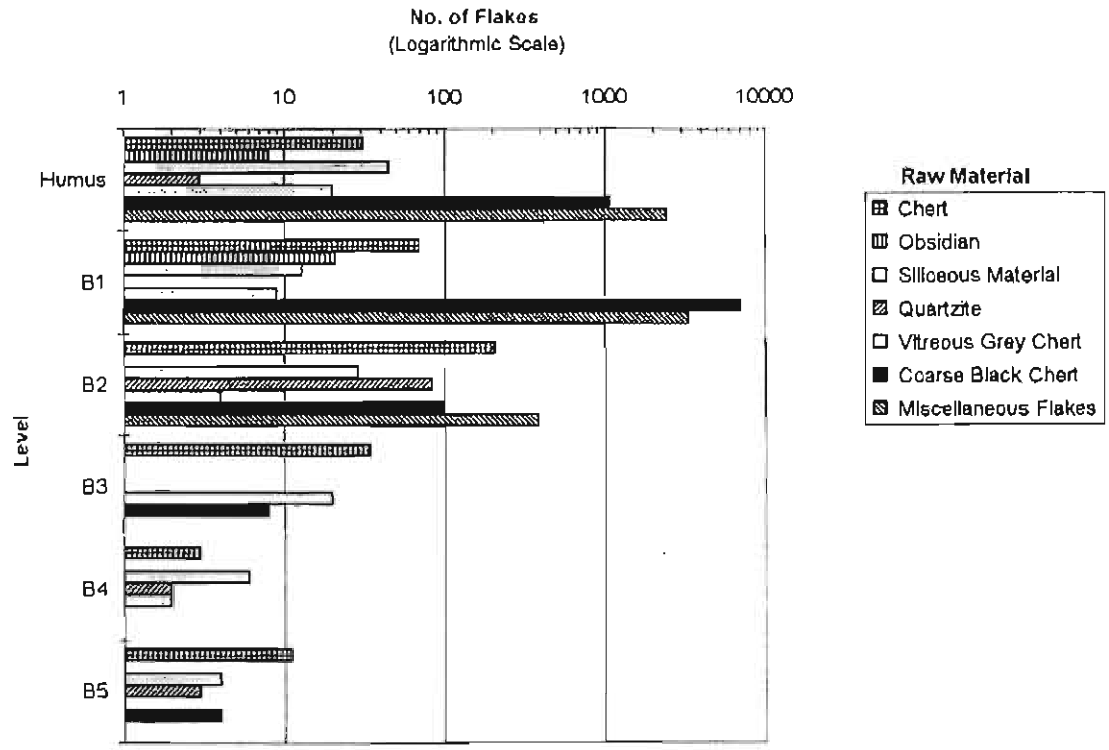


Figure 5:1: Distribution of Raw Material By Level at JcUr-3 - For All Squares. (Various colours of chert have been grouped together. Single and limited occurrences have been omitted.)

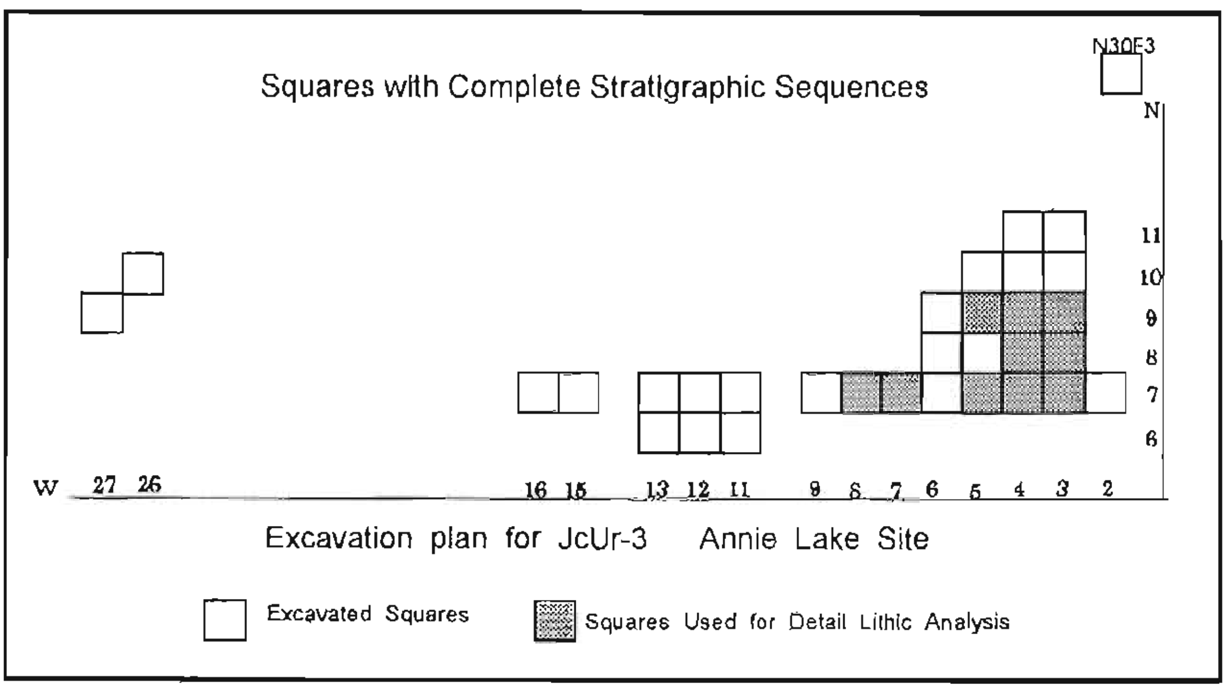


Figure 5:2: Excavation units used for detailed analysis at JcUr-3.

- primary trimming (optional)
- secondary trimming and shaping (optional)
- maintenance/modification (optional).

Each step produces two kinds of lithic material—waste products and finished products (or products destined for further reduction). The waste products, or debitage are particularly well-suited for technological analysis, Collins reported, as they usually remain at the area of manufacture, while finished products are often transported to the loci of use and may be best treated typologically, rather than technologically. Collins stated that the characteristics of manufacture are as well represented in the debitage as in the finished product; therefore, it is possible to quantify and compare lithic assemblages rich in debitage and impoverished in diagnostic tools, as is often the case in subarctic archaeology.

> The specific activities which were employed in any given activity set impute certain discernible attributes in the product group. If isolated, product groups can be described in terms of their technological attributes and inferences can be drawn concerning the specific activities by which the particular manufacturing step was accomplished. (Collins 1975:17)

Within this very general lithic reduction model, it was necessary to select from the myriad of possible attributes those lithic qualities that are most informative and least redundant. There are numerous debitage attributes that may be recorded but have little correlation with the sequence or tool type of manufacture, and instead may reflect technologically meaningless qualities, such as the fracture properties of a raw material. Magne (1985:108-111) reviewed and assessed a number of studies that used univariate, bivariate and multivariate statistical techniques to narrow the range of meaningful debitage characteristics. He concluded that two studies by Pokotylo (1978) and Katz (1976), which reached similar conclusions, provided the most robust and meaningful short list of attributes. The two authors reported that of numerous variables tested, three were the most useful in describing tool manufacturing sequences. They were: flake size, number of flake scars and platform angle.

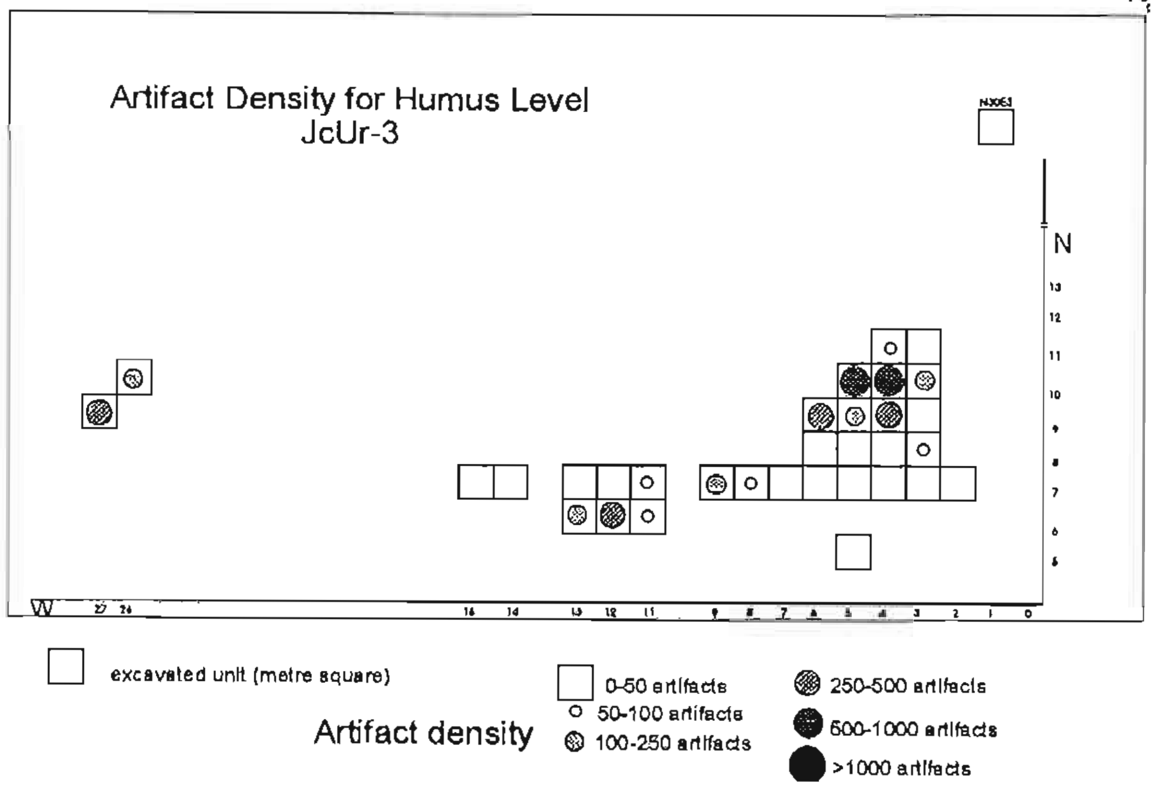


Figure 5:3 Artifact Density for Humus Level, JcUr-3.

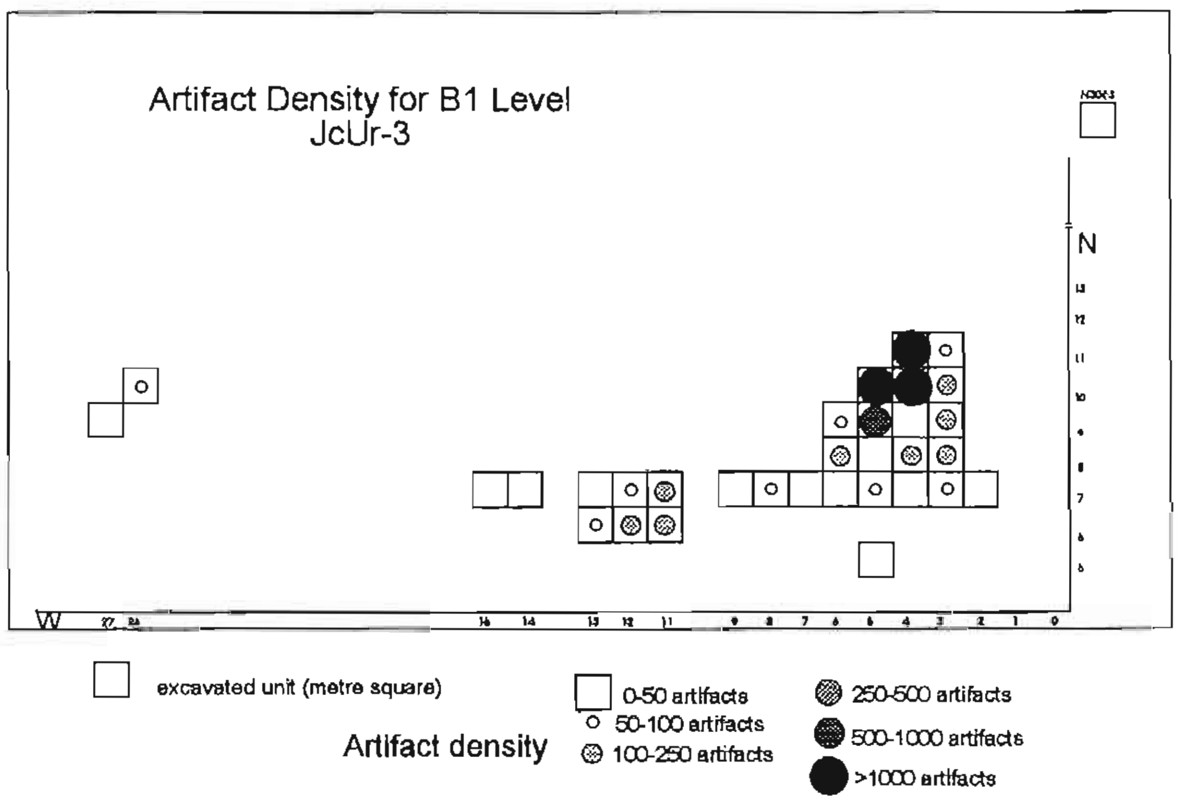


Figure 5:4: Artifact Density for B1 Level, JcUr-3.

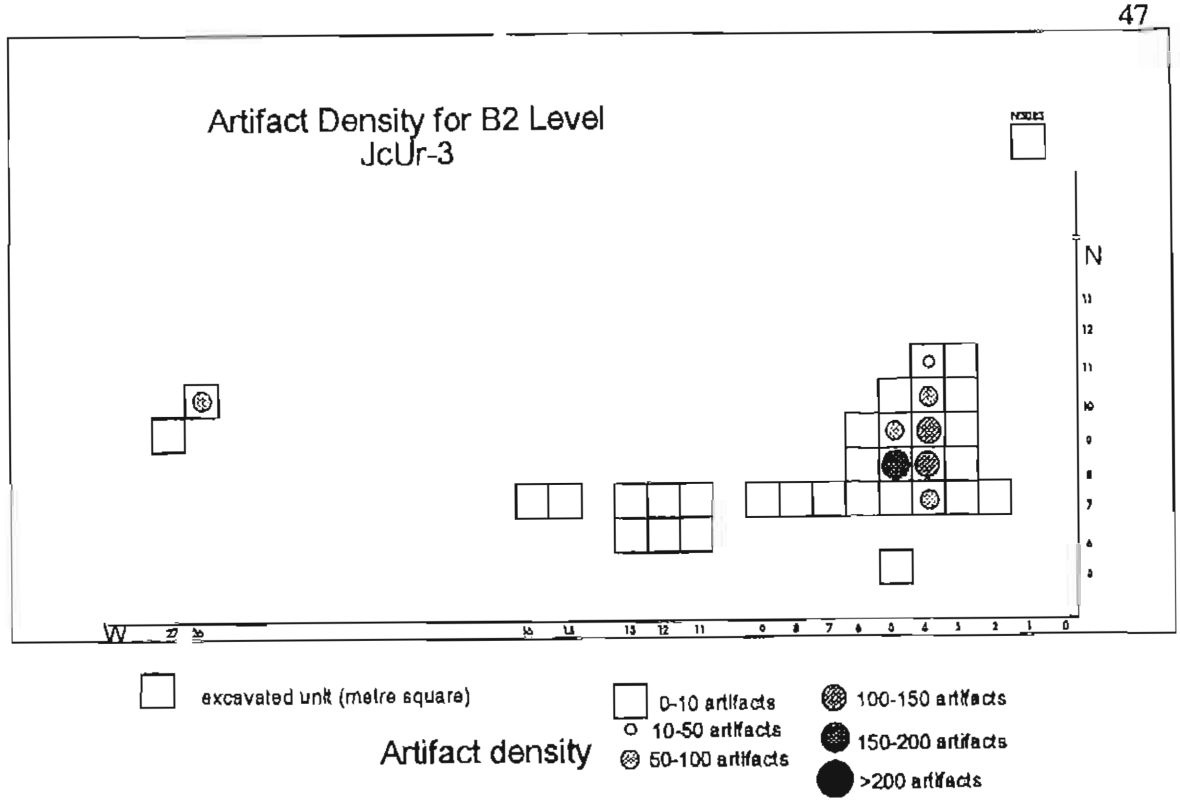


Figure 5:5: Artifact Density for B2 Level, JcUr-3.

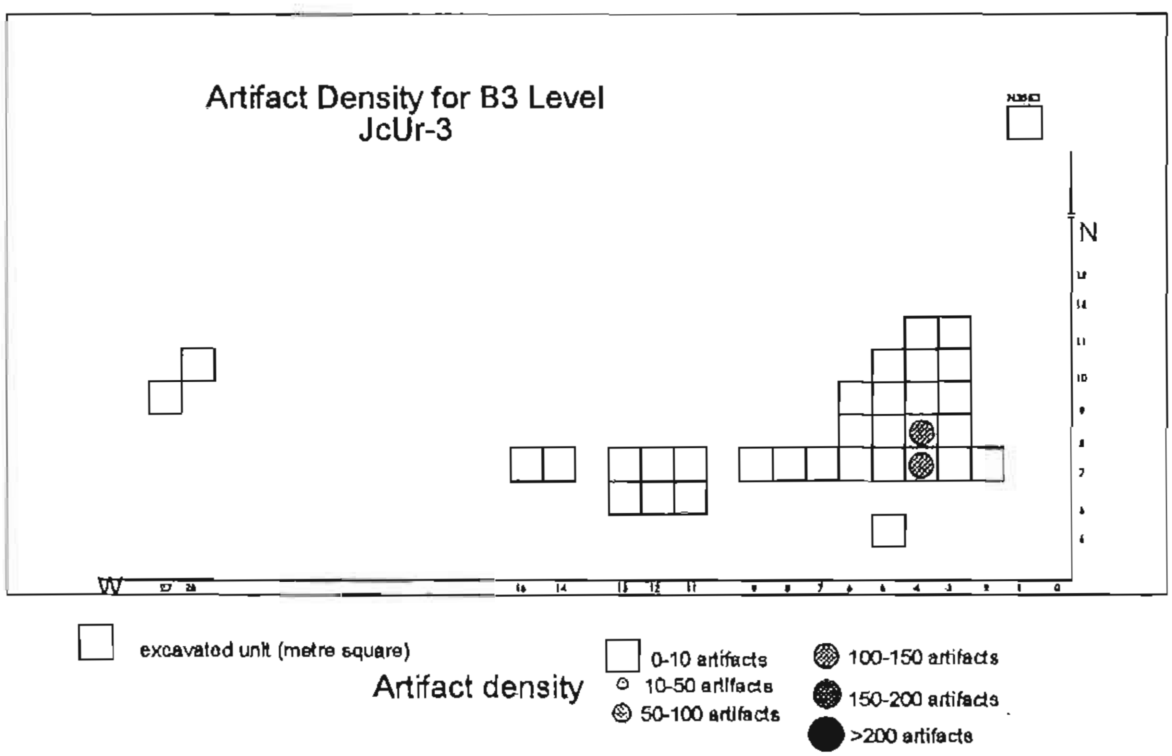


Figure 5:6: Artifact Density for B3 Level, JcUr-3.

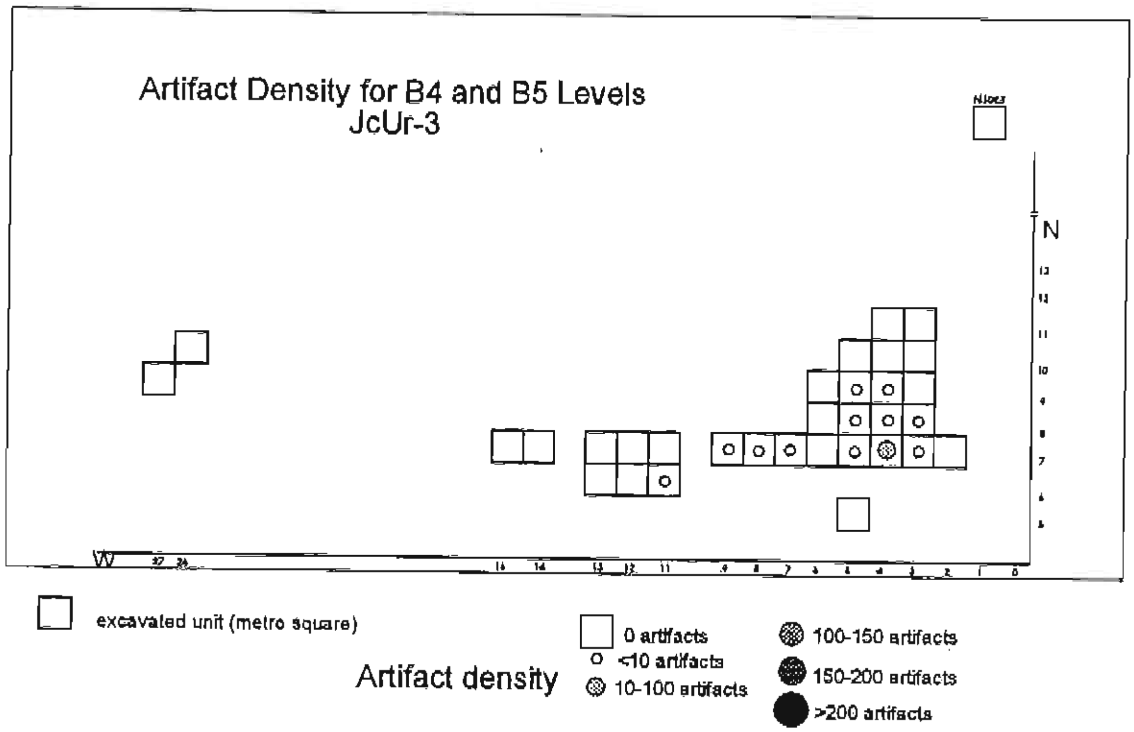


Figure 5:7: Artifact Density for B4 and B5, JcUr-3.

> Pokotylo and Katz each efficiently reduced the number of variables to be coded on each flake, and found a short hand way of measuring overall debitage variability, with some theoretical grounds for proposing that the selected variables were correlated with reduction stages.
> (Magne 1985:111)

However, Magne argued that while these three attributes may have been the most statistically meaningful, the sequence of reduction stages could still only be inferred by co-association of variables. To better address the issue of sequential variability, Magne added three other attributes of study: dorsal scar complexity, platform scar count and cortex cover.

Using these six variables, Magne experimentally tested the hypothesis that manufacturing stages could be inferred from quantitative debitage analysis. He concluded that platform types and dorsal flake scar counts were reliable indicators, but the weight of a flake had little predictive integrity. He then applied the experimental data to a suite of archaeological sites and showed a correlation between stages of manufacture and past processes of assemblage formation, due to lithic technology and settlement strategy factors. For a full discussion see Magne (1985).

The lithic attributes employed in this analysis are derived in part from the short list of Magne. However, his process of determining stages of reduction was largely based on the premise that only a single technology was represented at a site. One of the purposes of the Annie Lake analysis was to try and determine changes in lithic technology through time; therefore, Magne's short list was modified slightly in an attempt to address this second issue. The list was kept deliberately short to speed analysis; as it was, technological examination of the 2300 flakes required many weeks to perform. The following is a list of the attributes examined and an explanation of expectations.

Size. Artifacts were measured according to size ranges, employing .5 cm range divisions. It was expected that the ratio of size to number of dorsal flake scars would vary inversely according to the stage of reduction (i.e., small flakes with numerous flake scars would represent final stages of reduction.)

Weight. Each flake was measured on an electronic scale to .10 of a gram. Despite Magne's findings, it was thought that weight still provided a useful indicator of reduction stage, and as a general indicator of the overall quantity of a raw material being processed on site.

Debitage Type. Debitage type was determined by the presence and angle of flake platforms. Flakes with characteristic "lipped" platforms, usually incorporating a portion of the original biface edge were classified as Bifacial Thinning Flakes. Flakes with more obtuse platform angles were termed Core Reduction Flakes, and those lithics with no platforms were classified as Shatter. These classes were employed as a shorthand method inferring both reduction stages and intended finished product.

Dorsal Scars. The number of flake scars on the dorsal surface were measured according to ranges, i.e., 0-3, 4-5, 6-10, >10. As determined by Magne, stage of reduction could be inferred from number of dorsal flakes scars. When analyzed in co-association with size, it was also thought that technological changes could also be inferred by flake scar complexity.

Platform Scars. The number of platform scars, or facets, was classified according to number ranges, i.e., 0-1, 2-3. >3. This did not include platform preparation scars adjacent to the platform and the category applied only to bifacial thinning and core reduction flakes. Debitage with no trace of platform were classified as Shatter. It was expected that platform scars would increase at later stages of reduction.

Platform Grinding. Platform grinding was assessed nominally as present/absent. It was thought that methods of platform preparation, stage of reduction and changes in tool technology could be inferred from the presence of grinding.

Several other attributes were included in the analysis, including raw material, palaeosol association and general metric provenience data. Percentage of cortex was not a category of analysis, but was noted in comments.

Results of Analysis

In addition to analyzing stages of reduction represented by the Annie Lake debitage, a second objective of the study was to investigate inter-level variation at the site which may be attributed to cultural or technological change. Gotthardt (1990:223) reported variation in debitage at different strata of the Rock River site (MfVa-9, MfVa-14) in northern Yukon, which she interpreted as resulting from differences in biface manufacturing strategies. At that site, stratigraphically separate assemblages contained two different bifacial projectile points—Kamut points and round-based projectile points. In addition to typological variations, these points varied in the ratio of flake scars to overall biface length; similarly, debitage varied significantly by level in terms of flake size and platform width. The debitage analysis of JcUr-3 incorporated two of these attributes, flake size and number of flake scars, to test for differences of manufacturing strategies.

Before testing for inter-level variation, it was necessary to eliminate all squares that lacked coherent internal stratigraphy, or where the stratigraphy could not be made to align reasonably with the stratigraphy of other squares. Only 10 squares, located within the gully or basin at the east end of the site, contained four or more buried palaeosols that displayed stratigraphic integrity between squares (see Figure 5:2 for squares included). Debitage from the other 23 squares was catalogued and analyzed but was eliminated from the detailed comparative analyses.

Attempts were made to control for the variables of raw material, as it was felt that manufacturing strategies could vary depending on the fracture properties of a particular raw material and lithic reduction stages could be subject to misinterpretation. These concerns applied specifically to the assemblages from the Humus and B1, that were dominated by a coarse-grained black chert, a raw material which was only marginally represented in the finished stone tools. The ratio of debitage to finished product suggested that this chert had unpredictable or otherwise less desirable, fracture properties than higher quality materials. Furthermore, the coarse nature of the chert made it difficult to identify cortical surfaces, placing in doubt proper identification of lithic reduction stage. However, this chert was the major cultural material for the Humus and B1 and removing it from the analysis not only substantially reduced sample size, but also undermined inter-level technological comparisons. In an effort to balance the analysis, I examined all artifacts from levels B2, B3, B4 and B5, and all artifacts from the Humus and B1, with the exception of those from several large flake pavements, which were given lot numbers. This method provided a sample of the coarse chert, but not such a large sample as to overwhelm the other raw material categories. (See Table 3 for a summary of raw materials present in these 10 selected squares.)

Stages of Reduction

Stages of lithic reduction present within each level were predicted based on factors of size, platforms scars, dorsal flake scars, flake type, and presence of cortex. Due to an analytical irregularity, the predictive significance of dorsal flake scars was greatly diminished for general flake categories with most of the flakes being classified as Early Stage reduction flakes (see Figure 5:11). Platform scars also proved to have little predictive ability; in contrast to Magne's model (1985), the number of platform scars correlated poorly with stage of reduction (see Figure 5:8). Analyses involving platform scars alone, and platforms scars cross-tabulated with flake size, produced results that contrasted sharply with results obtained when flake size, flake type, and cortex were examined; they were also counter-intuitive. In many cases, the number of platform scars decreased in flakes that were almost certainly from the final stages of reduction. The

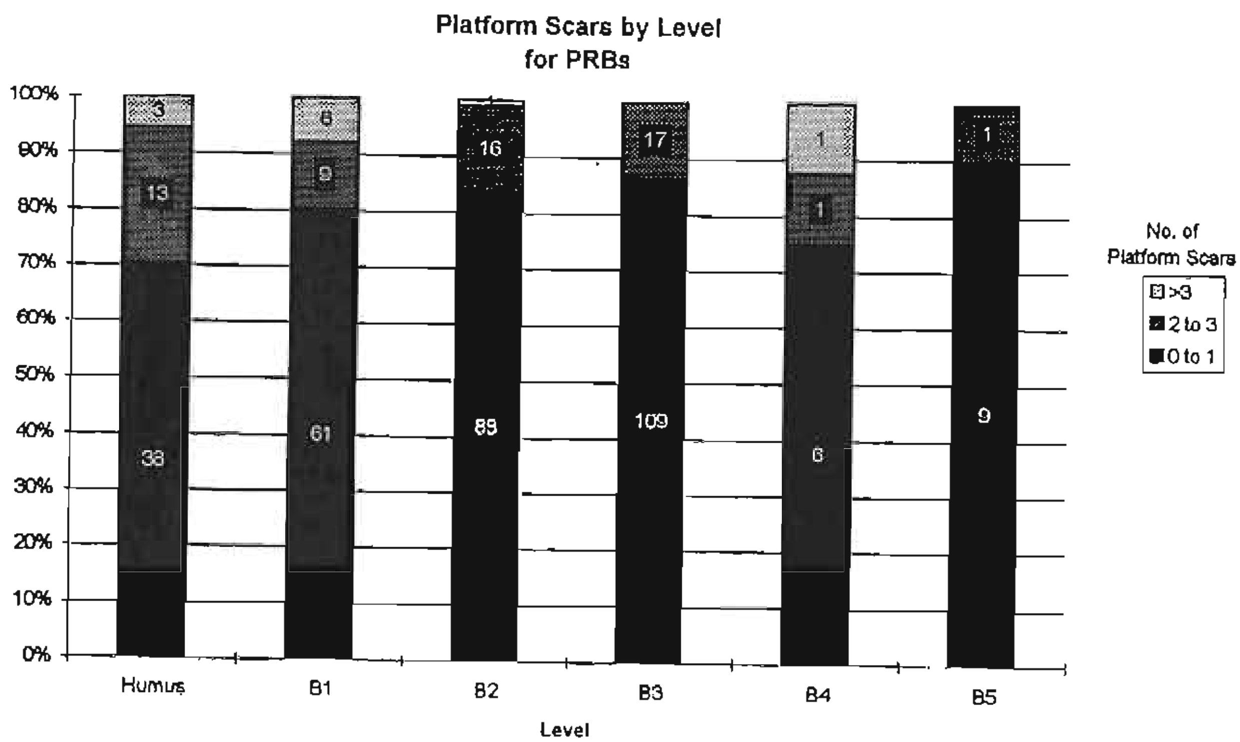


Figure 5:8: Number of Platform Scars for PRB's at each level.

failure of platform scars to predict stages of reduction at JcUr-3 suggests that other variables in lithic manufacturing strategies through time may also contribute significantly to how a platform is prepared and to platform scar number. For the purposes of these analyses flake size, flake type and presence of cortex were considered the most reliable indicators of stages of lithic reduction.

Analysis of debitage by flake type (biface thinning, core reduction and shatter) provided general information on stages of reduction and manufacturing strategies (see Figure 5:9). From these data it is clear that more core reduction/preparation and less biface manufacture is taking place within the Humus than levels B1-B3, indicating early stages of reduction, while the highest percentage of biface production/trimming flakes occurs in B3. These figures are somewhat misleading, however, until the analysis is controlled for flake size. For instance, core reduction flakes in B4 and B5 all cluster at the small end of the size range and almost certainly reflect microblade core reduction rather than generalized core/flake production. These, and other differences, between levels only become obvious when flake type is correlated with flake size.

To refine the analysis and test for stages of reduction, all flakes with platforms (Platform Remnant Bearing - PRBs) were examined with reference to flake type (biface thinning or core reduction), size and level. Only levels Humus to B3 were included in the comparison due to small sample size in B4 (n=7) and B5 (n=4). Actual counts were converted to percentages by level, with the combined percentage of biface thinning and core reduction flakes totaling 100 percent of the PRB's for that level. Figure 5:10 provides a representation of flake type by size and level for all PRB's, showing that all stages of reduction are represented in the Humus and level B1, with a tendency to larger flake sizes, while levels B2 and B3 are dominated by small biface thinning flakes with fewer large or core reduction flakes.

Of the 907 flakes analyzed from the 10 central squares, only two flakes displayed obvious cortical surfaces; however, the coarse texture of the dominant black cherts in Humus and B1 made identification of cortical surfaces difficult. It is likely that these

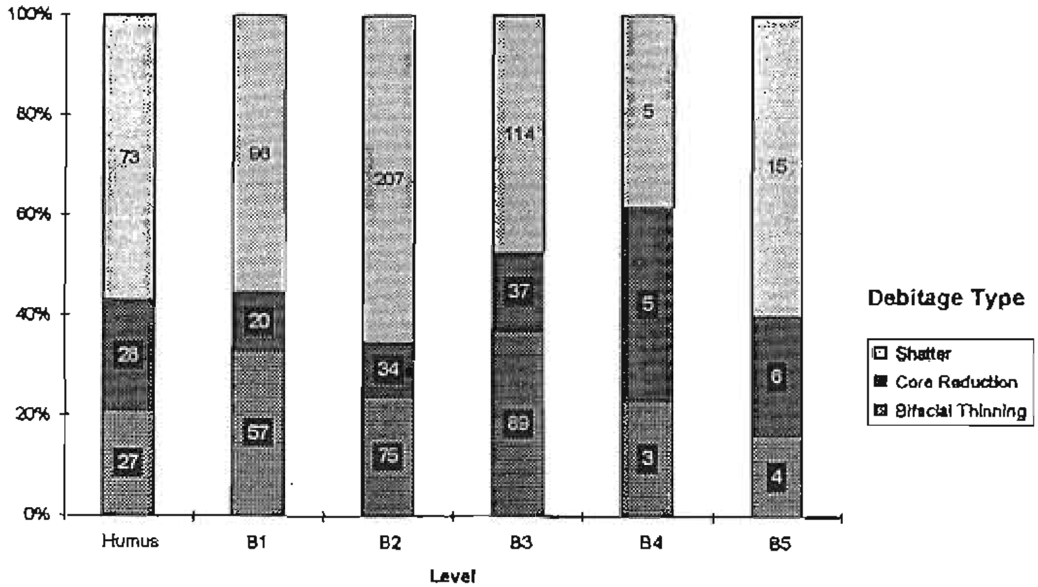


Figure 5:9: Debitage Type by Level, JcUr-3.

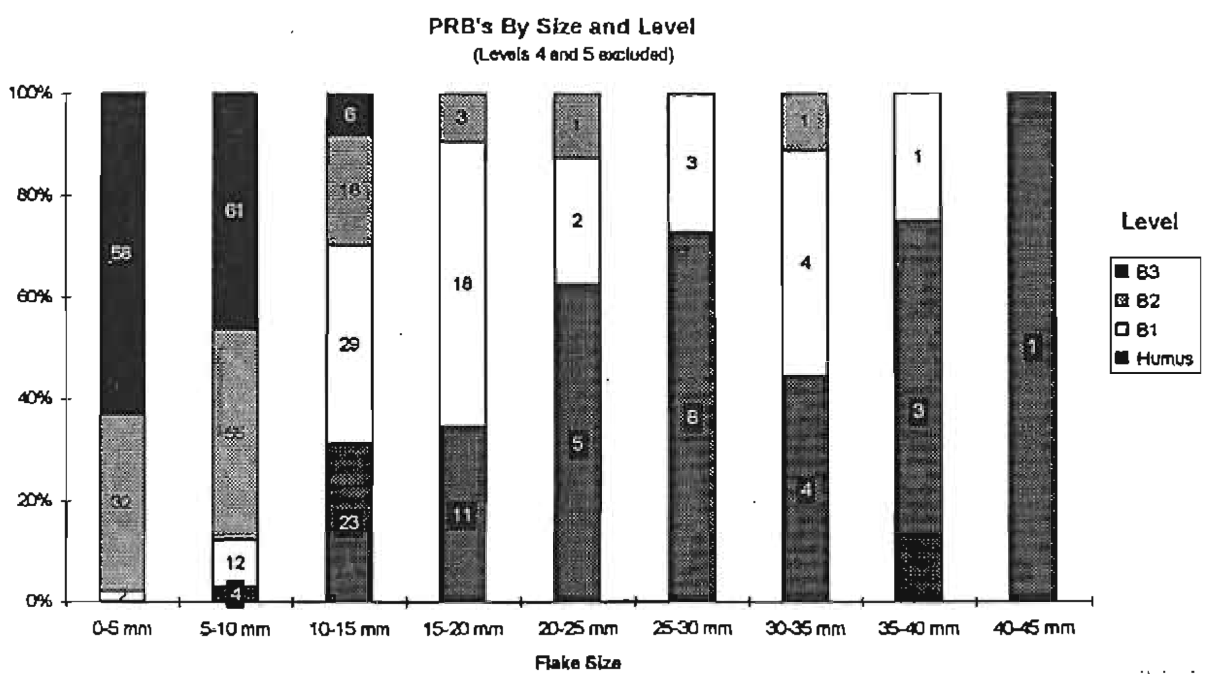


Figure 5:10: Platform Remnant Bearers by Size and Level, JcUr-3.

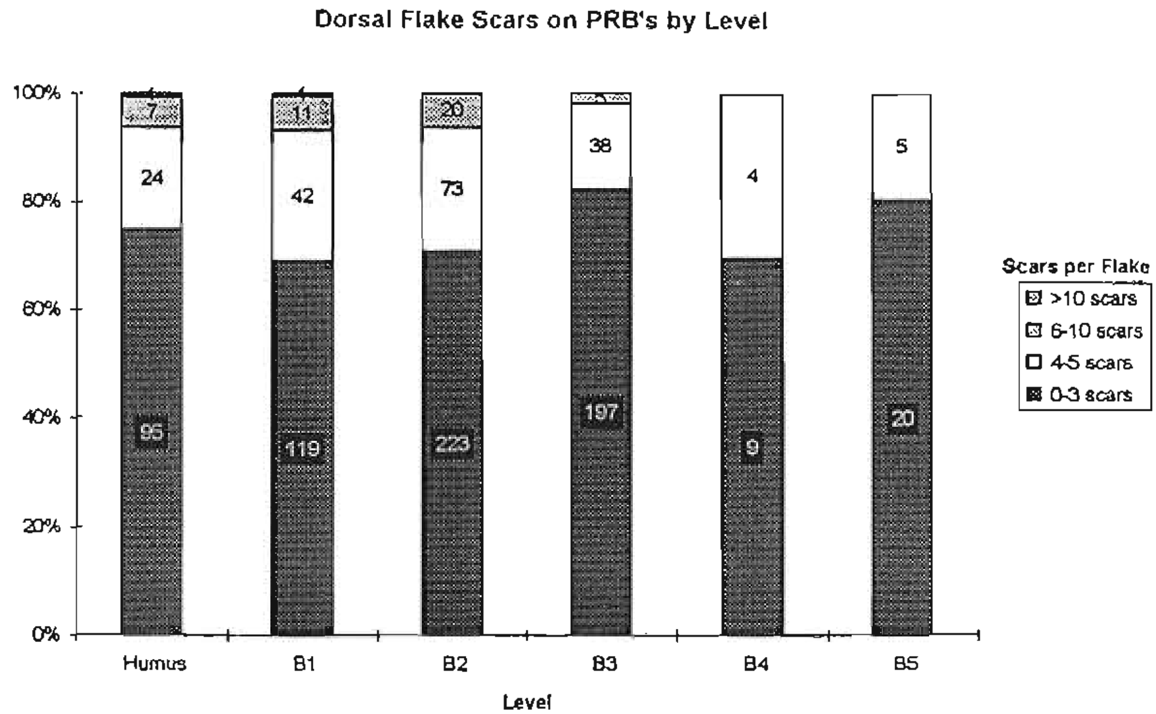


Figure 5:11: Dorsal Flake Scars on PRB's by Level, JcUr-3.

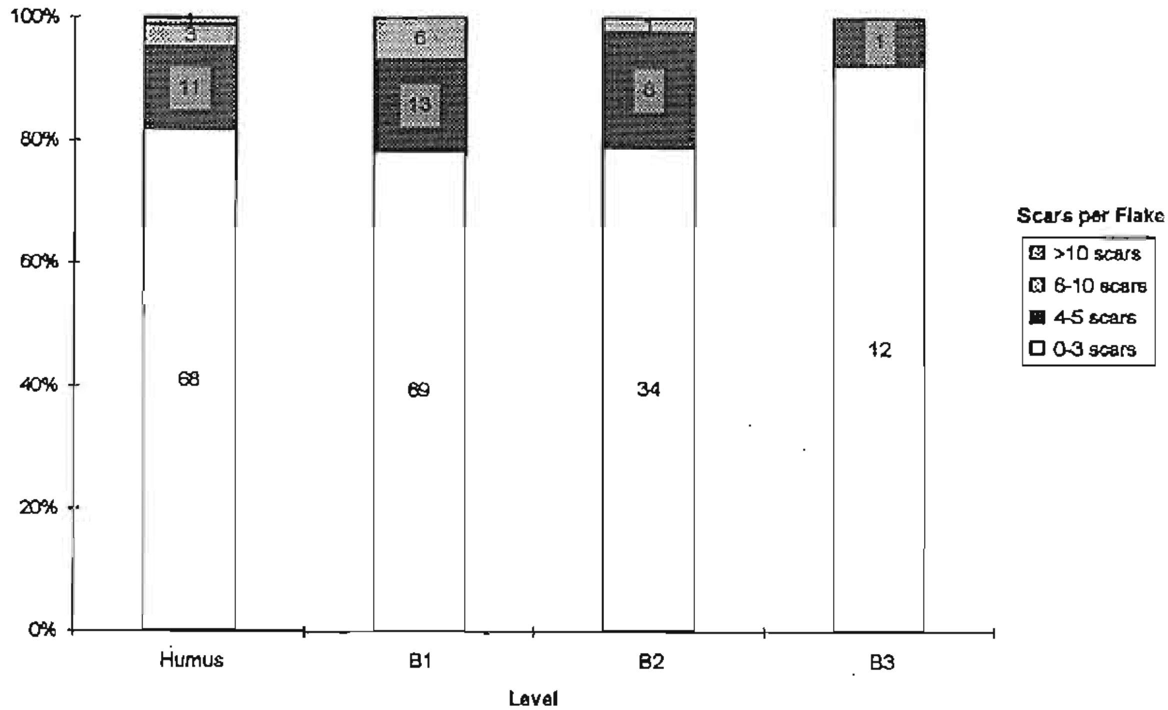


Figure 5:12: Dorsal Flakes Scars for flakes ranging in size from 1.0-2.0 cm.

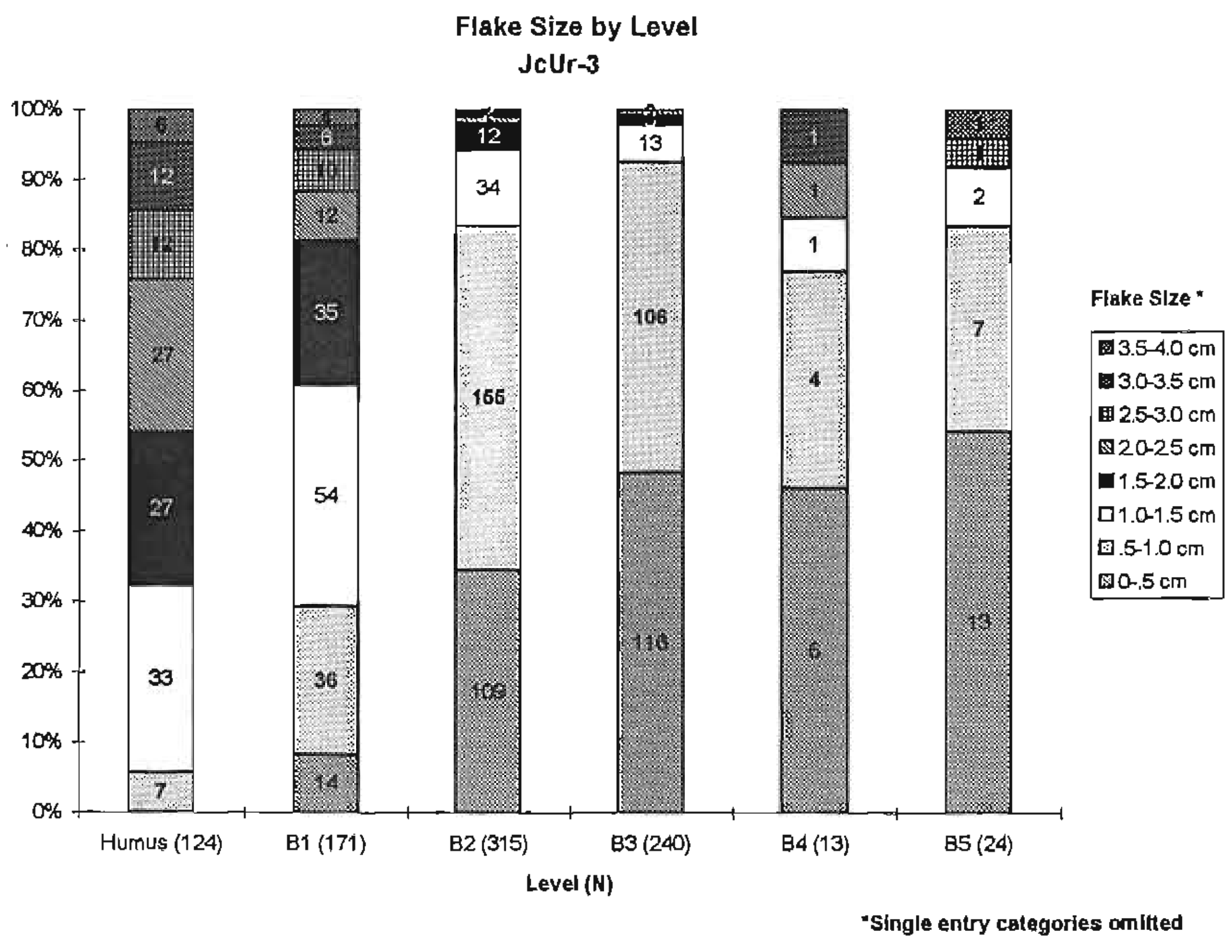


Figure 5:13: Flake Size by Level.

the coarse cherts were quarried locally and primary reduction took place at the quarry. The material was likely transported to the site as large tabular blocks where middle stages and later stages of reduction took place. With the finer grained raw materials in lower levels, the absence of cortex and very small flake size reinforces the interpretation that primary or early stage reduction was taking place elsewhere.

Inter-level differences were also investigated by cross-tabulating flake size with dorsal flake scar counts for all flakes (biface thinning, core reduction and shatter). Actual counts were converted to percentages and plotted for each level, providing an approximate debitage signature for each horizon. These signatures were not precise indicators of stages of reduction; however, patterns were evident between levels and general interpretations and comparisons are possible. As with the analysis of PRB's by size, these debitage signatures indicate that middle and late stages of reduction are represented in the Humus and B1 levels with greater emphasis on larger and middle stage reduction flakes. This contrasts with debitage from B2 and B3 which was almost entirely composed of small flakes less than 1.5 cm. Levels B4 and B5 contained too little debitage for valid interlevel comparisons (B4=13, B5=25).

These results further reinforce the interpretation that similar lithic reduction activities are taking place in the Humus and B1 but different activities in B2 and B3. The upper horizons are characterized by a broad range of activities and middle/later stages of reduction. The overall tendency towards large flakes with few platform scars in the Humus and B1 is consistent with middle stage lithic reduction. This conclusion is supported by the preponderance of coarse-grained chert which is likely of local origin. At levels B2 and B3, however, the combination of small flake size and few platform scars suggests an interpretation that falls outside of Magne's criteria for determining stages of reduction. Magne confirmed that debitage could only be assigned to stages with 60% accuracy, with the greatest uncertainty in the prediction of middle and late stages of tool manufacture (Magne 1985:118). At the lower levels of JcUr-3, however, it is likely that primary reduction did not occur; rather stone tools were being reworked, and the lithic characteristics of curation appear to be slightly different from those of manufacture. It is likely that the debitage from levels B2 and B3, consisting largely of small flakes with few platform flake scars, reflects the retouch and resharpening of existing bifaces, rather than original core preparation and tool manufacture.

Cores

Given the large amount of debitage, surprisingly few flake cores were recovered at the site. Seven Randomly Flaked Cores, defined as flake cores which display no coherent pattern of flake detachment (see Workman 1978), were identified at JcUr-3 in 1992. All of those cores were quite small, suggesting that their utility was nearly exhausted when they were discarded. Two of the seven cores (JcUr-3:2845 and 2846) are of fine-grained grey chert another four are of coarse-grained black chert. The only one to contain any cortical surface is JcUr-3:2853, a heavily battered, large granite cobble. The presence of exhausted cores may indicate flakes were being detached and fashioned into tools. Most of the cores were recovered in the B1 horizon (five of seven cores), with another coming from a post-ash context. The only one from below B1 was a possible granite cobble core JcUr-3:2853 which was recovered 27 cm below surface in the B2 horizon; however, this implement may have used as an anvil rather than a core, and there do not appear to be any flakes of this type of granite at any level. The clustering of cores in the B1 horizon strongly supports the position that tool manufacture was taking place only in the upper horizons at Annie Lake; while below that, tools were only retouched and sharpened, not manufactured. The significance of this pattern will be discussed in the following section.

Changes in Manufacturing Strategies

It is difficult to distinguish variations in lithic assemblages that are due to changes in manufacturing strategies rather than different stages of reduction. According to Gotthardt (1990:223) debitage patterns of flake size and platform width (measured from the horizontal plane) are likely correlated with changes in biface manufacturing strategies, but in the absence of adequate sample controls for flake size and raw material, differences in inter-level debitage patterns may simply reflect different stages of reduction.

Attempts to assess inter-level variations in manufacturing strategies at JcUr-3 were plagued by small sample sizes in the lower levels. In an attempt to discern possible differences in flaking patterns (i.e., if dorsal scars exhibited any size difference between levels), which may be interpreted to represent differences in the way tools were being manufactured, I examined the number of dorsal scars for particular size ranges of all Bifacial Thinning Flakes. Meaningful conclusions and comparisons were not possible for most size ranges, however, because of obvious dissimilarities in the debitage assemblages from each level. Within the Humus and B1 there were very few small Bifacial Thinning Flakes, in contrast with B2 and B3; and while large bifacial thinning flakes were abundant in the Humus and B1, they were virtually non-existent below those levels. Even when all flakes (Bifacial Thinning, Core Reduction and Shatter) were included in the analysis, there was little overlap within most size ranges at each level, making it difficult to isolate a flake size category for each level with an adequate sample. Only within one size range (1.0 - 2.0 cm) was the sample size judged large enough for valid inter-level comparisons (see Table 4 and Figure 5:12).

Table 4: Dorsal Flakes Scars for Flakes Measuring 1.0 - 2.0 cm, from each level.

Level	**Dorsal Scars**					
	0-3 (n)	**%**	**4-6(n)**	**%**	**6-10 (n)**	**%**
Humus	49	81	10	16	1	2
B1	62	69	22	24	5	6
B2	33	71	8	17	5	10
B3	12	75	3	19	1	6

From this table and the accompanying graph, it appears there is no significant differences in flaking patterns, expressed as a ratio of dorsal scars to flake size, between the Humus, B1, B2, and B3 levels at JcUr-3. The overall results of the analysis are not strongly conclusive, but they suggest that when the same size flakes are examined, there are insignificant differences in flaking patterns, at each level. If by extension, flaking patterns are indicative of variation in manufacturing strategies, as indicated by Gotthardt, the results would lend little support to theories of technological changes at Annie Lake over the past approximately 5000 years. Based on this assessment, it would appear that most of the variation in the lithic assemblages from the first four cultural horizons is due primarily to different stages of reduction rather than changes in manufacturing strategies through time.

Artifact Descriptions

As described previously, despite the large lithic assemblage recovered at JcUr-3, only a small percentage showed evidence of modification or use wear. From the entire inventory, only 76 artifacts displayed discernible modification. Artifacts were examined under the microscope at 10x, analyzed using the same attributes as the unmodified debitage, and described following Workman (1978). His tool classifications for Southwest Yukon provided the most comprehensive and the geographically closest dataset for comparative purposes. As with Workman, artifacts have been grouped into categories of comparative and descriptive value. The technological and chronological significance of artifacts is discussed in the appropriate sections and metric, distributional and descriptive notes are presented in Appendix 1. The descriptive categories used here are: projectile points, finished bifaces, rough bifaces, blades, unifacial tools and implements, cores and hammerstones. Implements of bone or antler, index traits of the Late Prehistoric period, were not preserved at the Annie Lake site (for a summary of tool distribution by level, see Table 5).

Projectile Points

Projectile points were identified by the following criteria: bifacially flaked, relatively thin, symmetrical with a complete or fragmentary outline that suggested parallel sides converging to a sharp tip. This was primarily a functional interpretation of implements which could be used as weapons. Overall size was also an important characteristic to distinguish projectile points from large, hafted, biface knifes, but there is

Table 5: Distribution of Lithic Tools by Level at JcUr-3

Level	Biface	Blade	Blade Related	Core Fragment	Use/Edge Retouch	Microblade	Micro-core-probable	Hammerstone	Projectile Point	Projectile Preform	Rough Biface	Scraper	Scraper/Grave	Unknown
Humus	2			4			1		2	2	1			2
B1	7			3	4			1	6		5	6	1	1
B2				1				1	2			1	1	
B3	2	1	1						2				1	
B4					2							2		
B5			1			7			1					1
B6		1												

no. of tools

always a degree of uncertainty in distinguishing the two tool types. Following Workman (1978), descriptive, rather than typological classifications are employed. Thirteen complete or fragmentary projectile points were recognized from the excavations at JcUr-3 in 1992, (see Plate 5:1) constituting 17 percent of the total tool assemblage. The majority of these were recovered in the B1, B2 and B3 horizons (10 of 13), suggesting that, at least during these periods, hunting was the major focus of activity at the site.

Thick Bi-Convex Straight Edged Points (N=2)

These point types are identified from two medial fragments, which, based on both metric attributes and overall ratio of width to thickness, fall within the range of Workman's P6 classification (1978:210). Both specimens, JcUr-3:2797 & 2806 (Plate 5:1), display variable, bifacial flaking on grey or grey/green chert similar enough to be from the same raw material source. Workman described these as long, slender, parallel-sided points with straight bases; however, based on the fragmentary nature of the Annie Lake specimens, it is not possible to determine approximate lengths or base morphologies.

Plate 5:1 Projectile points from JcUr-3, 1992. Top (L-R) JcUr-3:2802, 2803, 2816, 2797, 2806, 2900
Bottom (L-R) JcUr-3:2827, 2810, 2807, 2788, 1853, 2831

Stratigraphic Placement and Chronology

Both of these points were recovered in the B1 horizon from two squares approximately seven metres apart. This horizon contained an abundance of cultural material, including hearths; a date of 1490±100 BP was obtained from charcoal collected in association with a large cultural feature. The date corresponds well with the established date of 1250 BP for the overlying White River ash (Lerbekmo et al. 1975). Workman's small sample of Thick Bi-Convex Straight Edged Points (N=2) were also situated below the ash but he was unable to date the point type more precisely, other than to say it was older than 1250 BP. The basic morphology of this point type may have persisted for many millennia in northwestern North America, with Workman reporting similar specimens ostensibly ranging in age from early post-glacial to post-ash times.

Shallow-Notched Weakly-Shouldered Points (N=3)

Workman defines these points (PN3) as having broad shallow side notches, rounded corners and poorly defined shoulders. Rather than creating an entirely new category, three points, 2802, 2803 and 2816 (Plate 5:1), have been placed somewhat uncomfortably within this classification. The Annie Lake specimens are somewhat variable, but are consistent in having relatively long stems, prominent to very prominent basal ears and a slight asymmetry. Two of the specimens have straight ground bases while the third is marginally convex and ground. They differ from Workman's sample in that the shoulders are better defined and the prominent basal ears create a stemmed/side-notched outline near the base, rather than a shallow notched morphology. These specimens are characteristically asymmetrical, especially in the shoulder outline. They are similar in morphology to one variety of Tuktu corner-notched points (Campbell 1961:76 Plate 3). Numerically, this is the best represented point type at Annie Lake, and while all three are fragmentary both JcUr-3:2802 and 2803 are nearly complete. These two points sustained transverse breaks at the distal end and both show evidence of use wear subsequent to the snap. JcUr-3:2816 is the smallest of the three points but appears to have been significantly reworked, perhaps subsequent to a similar transverse fracture, and may have been used as a small, hafted scraper. JcUr-3:2803 and 2816 appear to be heat spalled. All three display broad, variable flaking on grey chert.

Stratigraphic Placement and Chronology

These three projectile points were recovered from adjacent squares immediately below the White River ash, and are presumed to be related to the cultural occupation dated at 1490±100 BP. As notched points, these specimens fit well within the technological and chronological range of the Northern Archaic Tradition. However, the relatively poor fit within Workman's PN3 category underscores the need for better definition of the possible range of so-called weakly shouldered notched points. These points, along with another recovered near Annie Lake (Hare 1990:24), appear to have been fashioned with the intention of increasing stem length rather than producing a notch to facilitate hafting. These characteristics correspond with a point type described by Anderson at Onion Portage. He identified a form of notched point in which "stems, rather than being formed by two deep side notches are formed by one deep side notch and one shallow side and corner notch, resulting in partially stemmed and partially notched variety of point" (Anderson 1968b:4). The points were contained in a level that was dated to between 2900 to 2700 BC (ibid.). Given the possible range of technological variation for the PN3 type, it is perhaps not surprising that the temporal span of these points is also extensive. Workman reported ages ranging from 200 to almost 5000 years from various sites with identified PN3 points; although he noted that the majority of northern examples are dated between 3000 and 4000 years old, emanating from an "Alaskan center of gravity" (ibid. :215). This earlier appearance of a point type in Alaska prior to the Yukon is consistent with the proposed spread/diffusion of Northern Archaic traits as outlined by Workman. It is worth noting that a PN3 point from the Canyon site, dated at 2780 BC ± 320 (MacNeish 1964:309), represents the oldest dated notched point in southwest Yukon.

Straight Point Base with Grinding (N=1)

A single point with a ground straight point base, JcUr-3:2810 (Plate 5:1), was recovered during excavations at JcUr-3. As with Workman's sample, identified as PSBg, this specimen has relatively sharp corners, but is distinctive in having rapidly expanding sides. At the point of fracture, it appears that the sides were about to expand even more rapidly, suggesting a possible stemmed point rather than a lanceolate point (PS1). This specimen has slight grinding on the sides and base, and use wear polish along the snap facet. It displays random, variable flaking on patinated grey chert.

Stratigraphic Placement and Chronology

The single specimen in this category was recovered in the B2 horizon at a depth of 20 cm below surface. A pooled charcoal sample from an apparent nearby hearth, at the top of the same horizon, produced a date of 2795±65 BP, and there is no obvious reason to challenge the stratigraphic integrity. If this point base does represent a stemmed point, the date falls well within the range of the Northern Archaic Tradition. Workman (1978:218) suggests that stemmed points may be a more recent derivative of shallow notched points, following Anderson (1968b:8). Points similar to those identified above as PN3 are described by Anderson as stratigraphically ancestral to stemmed points (ibid. :7). At Onion Portage, the horizon containing this sequence was dated from 2900 to 2700 BC. Again, while a greater age for Alaskan assemblages is consistent with the previously noted timeline and suggested direction of Northern Archaic diffusion, the stratigraphic placement at Onion Portage is the reverse of that at Annie Lake, indicating that a linear evolutionary relationship maybe inappropriate.

Thin, Wide Point Tip - Annie Lake Point (N=1)

A single, thin, wide, finely flaked point fragment, JcUr-3:2788 (Plate 5:2), was recovered at JcUr-3 in 1992 that can only be accommodated within Workman's descriptive classification scheme in a general way. Workman's P3 point type (Whitehorse point) is identified as a broad lanceolate point with a sub-concave base and sharp or rounded basal ears. However, based on the 1982 excavations at Annie Lake, Greer identified a previously unrecognized point form which she named the Annie Lake point and considered to be the diagnostic tool type of an Annie Lake Complex (see Greer 1993). Based on two complete and three fragmentary specimens, this point type is defined by a deep basal concavity, well defined basal ears, a sharp tip and no evidence of edge grinding or fluting. Flake scar patterning is variable and random. The specimen recovered in 1992 is not complete, lacking the diagnostic concave base; however, other characteristics, as well as stratigraphy (discussed below), suggest that it be classified as an Annie Lake point. The specimen is thin, wide and sharply pointed. Flaking is generally variable and random; however, the presence of lamellar, oblique flaking (see Gotthardt 1990:298-299) along one edge indicates that the random flaking patterns observed over the rest of the point may be determined in part by characteristics of raw material. The specimen is broader than any of Greer's small sample, but it appears to comprise the distal half of the point and quite likely the span of maximum width. Its outline matches almost perfectly with one of Greer's point tips (JcUr-3:944), which appears to consist of slightly more than the distal third of the point, and conceivably would have continued to expand to attain a similar width. It is worth noting, however, that the lateral margins of both of these point tips continue to expand past the distal third, while in the other Annie Lake points, point expansion is complete before the distal third.

Greer's sample of "classic" Annie Lake consists of only three complete specimens, so further refinement of the lithic attributes is clearly required. Therefore, while it may be argued that the manufacturing techniques and stratigraphic placement of the 1992 point tip are comparable to those previously identified as Annie Lake points, the absence of the diagnostic deeply concave base undermines complete confidence in including this point in the Annie Lake category. Nonetheless, this specimen, manufactured on banded grey chert, is quite distinct from other projectile points at the site for its thinness, sharpness of the point tip, and the quality of its flaking.

Stratigraphic Placement and Chronology

The Annie Lake point was recovered from near the base of the B3 horizon 25 cm below surface. A sample of small mammal bone from near the artifact returned a date of 810±80 BP. This date is considered unacceptable as it is younger than the overlying White River ash and the other two dated horizons. Therefore, the point can only be bracketed at between 2795±65 BP and 6260±80 BP, based on dates for the overlying and underlying cultural horizons. The provenience of this point compares very well with one of those recovered by Greer in 1982, also recovered at a depth of 25 cm below surface, within 15 m of the 1992 find. Greer bracketed the Annie Lake points at between 4400/4900 and 2000 years ago (Greer 1993:26), based on Workman's terminal date for microlithic technology in southern Yukon and a carbon date from an overlying feature. The bracketing of the 1992 dates provides little refinement to the age range; however, based on soil chemistry analysis, Scott Smith (personal communication 1993) indicated that several thousand years would have been needed to accomplish the degree of weathering observed in the B3 soil horizon. This suggests that the older end of Greer's range (4400-4900 years ago), represents the best fit with the data; although dating of the microlithic component of JcUr-3 to older than 6200 BP provides for an even older possible upper time bracket. Based on bracketed dates and Smith's soil chemistry interpretation, Greer's Annie Lake Complex can reasonably be assigned an antiquity of approximately 5000 years. The significance of this dating and the place of the Annie Lake Complex within the Northern Archaic will be discussed further in the following section.

Notched Concave Point Base (N=1)

A single small, side-notched point base, (JcUr-3:2807 Plate 5:1), was recovered during the 1992 excavations. The small size of the artifact, snapped immediately above the notches, makes placement within Workman's classification somewhat difficult, underscoring the many gaps in the current southern Yukon archaeological database. Its basal outline generally corresponds with Workman's PN2, as a small convex-bladed multi-notched point, and is similar to a point, identified at a Besant point, recovered at Gladstone by Johnson and Raup (1964 :Fig 36:8). The point has small, well defined side notches and a slightly ground basal concavity of approximately 1.7 mm. Basal ears are distinct and rounded. Flaking is random and variable, on a patinated beige chert.

Stratigraphic Placement and Chronology

JcUr-3:2807 was recovered at the base of the B3 soil horizon at a depth of 30 cm below surface. This represents the most deeply buried identifiable notched point at JcUr-3. However, as with the Annie Lake point discussed above, there were no datable organics in association, and the age of the cultural deposit can only be estimated based on known dates for overlying and underlying horizons and soil analysis. Working from the assumption that the Annie Lake point, located stratigraphically above this artifact, is 5000 years old, this notched point base could have a slightly greater antiquity. This estimate is constrained, however, by a shortage of radiometric dates for the introduction of the Northern Archaic Tradition in southern Yukon. As stated above, a notched point from the Canyon site dated at 2780 BC ± 320 (MacNeish 1964:309), represents the earliest known Northern Archaic component in southern Yukon. An antiquity of approximately 5000 years reaffirms the possibility of a similar or greater age for this notched point base. The patina observed on this artifact may also be a general indicator of age, insofar as all other artifacts with similar weathering, recovered from areas with reliable stratigraphy at Annie Lake, appear to have an antiquity of approximately 6000 years or older. This apparent weathering process could simply reflect a characteristic of desilicification of a raw material that was not much used in recent millennia; however, the possibility of using patination as a general indicator of age should not be overlooked.

Projectile Point Tip (N-2)

Two very small point tip fragments (Plate 5:1), designated by Workman as PFTs were recovered at JcUr-3 in 1992. The first, JcUr-3:2831, is thin and sharp, although not as sharp as the Annie Lake point tip, with lateral margins expanding at an angle of 46°. Bifacial flake scars are small, and appear to be random and variable. It is manufactured of a distinctive speckled green/grey chert. The other, JcUr-3:1853, is a broad, rounded, reasonably thick point tip. Flaking patterns are random and variable on one side, while on the reverse side there are three broad, nearly parallel flake scars. The rounded tip is quite battered, and raw material is grey chert.

Stratigraphic Placement and Chronology

Recovered in the screen from the B5 horizon at a depth of 45-48 cm below surface, tip fragment JcUr-3:2831 represents the earliest evidence of bifacial technology at JcUr-3. Although no microblades were found in association, this B5 horizon was the microblade level elsewhere at the site; furthermore, the distinctive speckled green/grey chert was noted on only four other artifacts, all small microblade fragments recovered 56-

60 cm below surface in a square 8 m away. Charcoal collected from this microblade soil horizon provided a radiocarbon date of 7160±70 BP. Clark (1983:42) stated that bifacial projectile points are rare within microlithic traditions; however, the unquestionable similarities in raw material indicate that this is one of those supposedly rare examples. While it is risky to advance opinions based on such a small fragment, it is worth noting that the sharp, delicate outline of this point tip does not correspond well with the large, round-based lanceolate points claimed by Workman to be associated with the Little Arm phase in southern Yukon (1978:415). This particular point tip more closely approximates the tip of a sharply pointed, long triangular projectile point recovered by Hunston from the microblade level at the Moosehide site in Central Yukon (Jeff Hunston personal communication 1993). This specimen has a straight base and is basally thinned. These two examples suggest that the full range of projectile points within the microlithic tradition has yet to be established.

Point tip JcUr-3:1853 was also recovered in a screen from about 10-15 cm below surface, coming possibly from the B2 or B3 horizon. This provides an age bracket of about 2900 BP to 5000 BP, based on the known and estimated dates for the two horizons. Due to the small size and somewhat nondescript nature of this fragment, it was not possible to associate it with any of Workman's point classifications.

Diminutive Notched Point (variant) (N=3)

Although only one of three diminutive notched points recovered at JcUr-3 in 1992, is finished, they are so similar in morphology they should be considered the same type (Plate 5:3). JcUr-3:2900 is a small, thick arrow point manufactured on a flake with a prominent keel or arris in the centre of the dorsal side. With this triangular, keeled shape providing the point preform, flaking is largely limited to the margins of the point, and part of the smooth ventral surface of the flake is still visible The notching on the side is very shallow and more closely resembles a slight narrowing or waisting of the point. A small section on the right side of the base is missing. The other specimens, JcUr-3:2824 and 2828, are considered preforms of the same point type. Both are of similar size and distinguished by a prominent dorsal keel with triangular cross section. On JcUr-3:2828, the bulb of percussion is still evident at the distal end of the tip. A small amount of cortical surface is present on the proximal end, and there has been minor bifacial retouch on both lateral margins, although no attempt was made to notch or narrow the point near the base. JcUr-3:2824 displays less modification, perhaps because the thicker keel made the preform unsuitable. There has been minor unifacial retouch on one margin, and no attempt to was made to notch the sides. Both JcUr-3:2900 and 2824 are made of a high quality vitreous grey chert, while JcUr-3:2828 is of a coarse-grained black chert. These points have been classified as diminutive notched points (Workman's PN5) primarily on the basis of size, although Workman (1978:216) states that the characteristics of this type are so variable as to lack coherency. Compared to other diminutive points from the southern and central Yukon, these points seem unusually thick and somewhat awkward; however, the recovery of three similar points strongly suggests that it is a standardized rather than aberrant point form.

Stratigraphic Placement and Chronology

Of the three samples, one was recovered in the humus, slightly above the White River ash while the others came from within the ash itself, presumably having drifted down from above. No attempt was made to date organics from this level, as the ash lens provided a time marker of approximately 1250 BP. The diminutive side-notched point is a diagnostic artifact of the Late Prehistoric, which is consistent with the post-ash provenience. From the small sample of projectile points recovered at JcUr-3, this type is the only one identifiable as an arrow point, by virtue of its small size.

Projectile Point Preform (N=1)

This round-based, point preform with a triangular cross section (JcUr-3:2796) is similar in gross morphology to the diminutive point preforms discussed above, but is distinguished by the lack of a prominent dorsal ridge. It displays bifacial flaking along all margins, although some cortex is still evident on the dorsal side. The lateral edges are sharp and ragged, there has been no attempt to notch the side or base, and the point tip is missing. It is manufactured on dark green chert which contains many fracture planes, perhaps the reason for the tool's incomplete state. This specimen is slightly larger than the

Plate 5:3 Diminutive Notched Points. (L-R) JcUr-3:2824, 2828, 2900.

diminutive preforms above, but given its preform status, may have been destined to become similarly small; nonetheless, accurate placement within Workman's classification is not possible.

Stratigraphic Placement and Chronology

This preform was recovered from the humus, 2 cm below surface, representing an age range of less than 1250 years old. If properly identified as a diminutive notched point preform, this age is consistent with the Late Prehistoric period.

Projectile Point Midsection (N=1)

A single medial fragment of a unifacial tool, JcUr-3:2827 (Plate 5:1), has tentatively been identified as a projectile point midsection (Workman's PFM). It is thin with straight, parallel edges with a convex/plano cross-section. Flaking patterns are random and variable, and lateral margins are sharp and ragged with no evidence of use wear. Lacking both a tip and a base, there is very little diagnostic information that can be derived from this specimen. Given its fragmentary nature, it is even possible that it was intended as knife; however, the absence of use wear along the sharp edges suggests that it was never employed as a cutting implement.

Stratigraphic Placement and Chronology

JcUr-3:2827 was recovered from the B1 soil horizon at a depth of 16 cm below surface. As previously discussed, this level represented the major cultural deposit at JcUr-3 and has been dated at 1490±100 BP. It was manufactured of coarse black chert, the raw material which dominated the lithic assemblage on this horizon, although this is one of the few shaped artifacts using this material.

Bifaces

Bifaces are distinguished from projectile points primarily on the basis of their larger size, measured in terms of length, width or thickness. Within the small tool assemblage at JcUr-3, there was generally not a problem sorting one class from the other, with the exception of two small specimens, classified here as large biface fragments. Unfortunately, the biface assemblage at Annie Lake is meagre, fragmentary, and largely dominated by unfinished bifaces. Bifaces were classified into three categories: finished bifaces, rough bifaces and partial bifaces (adapted from Gotthardt 1990:173).

Finished bifaces are defined as implements near completion, with a regular outline and relatively straight edges. Also included were artifacts showing signs of use related to their primary function. Rough bifaces are implements which have bifacial retouch on all margins and complete facial flaking on at least one face. Partial bifaces are implements with only localized bifacial flaking. Within this broad framework, the few reasonably complete implements will also be defined according to Workman's classification scheme. Most of the rough and partial bifaces are made from coarse-grained, coarse black chert, whose numerous faults and inclusions that appear to render the material ill-suited for tool manufacture.

Finished Bifaces

Five finished biface fragments were recovered during excavations at JcUr-3 in 1992 (Plate 5:4). Only one of these, JcUr-3:2800, is reasonably complete, with most being only small fragments of presumed larger pieces. Three are of various fine-grained grey and black chert and two of coarse-grained black chert.

Large Broad Biface with Convex Edges (N=1)

The largest and most complete biface, JcUr-3:2800, is a finely crafted, large broad biface with convex edges (BS2). It has a symmetrical outline but is slightly thicker along the left margin. The tool is widest on the proximal side of the midpoint, and that end of the implement is missing. Flaking is complete on the dorsal side and largely confined to the margins of the ventral surface. There is extensive retouch along the dorsal margins, and several pot lid spalls on each side. The tip is rounded and the cross-section is plano/convex.

Stratigraphic Placement and Chronology

In addition to being the largest and most complete biface fragment collected, this implement also appears to be the oldest. It was collected in three pieces, with two of the fragments coming from the B3 horizon in N7W3. This is from the same level as the Annie Lake point, and therefore provides an age estimate similar to the Annie Lake point of approximately 5000 years old. While BS2 is admittedly a broadly defined lithic category, the age estimate compares favourably with Workman's proposed chronology. He notes that bifaces of this type only occur in pre-ash levels in southern Yukon, and based on excavations at JhVq-1 states, "One might tentatively suggest that this form was in vogue in relatively early post-microblade times in southwest Yukon" (Workman 1978:229). The significance of this biface will be included in the following discussions on the Annie Lake complex. The third fragment of this implement was recovered at a shallower level three metres distant, possibly the result of more compacted stratigraphy, discussed below.

Unclassifiable Large Biface Fragments (N=4)

Four implements are included in Workman's BIf category. Two are made of fine-grained materials and are small enough to classify as possible projectile points, but are so fragmentary, that such a distinction is not warranted. The other two are manufactured of the ubiquitous coarse black chert. Implement JcUr-3:1826 consists of the right proximal end of a biface. It is relatively thin, but contains the thickest part of the tool, indicating that the finished biface was probably only slightly broader than a projectile point. Flaking is random and variable, with a sharp, straight, lateral margin. The biface is made of siliceous grey chert and has a slight patina. Biface fragment JcUr-3:2808 is a small edge fragment of a relatively thin biface, made of fine-grained grey chert. It is not possible to estimate potential size or shape, but the thickness of the fragment suggests that the implement was not a projectile point. Flaking appears random and variable. JcUr-3:2817 appears to be the proximal third of a large convex-edged asymmetric biface, (Workman's BA1). Flaking is broad, random and variable, and the implement is made of coarse black chert. JcUr-3:2836 is the proximal end of a biface fragment of the same coarse-grained material, and also appears to have been asymmetrical.

Stratigraphic Placement and Chronology

The stratigraphic context of biface fragment JcUr-3:1826 is somewhat questionable. It was recovered 15 cm below surface, from a square (N9W6) which had no intervening loess horizons to define clearly the various cultural levels. It appears to have

Plate 5:4 Finished bifaces from JcUr-3, 1992. (L-R) JcUr-3: 2800, 1286, 2808, 2836 (bottom row) JcUr-3:2817

come from the bottom of B2 or the top of B3. In the adjacent square (N9W5), the third fragment of the previously mentioned large broad biface with convex edges (BS2) was collected from approximately 18 cm below the surface, with the remaining pieces of the tool coming from a B3 horizon in square N7W3. This suggests that the fragment is somewhat younger that the BS2, estimated to be about 5000 years old. The evidence of patina on the chert also suggests an antiquity consistent with this estimate. All of the other unclassified biface fragments were recovered in the B1 horizon or immediately above, in the ash lens, and are presumed to date to approximately 1500 BP.

Unknown Biface Fragments (N=3)

This classification was created to accommodate three enigmatic bifacially shaped implements, which either could not be made to fit any of Workman's categories or simply deserved a category of their own to promote further discussion (Plate 5:5). The most puzzling of the three is JcUr-3:2793, a large bifacially flaked obsidian flake fragment that displays significant battering on all margins. It is rectangular in morphology with two prominent facets on the dorsal face. Flaking on the ventral side is limited to lateral and distal margins. Rough, bifacially flaked notches are evident at about the midpoint of both lateral margins, suggesting that the tool may have been hafted or intended to be hafted. Both of these lateral margins display long, utilized flake facets, and there are two transverse facets at the proximal end. Although none of these long facets appear to be the result of deliberate burination, the flake may have been used in the manner of a burin. There is approximately five percent cortex evident on the dorsal side. JcUr-3:2822 is a small multi-notched biface fragment. There are two prominent notches on the left margin and a single small notch near the base of the right lateral margin. Flaking is complete on both dorsal and ventral faces with the exception of two potlid spalls. Made on lightly patinated grey chert, this tool possibly represents a notched projectile point base that has been reworked into a spokeshave or notched scraper. JcUr-3:2848 is a small, bifacially flaked fragment of fine-grained grey chert. Flaking is evident on the dorsal face and along the lateral margins and distal edge, although limited to the lateral margins of the ventral side. General morphology suggests a reworked medial portion of a small, thick projectile point; however, the fragment displays significant alteration towards some unknown end after it broke. Most of the retouch is focused on the distal margin, but the piece seems too small to have any functional value.

Stratigraphic Placement and Chronology

It is unfortunate that no technological or functional insights could be gained into JcUr-3:2793, as it was recovered in association with a hearth which provided a radiocarbon date of 6170 ± 230 BP. It was found 36 cm below surface from square N6W12. The stratigraphy of this square was significantly disturbed, making inter-level comparisons difficult, but there were small pockets of intact soil units, within which associations are thought to be quite reliable. This tool and hearth were placed stratigraphically above the deepest broken palaeosol level, but the relationship between the two soil units is uncertain. The distinction may be unimportant, however, as in the main gully area both the B4 and B5 horizons returned dates ranging from about 7100 to 6200 BP. JcUr-3:2822 was recovered in the B1 horizon, and appears to relate to the major Northern Archaic or Taye Lake technological horizon at Annie Lake, dated at about 1490 BP. JcUr-3:2848 was recovered in a surface setting and presumably dates to the Late Prehistoric period.

Rough Bifaces (N=1)

A single, nearly completed biface, JcUr-3:2812, was made of coarse-grained black chert. The fragment consists of the distal end of the roughed out biface, with convex margins that converge to a rounded tip. In shape, the biface approximates a broad, projectile point preform, but was likely intended to be a long, symmetrical, parallel-sided biface (Workman's BS1). It is convex/plano in cross-section.

Stratigraphic Placement and Chronology

This implement was recovered in the B1 Horizon, immediately below the ash, and likely dates to about 1500 BP.

Plate 5:5 Unknown Biface Fragments. (L-R) JcUr-3: 2793, 2822, 2848

Partial Bifaces

Four partial biface fragments (Workman's Bf) were recovered at JcUr-3, # 2970, 2789, 2659 and 2400. Partial bifaces are defined as implements with only localized bifacial flaking on one or more margins. These samples can be dealt with summarily. All are made from coarse-grained black chert; all display minimal bifacial shaping; all were recovered in the B1 horizon, or immediately above this level in the ash; and all presumably date to the same period of approximately 1500 BP.

Blades and Microblades

The small sample of blades (referring to large blades or macroblades) and microblades recovered at JcUr-3 in 1992 constitute some of the most significant and potentially most informative artifacts of the entire Annie Lake assemblage. Macroblade technology is a poorly understood aspect of the prehistoric technological traditions for northwestern North America, where temporal and spatial distributions are just beginning to emerge. Although only two blades were recovered at the Annie Lake site, the stratigraphic context permits a number of general and specific comments about the place of this tool type in the prehistory of southern Yukon. Similarly, the stratigraphic placement of the small microblade assemblage from Annie Lake refines current theories of the introduction of microlithic technology to southern Yukon. The collection of seven microblades, and three microblade-related artifacts now constitutes the earliest known microblade component in glaciated regions of the Yukon.

Blades (N=2)

Blade technology has rarely been identified in lithic assemblages from southern Yukon, consequently, this tool category was not present in Workman's classification scheme. I will, therefore, briefly discuss the attributes of blades collected at JcUr-3, and in the following section review the characteristics and distribution of blade technology at other locations in extreme northwestern North America.

Two large, complete blade tools (Plate 5:6) were recovered at Annie Lake in 1992, and while similar in size, they display considerable variation in method of manufacture.

Both are lamellar with relatively straight, sharp, parallel sides, and both show use wear/modification along a single edge. JcUr-3:2838 has an isolated small single facet, or punctiform, platform with evidence of platform preparation. The dorsal surface has a single longitudinal arris, with one facet running parallel to the orientation of the flake, and multiple flake facets of various orientations along the left margin, which may be related to the original core preparation and rotation. The blade has a triangular cross-section, curvilinear longitudinal profile, a feather termination, and is sharply pointed at the distal end with no evidence of use at the tip. Implement JcUr-3:2798 lacks a platform and displays several dorsal flake scars that indicate bi-directional blade removal from a core. It has two major arrises, although one is not present along the entire length of the tool, and the blade terminates in a hinge fracture. Both blades are of green or green/black chert; although, JcUr-3:2798 contains numerous small crystalline inclusions.

Stratigraphic Placement and Chronology

Only one of the two blades from JcUr-3 was recovered in reliable stratigraphic context. JcUr-3:2838 was located at a depth of 56 cm below surface in a coarse sandy soil matrix underlying the B5 horizon. This level, which contained only slightly streaked organic residues, has been identified as a poorly expressed B6 horizon (see discussion of soil analysis in Chapter 4). The artifact was recovered from square N11W3, located in an area where soil deposits were somewhat shallower than the best stratified sections, located five metres southwest. While soil horizons were compressed, stratigraphic continuity was demonstrable over this distance, especially for the overlying distinctive red/brown B5 palaeosol. This provenience places blade technology stratigraphically below the microlithic component, and presumably dates the B6 horizon to older than 7160±70 BP.

The other blade, JcUr-3:2798, was recovered from N6W12 at a depth of 29 cm below surface; in this area, soils were considerably thinner, with glacial gravels encountered at 50 cm below surface. Unfortunately, the stratigraphy of this and the adjacent square had been significantly disturbed, perhaps by a tree throw or burrowing animal; consequently, coherent palaeosol profiles could not be discerned. This disturbance

Plate 5:6 Large Blades from JcUr-3, 1992. (L-R) JcUr-3: 2838, 2798

appears to have occurred in the past 1200 years, as red sands from previously buried palaeosols were noted on top of the White River ash. An apparent hearth was encountered in this square 36 cm below surface in a small undisturbed portion of what appeared to be the penultimate palaeosol. A radiocarbon date of 6170±230 BP was obtained for this hearth; however, given the disturbed context of the square, it is not possible to apply this date to the blade tool.

The significance of blade technology in the prehistoric technological sequences of the northwestern North America is still uncertain. A review of the literature indicates that while blades and microblades are commonly included in a single tradition in the northwest, there are a number of competing hypotheses that would distinguish the two tool forms and place macroblade technology on the continent earlier than microblades. In addition, while there are a number of sites where the two tool types appear to be contemporaneous, it also is evident that in many locations microblade production continued well after blades were no longer part of the toolkit.

MacNeish included blades (along with microblades) in the tool assemblage of his Cordilleran Tradition, which he envisioned as the earliest archaeological tradition in the northwest (MacNeish 1964:285). Following MacNeish, Irving and Cinq-Mars (1974:77) placed blades with round-based lanceolate points in a pre-microblade "northern or Arctic Cordilleran complex or tradition." In the 1980s, Clark and Morlan revived and revised the northern Cordilleran tradition to include "prismatic blades, but not microblades, burinated flakes and various generalized implements..."(Clark and Morlan 1982:81).

Since the late 1960s, however, many researchers have routinely lumped microblades and blades into the same technological complex. West (1967) included the two forms in his Denali complex, which he suggests emerged intact out of Asia sometime prior to 10000 years ago. Despite the fact that the Donnelly Ridge type site for the Denali Complex was unstratified, West felt that the assemblage was small enough to constitute a single occupation and, therefore, justified the inclusion of both blades and microblades in the complex.

Following excavations at Onion Portage, at which Anderson defined both the American Paleoarctic and Northern Archaic traditions, blades and microblades were again placed within a single technological complex, known as Akmak (Anderson 1970). It is worth noting that at this site, the stratigraphic co-association of blades and microblades is, if not questionable, at least very poorly documented. In addition to reporting blades and microblades in stratigraphic association, Anderson also noted similarities in lithic production, which he interpreted as representative of stages in a single technology. Onion Portage was a well stratified and widely publicized site, which greatly influenced subsequent archaeological reconstructions in the northwest. The stated technological similarity and stratigraphic co-association of blades and microblades at these sites has obscured the fact that each of these tool forms are often found in assemblages where the other is completely absent.

In the northern Yukon, Gotthardt (1990:234) noted differences between large blade core and microblade cores in platform preparation, number of platforms and location of blade removals. She also reported that based on distribution and association of artifacts from sites examined in northern Yukon, blade and microblade technologies may not always be entirely contemporaneous. Instead, she suggested that blade technology was a critical index trait of the pre-microblade Northern Cordilleran tradition (ibid. :263).

More recently, Goebel et al. (1991) have argued that a large core and blade industry constitutes a hallmark of the Nenana Complex, first defined at Dry Creek, Walker Road and Moose Creek in central Alaska (a distance of approximately 800 km from Annie Lake). The authors suggest that the Nenana Complex, dated at >11000 BP, is the oldest archaeological tradition in the New World; it pre-dates microlithic technology and is probably ancestral to the Clovis culture of the American southwest, based largely on observed similarities in blade technology between Clovis and Nenana assemblages (see Goebel et al. 1991 and Hoeffecker et al. 1993). More recent evidence, however, indicates that microblades may be present in the Nenana Complex toolkit (Raymond Le Blanc personal communication 1994). Furthermore, Kunz, who has recently reported (Kunz and Reanier 1994) an even older Paleoindian site in Alaska, (in this case defined by large convex and concave based lanceolate points, argues that Nenana should properly be placed within the Denali complex. He discounts any similarity between Clovis blades and those of the Nenana Complex (Michael Kunz personal communication 1993). The issue is further complicated by the evidence from Bluefish Caves in northern Yukon, where there is evidence of microlithic technology at least by 12000 and possibly as early as 18000 BP (Cinq-Mars 1985), earlier than any known Paleoindian sites in the region. Moreover, a burin on a blade at this site (Morlan and Cinq-Mars 1982:Fig.9) suggests the presence of blade technology as well, although, based on current information, it is not immediately obvious whether the two technologies were contemporaneous.

Regardless of the absolute antiquity of blade technology, it is likely that there was considerable regional variation in the importance and duration of this technology, whether included in Northern Cordilleran, Paleoarctic, Nenana or some other complex. Anderson (1970) reported blades and microblades in association in the basal Akmak complex, but blades were absent in the overlying Kobuk complex, while microblades persisted. Furthermore, Clark notes that blades were not restricted to the mid-Holocene and lists numerous occurrences of blades in Northern Archaic assemblages in the northwest, sometimes in association with microblades (Clark 1992:88).

In southern Yukon, however, the temporal and spatial distribution of blades appears very limited. Microblade sites are relatively numerous, but Workman found no evidence of blade technology in his assessment of the southwestern Yukon. Recently, personal communication reported a blade industry in a surface context at Fish Lake, approximately 30 km from Annie Lake. While a number of blades and cores were collected at several sites, no microblades or microcores were found in association (Ruth Gotthardt personal communication 1993). The two blades from Annie Lake appear to be the only ones recovered from a stratified context in the southern Yukon. Extrapolating from this limited sample, it seems evident that there is a temporal separation of blades and microblades in southern Yukon, and based on stratigraphic provenience at JcUr-3, the blade technology preceded microblade technology by some unknown period of time.

Microblades (N=10)

A small, but well-stratified assemblage of microblade related artifacts were recovered at Annie Lake in 1993 (see Plate 5:7). These include seven microblade fragments, two microblade related flakes and one possible blade core fragment, which was collected out of stratified context. Most of the implements are fragmentary, including four proximal, two medial and one distal fragment. Two microblades, JcUr-3:2785 and 3001, are complete, insofar as they possess platforms and feather terminations; however, their small size and lack of use wear indicates they were unsatisfactory blade removals. Three of the four largest microblades, JcUr-3:2856, 2784 & 2781, show extensive edge damage along one margin, but none appear to have been backed on the opposing margins. One small microblade fragment and two microblade related flakes show no evidence of use. Five microblades have two arrises, while the remaining four have a single arris. It was possible to determine the longitudinal profile of only the largest microblades, which are slightly curvilinear. Four of the blades are manufactured of a grey/green speckled chert, two of green chert, two of grey siliceous material and one of brown siliceous material.

A small fragment of a possible microblade core, JcUr-3:2830, (Workman's MCfd) was also recovered at JcUr-3. It appears to be a flake from the face of a blade core, which displays the striking platform and a three vertical flake facets on the face. There appears to have been bi-directional flake detachment on the core face. The area of the platform is heavily battered and perpendicular to the top of the core. The identification of this implement as a microblade core fragment is tempered by its shallow provenience, 6-10 cm below the surface, and the bi-directionality of flake/blade detachment of the face front. In defense of the blade core identification, however, it is difficult to imagine what other lithic reduction sequence could have produced such a implement. After detachment, the fragment was used as a very small end scraper, with use wear evident on the distal margin.

Stratigraphic Placement and Chronology

Most of the excavated microblades were restricted to a small area. Squares N7W2 to N7W5 produced all but two of the microblades, with the others coming from N7W9 and a test square which corresponded approximately to N5W14. All but three of the microblade related artifacts were recovered *in situ*; the others came from backdirt screenings. Depths below surface varied depending on overall thickness of soil sediments; however, all appear to have come from the same palaeosol, identified as B5. While not all squares displayed five distinct palaeosols, stratigraphic continuity was demonstrable for the B5 horizon over the range of the squares containing microblades. This soil horizon has been well-bracketed, with radiocarbon dates obtained from charcoal samples recovered near the base and near the top of the palaeosol, both associated with microblades. A probable hearth from the bottom of B5 at N7W4 provided a date of 7160±70 BP, while a date of 6230±70 BP was obtained for a pooled charcoal sample near the top of the B5 horizon in the adjacent square, N7W3.

The dates obtained for the B5 horizon indicate that this is the earliest known microblade component in glaciated regions of the Yukon. There are few other dated microblade sites in the territory and many of these are problematic. Generally, however, microlithic technology is assumed to extend from approximately 7000 BP to approximately 4500 BP in southern Yukon (Workman 1978). Radiometrically dated sites include Otter Falls (JgVf-2) dated at 4570±150 BP (Workman 1978:248), and Moosehide (LaVk-2) dated at 5625±80 BP (Jeff Hunston personal communication 1994). MacNeish (1964) reported a date of 1270±140 BC for a microblade horizon at Little Arm (JiVs-1); also a date of 1150 ± 70 BC for the Pelly Farm site (KfVd-2). Workman dismissed both of these dates as too recent to be valid (1978:256, 403). This interpretation was based on the absence of microblades at a component of the Chimi site (JjVi-7) which had provided a date of 2900±130 BP, and therefore "would seem to establish a *terminus ante quem* date for the disappearance of microblade technology in the area" (ibid. :256). Furthermore, Hunston (1977) reported that a careful re-examination of the Pelly Farm collection revealed no evidence of the microlithic technology claimed by MacNeish. He suggested that the date of 1150 ± 70 BC was reasonable for the lithic assemblage, but the site did not actually contain a Little Arm component. Another recent date of 1870±180 BP was reported for an apparent microblade component at the Rock River site in northern Yukon

Plate 5:7 Microblades and blade related artifacts from JcUr-3, 1992. (L-R) JcUr:3: 2781, 2782, 2856, 2785, 3001, 2784, 2787, 2786

(Gotthardt 1990:41,237); however, once again this was considered too recent to be a valid date (Ruth Gotthardt personal communication 1994).

At the older end of the scale, Workman assigned the basal horizon of the Canyon site (JfVg-1), dated at 7195±100 BP, to the microlithic Little Arm phase, based on the presence of geometric, round-based projectile points. Despite the fact that no microblades were recovered at this site, Workman's assumption that Little Arm was the first technological tradition in the Yukon precluded any other interpretation. The earliest evidence of microblade technology anywhere in the Yukon comes from Bluefish Caves in the unglaciated northern portion of the territory. Here, Cinq-Mars (1985) reported microlithic artifacts in association with a Pleistocene bone assemblage dated to between 12000 and 18000 years ago. Elsewhere in the Northwest, microblades have been dated from 10600 BP at Dry Creek in Alaska (Powers et al. 1983) to as recent as 1000 AD at Healy Lake (see Shinkwin 1979:149).

The possible microblade core fragment was recovered from 6-10 cm below surface in square N9W27. At this location, total deposits did not exceed 30 cm and only one palaeosol was discernible below the White River ash. No dates were obtained for this or the adjacent square, so it can be stated only that the artifact is older than 1250 years, based on the location below the ash. The raw material of the core fragment does not match any of the recovered microblades.

Endscrapers

Following Workman (1978), endscrapers were defined as unifacial implements on a flake that show deliberately retouched convex to sub-convex end margins. Only six implements were recovered at Annie Lake in 1992 that were identified as endscrapers or endscraper fragments. In addition, one other artifact which displays unifacially retouched lateral edges will be included in the following discussion (see Plate 5:8).

Endscrapers are a ubiquitous, highly varied stone tool type, which occur frequently in Yukon assemblages. Workman classified a large series of endscrapers from Southwest Yukon according to metric attributes which he assumed were related to function, rather than descriptive classifications based on shape, raw material or blank type. The attributes of classification are: maximum thickness of the working end, maximum width (chord) of the working end, ratio of width to thickness of the working end, and weight. The ratio of width to thickness provided the basic unit of classification and the descriptive category, for endscrapers from JcUr-3. Metric data are presented in Appendix 1.

Typical Endscrapers (N=2)

Two highly varied but typical endscrapers (Workman's ES3) were recovered at Annie Lake in 1992. JcUr-3:2839 is a thick, clear quartz crystal endscraper with steep marginal retouch on the distal end. General outline is ovoid, with a heavily battered, convex working edge. JcUr-3:2783 is a small, thin endscraper on a heavily patinated grey siliceous flake. Only the distal end of the flake is present; the proximal end terminates in a hinge fracture. Lateral sides are parallel and there is steep marginal retouch on a sub-convex distal edge. There are three broad, parallel facets on the dorsal surface, suggesting that it was made on a large blade.

Stratigraphic Placement and Chronology

Despite their typical classification, both of these endscrapers appear to challenge the temporal range of endscrapers in the extreme North American Northwest. According to Anderson (1968b:14), endscrapers are most abundant within the Northern Archaic component at Onion Portage, and Workman (1978:278) states that, in his sample, no typical endscrapers were recovered above the White River ash. However, the quartz crystal endscraper was recovered above the ash from square N10W26, suggesting an age of less than 1250 years, while the other endscraper (JcUr-3:2783) came from 26-30 cm below the surface in square N6W12. As discussed above in the section on the chronology of blades, this square was heavily disturbed and stratigraphic provenience is unreliable. However, the close proximity of this scraper to the blade (JcUr-3:2798) as well as the heavy degree of patination, suggests an antiquity greater than 5000 years and possibly outside the range of the Northern Archaic. A date of 6170±230 BP was obtained for an apparent hearth in the same square several centimetres beneath it, at a depth of 31 cm below surface.

Broad Thin Endscrapers (N=3)

Three of the endscrapers recovered at Annie Lake are classified as Broad Thin Endscrapers (Workman's ES5). JcUr-3:2819 is a relatively large endscraper on a coarse-grained grey siliceous material. It is fan-shaped with expanding lateral edges and steep unifacial retouch on the convex, distal margin. Both lateral edges and distal corners are sharp but show no sign of use wear. JcUr-3:2820 is a flat, thumbnail-size endscraper on grey chert. There is relatively steep marginal retouch on the convex distal end, with minor retouch on the left margin and possible use wear on the right margin. The proximal end terminates with a snap fracture. JcUr-3:2792 is a very small endscraper on vitreous black chert. It is roughly ovoid in outline with steep marginal retouch on a convex distal end. The proximal end displays two platform facets. There is no evidence of use wear on either lateral margin or on the sharply pointed right corner.

Stratigraphic Placement and Chronology

Two of the three endscrapers fall firmly within the temporal range of the Northern Archaic. JcUr-3:2820 was recovered from the B1 horizon of N10W5, and JcUr-3:2819 was found in the adjacent square, N9W5, and attributed to the B2 level. In these squares, however, there was not a clear separation between the two horizons; therefore only bracketed dates will be advanced for these artifacts. Several metres distant, the B1 level was dated at approximately 1490 BP and B2 at about 2795 BP; consequently, these dates provide the range for both of the endscrapers. JcUr-3:2792 was recovered 25 cm below surface at square N6W11. This was the penultimate palaeosol in the square, lying above the clearly identified microblade horizon and, as such, could represent either the B3 or B4 horizon. The age range for this artifact, therefore, is either early Northern Archaic, at approximately 5000 years BP (the estimated age for the Annie Lake horizon) or late microlithic, at about 6200 BP, based on the radiocarbon date for the B4 horizon. The distinctive raw material does not match any other artifact in the assemblage.

Plate 5:8 End and Side Scrapers from JcUr-3, 1992. Top Row (L-R) JcUr-3:2839, 2819, 2792, 2783
Bottom Row (L-R) JcUr-3:2804, 2820, 2809, 2598

Endscraper Fragments (N=1)

One endscraper fragment (Workman's ESf) was recovered at Annie Lake in 1992. This piece (JcUr-3:2598) was too fragmentary to be placed within a more specific category, and consists of a narrow flake fragment with steep unifacial retouch on the distal margin. A battered platform remnant is visible at the proximal end of this artifact, made of grey/green chert. The left margin consists of a snap facet and the right margin shows the hackles of a heat spall. Quite likely this implement began life as another type of tool and was turned into a small scraper after having been broken.

Stratigraphic Placement and Chronology

JcUr-3:2598 was found in the backdirt and appears to have come from above the White River ash. A temporal designation of less than 1250 years is probably accurate.

Angular Side and Endscrapers (N=1)

One example of Workman's ESSA, Angular Side and Endscraper, was identified at Annie Lake in 1992. JcUr-3:2804 is rectangular in shape and displays shallow unifacial retouch on the convex, left lateral margin, and minor retouch/use wear on a concave distal edge. A well isolated and utilized graver spur is evident on the left distal corner, and it appears that both the left proximal corner and right distal corner may also have had graver spurs which have subsequently snapped off. A large, single facet platform is present on the proximal end, and it is made of fine-grained, banded grey chert.

Stratigraphic Placement and Chronology

JcUr-3:2804 was recovered 21 cm below surface in square N9W5. It was generally associated with a fragment of biface JcUr-3:2800, assigned to the B3 horizon and tentatively dated at about 5000 years old. It is noteworthy that the fine-grained raw materials which characterize this and all of the other tools assigned to this horizon stand in contrast to predominantly siliceous materials located below, and the predominantly coarse-grained materials above.

Angular Side and Endscraper Fragment (N=1)

One tool has been assigned to the Angular Side and Endscraper Fragment category (Workman's ESSAf). It consists of a small flake fragment with unifacial retouch on the ventral surface along the convex right lateral margin and a portion of the distal edge. The rest of the distal edge has been snapped off. Overall shape is irregular with a ragged, unmodified left lateral margin and a large single facet platform. The tool is made of a lightly patinated grey siliceous material.

Stratigraphic Placement and Chronology

JcUr-3:2809 was recovered 25 cm below surface in square N8W4. This depth and horizon corresponds with the B3 horizon and the location of the so-called Annie Lake point. This provides the tool with an estimated age of about 5000 years and a temporal correlation with the early Northern Archaic Tradition. Once again, the patina evident on the stone provides a degree of correlation with the presumed antiquity of the implement.

Unifaces

The largest inventory of tool types represented at Annie Lake belong to a broad category of implements identified by Workman as unifaces. Generally, these tools are defined by the presence of unifacial retouch on working edges and steeply beveled edges (see Workman 1978:288 for distinction between scrapers and unifaces). At the simpler end of the classification, deliberate shaping of the tools is not always evident and working edges are usually confined to naturally thin, sharp flake edges. However, Workman (1978:288) classifies unifaces according to general morphology, thus implicitly recognizing a correlation between tool function and selection for flake shape. Furthermore, he states that various shapes of unifacially retouched flakes can, at times, correspond to technological traditions. For the sake of comparability, the same categories will be employed here. Many of these implements at Annie Lake exhibited extensive edge damage, so it was difficult to distinguish deliberate retouch from heavy utilization. Following Le Blanc (1984:117), no distinction will be made between the two. Within the Annie Lake collection of 16 unifaces, none appear to be deliberately shaped and all fall within the category of thin unifaces.

Thin Unifaces with Multiple Retouched Edges (N=6)

Five artifacts display unifacial retouch on more than one margin (Workman's UTM1). JcUr-3:2833 and JcUr-3:2821 are somewhat similar in orientation with marginal retouch/use wear at the distal end of a convex left lateral margin, and at the proximal end of the right lateral margin. JcUr-3:2833 is a long lamellar flake with a single dorsal ridge, made on coarse-grained black chert. JcUr-3:2821 is a large irregularly shaped flake, also with a prominent dorsal ridge. JcUr-3:2835 is a small, irregularly shaped flake with minimal retouch on the ventral surface near the platform and along a straight, right lateral edge. Fifty percent cortex is present on the dorsal surface of the fine, grained black chert. JcUr-3:2834 is a triangular-shaped flake fragment with retouch along both expanding lateral margins. The tool is made of grey chert with crystalline inclusions, and the distal end tool is snapped off. JcUr-3:1245 is a small obsidian flake with minimal retouch/use wear along the left lateral and distal margins. A very small notch is present at the right side of the distal edge. JcUr-3:2795 is a long lamellar flake, with two sub-convex lateral edges, a hinge fracture at the distal end, and a snap facet at the platform. It is blade-like in morphology, and displays a single dorsal ridge with extensive retouch/use wear on the ventral surface of both lateral margins, including a small section on the ventral side of the right, distal edge. The tool is made of brown siliceous material which is now heavily patinated.

Stratigraphic Placement and Chronology

According to Workman (ibid. :305), this category does not display strong temporal or technological affiliations. At Annie Lake, four of the six unifacial tools in this category were recovered 1-3 cm below the White River ash in their respective squares (exact provenience shown in Appendix 1). These examples, therefore, all appear to date to shortly after the ashfall at about 1250 BP, and are probably related to the major cultural horizon at JcUr-3, dated at about 1495 BP. This indicates a Northern Archaic or Taye Lake phase affiliation. JcUr-3:1245 was collected within the humus and therefore presumably dates to the Late Prehistoric period. The noteworthy exception to the relatively recent nature of these artifacts is JcUr-3:2795, which was originally found in two fragments from adjacent squares. The largest fragment was recovered from N6W12 at a depth of 30 cm below the surface. As previously discussed, this square had disturbed stratigraphy; however, this tool was found in association with the large blade (JcUr-3:2798) and endscraper (JcUr-3:2783), both described above. As discussed, a date of about 6170 BP was obtained for an apparent hearth in the same square several centimetres lower, 31 cm below surface. Because of considerable stratigraphic disturbance, this date can only be used as a general indicator of age. Nonetheless, the pronounced patina on two of the three associated artifacts also suggests an antiquity which roughly corresponds with a pre-Northern Archaic date.

Thin Multi-edged Unifaces with at Least One Concave Edge (N=2)

Two tools were classified as Thin Multi-edged Unifaces with at Least One Concave Edge (Workman's UTM2). Both flakes have irregular outlines with extensive marginal retouch on several edges. Both appear to be unshaped. JcUr-3:2826 is a coarse-grained black chert flake fragment (3 pieces) with one incomplete unifacially flaked straight edge and one heavily used/retouched concave edge. JcUr-3:2811 is a broad thin, grey/green siliceous flake fragment with unifacial retouch on two undulating (concave/convex) edges.

Stratigraphic Placement and Chronology

Workman's only temporal observation about UTM2's is that they seldom occur above the White River ash. The black chert flake JcUr-3: 2826 was recovered in three pieces, two within the ash and the third fragment directly below the ash, providing a temporal estimate of approximately 1250 BP. JcUr-3:2811 was also collected in three pieces, with two fragments recovered from the distinctive red/brown B5 microblade horizon of square N9W6 and the third fragment coming from the bottom of the B4 horizon of N8W4. This fragment was in direct association with a distinct hearth feature which was dated at 6260±80 BP (calibrated age 7175 BP). This distributional link between B4 and B5, and the complementary dates of about 6200 BP for the top of B5 and the base of B4, indicates that the two palaeosols represent a single technological horizon. However, so few artifacts were found in the B4 horizon that this discovery has little value.

Plate 5:9 Unifaces from JcUr-3, 1992.Top Row (L-R) JcUr-3: 2833, 2668, 2780.
Bottom Row (L-R) JcUr-3:2044, 1489

Thin Unifaces with a Single Convex Edge (N=3)

Three artifacts have been identified as Thin Unifaces with a Single Convex Edge (Workman's UTS1), and most represent simple, expedient tools. In all cases, retouch is minimal with little apparent shaping. Artifacts JcUr-3:1489, 2668 and 2780 are fine-grained chert flake fragments with use wear evident on a single, slightly convex edge. All display flaking on the dorsal face and appear to be expedient, short term tools made on small waste flakes.

Stratigraphic Placement and Chronology

As with other unifacial tool categories, Workman notes little chronological or technological coherence for UTS1. Implements JcUr-3:1489 and 2668 were found on the surface or in the humus and postdate the White River ash fall. JcUr-3:2780 was recovered from the backdirt of N6W13 approximately 26-30 cm below surface, indicating an estimated age of about 5000 years old. However, no patina was evident on the grey chert material.

Thin Unifaces with a Single Straight Edge (N=1)

One Thin Uniface with a Single Straight Edge (Workman's UTS2) was recovered at Annie Lake in 1992. JcUr-3:2282 is an irregularly shaped flake fragment of coarse black chert with an isolated area of use wear along the right side of the distal edge. It was recovered within a large flake scatter at the top of the B1 horizon, immediately below the White River ash. This cultural horizon was dated at about 1490 BP.

Thin Uniface Fragments (N=2)

Two Thin Uniface Fragments (Workman's UTf) were identified. Both were originally classified as shatter but microscopic examination revealed minor marginal retouch. JcUr-3:2829 is a very small shard of obsidian which appears to represent the edge of a larger uniface, and JcUr-3:2044 is a irregularly shaped piece of grey chert shatter with isolated nibbling along one edge fragment.

Stratigraphic Placement and Chronology

Both 2829 and 2044 were found in the B1 horizon, so date to about 1490 BP.

Plate 5:10 Unifaces from JcUr-3, 1992. Top Row (L-R) JcUr-3:2811, 2826, 2795, 2821
Bottom Row (L-R) JcUr-3:2834, 2822, 2835, 1245

Tabular Uniface/Biface (N=4)

Tabular tools are distinguished from other unifaces and bifaces primarily on the basis of raw material, which are coarse stones rather than chert. Unlike chert and other fine-grained materials, the flaking of tabular pieces does not result in a clean flake detachment with sharp edges. Instead the retouched edge provides a hard, blunted surface ideally suited for scraping and dressing hides, which would be cut by sharper tools. Four tabular tools were recovered at Annie Lake in 1992. JcUr-3:2857 is a large tabular biface (Workman's TB1) with a sub-convex working edge. It is made on a flat fragment of schist and does not appear to have been backed. JcUr-3:2844, 2801 and 2813 are smaller fragments of tabular slate unifaces (TU) each with one convex working edge. JcUr-3:2801 is thicker than the others and its pattern of use wear—with a heavily utilized thick, blunt edge and an unused, sharp opposite edge—reinforces the interpretation that these were scraping rather than cutting tools.

Stratigraphic Placement and Chronology

These tabular skin scrapers are ubiquitous items in aboriginal toolkits even well into this century. Workman (1978:237) reports an increased incidence of tabular tools in post-ash context and suggests that the popularity of the tool type may be linked to an increase in moose populations in southern Yukon that resulted in increased hide preparation. The small sample at Annie Lake was distributed evenly above and below the ash. Implements JcUr-3:2844 and 2857, both found on the surface, possibly represent the most recent occupation of the site. The age of this poorly defined component is based primarily on the presence of a fragmented scallop shell that was recovered in a humus setting at square N9W3. The absence of any historical material and the relatively robust state of the shell suggests an occupation immediately predating European contact in the late 1800s. The other two slate scrapers, JcUr-3:2801 and 2813, recovered at the top of the B1, presumably date to about 1490 BP.

Hammerstones

The identification and selection of hammerstones at JcUr-3 was an admittedly arbitrary and subjective process. Because of the fine, aeolian nature of the deposits at

Annie Lake, virtually every stone found in buried context was thought to be of cultural origin. In the upper levels, fire-cracked rock was abundant, and in the gully area a large feature containing more than 100 large river cobbles dominated the B1 and B2 horizons (see Figure 4:5). Below this, and down to the glacial gravels of the C horizon, stones of any kind were exceedingly rare. All hand-sized cobbles were examined in the field for clear evidence of battering, and while many cobbles were possible hammerstones, only five were selected as unquestionable. All of these implements are of rounded and water-worn granite; three have been utilized on the ends (Workman's H1) while two show use wear on the sides (H2). Only one, JcUr-3:2852 shows sufficient pecking to have altered the shape of the stone, giving the tool a flattened profile at one end. Microscopic examination showed no evidence that the hammerstones were used as abraders.

Stratigraphic Placement and Chronology

The five hammerstones collected came from several levels, and therefore represent a wide expanse of time. One was recovered above the ash, two from within the B1 horizon, one from B2, and the heavily pecked hammerstone was recovered in the microblade horizon of N7W4, the square which produced the largest number of microlithic artifacts.

Plate 5:11 Tabular Skin Scraper from JcUr-3, 1992. JcUr-3:2857.

Plate 5:12 Hammerstones from JcUr-3, 1992. Top Row (L-R) JcUr-3: 2855, 2849, 2851. Bottom Row (L-R) JcUr-3:2852, 2850.

Chapter Six

Discussion and Interpretation

The Place of the Annie Lake Site in Southern Yukon Prehistory

The significance of the Annie Lake site for interpreting the technological and chronological sequences for southern Yukon lies in the stratigraphic integrity of the soil horizons and in the artifact assemblage. As most of the buried palaeosols were radiocarbon dated, it is now possible to make more precise temporal statements about certain tool technologies than are generally permitted in subarctic archaeology.

A review of data from sites used to provide the existing chronological framework for Yukon prehistory shows that there are, in fact, very few well stratified and well dated archaeological components in the territory. Current interpretations are based on a handful of dated sites and on technological sequences developed largely in others regions in the Northwest. The paucity of data is especially pronounced in components from mid-Holocene and earlier times, and it is to this period that data from Annie Lake are best applied to refine existing archaeological sequences. In addition to providing a general interpretation of the multiple components at JcUr-3, data that might elucidate two specific problems were examined: the possible existence of a technological tradition antecedent to the microlithic Little Arm phase (Workman 1978), and the viability of a proposed Annie Lake complex preceding the introduction of the Northern Archaic Tradition (Taye Lake phase) in southern Yukon (Greer 1993). The following section presents an interpretation of the significance of the Annie Lake material for refining our understanding of the existing technological sequence for the Yukon, and includes my arguments for a Paleoindian, pre-microblade tradition in southern Yukon; as well as a discussion of the significance and place of the proposed Annie Lake complex within the Northern Archaic Tradition.

Tool types and assemblages are discussed here in terms of technological traditions, which do not necessarily represent cultural traditions. Unlike Workman (1978) and

Anderson (1968a), I do not suggest that changes in tool technology necessarily indicate movements or replacements of people.

Northern Cordilleran - A Viable Technological Construct for Southern Yukon

The archaeology of the far Northwest is at once characterized as well as impeded by a preponderance of localized technological phases, complexes and horizons. In an effort to make their own unique contribution to prehistory, researchers sometimes attempt to extrapolate from these local assemblages to create new broad regional traditions and sequences, which often either ignore or vary little from previously proposed archaeological constructs. This situation is especially pronounced within the microlithic period of the Holocene in extreme northwest of North America which has been variously labeled Northwest Microblade, Denali, (Siberian-American) Paleoarctic, American Paleoarctic, Beringian, and Little Arm. However, as increasing numbers of researchers uncover components that may precede microlithic technology in the Northwest, the focus and intensity of technological debate has shifted to the late Pleistocene/early Holocene.

The presence of large blades at the lowest levels of the Annie Lake site adds further support to the evidence for pre-microblade traditions, at least in this region of the Northwest. As discussed earlier, the practice of lumping blade and microblade technology into a homogenous technological tradition (cf., West 1967, Anderson 1970) has been challenged on a number of fronts. Irving and Cinq-Mars (1974:77), Clark and Morlan (1982:81), Clark (1983) and Gotthardt (1990:263) all considered macroblade technology to be a hallmark of a pre-microlithic technological tradition that they identified as Northern or Arctic Cordilleran, following MacNeish (1964:285). Goebel et al. (1991) also include blades as one of the key artifacts in their 11000 BP pre-microlithic Nenana complex. They suggest that the large core and blade industry of the Nenana complex shows a high degree of similarity to Clovis blade technology, and they posit a direct genetic relationship between the two so-called Paleoindian complexes (ibid. :74).

The temporal significance of blade technology is complicated by the fact that large blades persist into later microlithic and even Northern Archaic times (see Clark 1992).

Perhaps at the heart of the issue is the degree of similarity between Paleoindian blades and later microlithic traditions. Haynes (1982:395) distinguished between the origins of the two early American technological traditions and suggested that Denali/Paleoarctic traditions are derived from the microlithic Dyuktai Tradition in Siberia, while the roots of the Clovis Tradition probably lie further west at Mal'ta-Afontova. He had earlier suggested that two distinct blade technologies may have existed in the far Northwest, characterized by formalized wedge-shaped cores such as those at Akmak, and generalized, informal blade cores such as those at Anangula and Gallagher (Haynes 1982). Gotthardt (1990:265) expanded on this theme and suggested that wedge-shaped blade cores may be viewed as typically Paleoarctic and closely related to microblade technology; while more generalized large blade forms, with an informal morphology and occasionally rotated cores, may be seen as part of a proposed Northern Cordilleran Tradition or Paleoindian technology. This distinction between formal and informal blade technology may not be as objective as some researchers might think, however, for while Goebel et al. (1991) see clear technological similarities between the blades of the Nenana complex and Clovis blades, Kunz, who has examined the collection, claims that these blades are typical of the Denali Tradition and dismisses any Paleoindian affiliation (Michael Kunz personal communication 1993). It is worth noting that Kunz' 11000 BP Mesa site contained large unfluted, lanceolate points but no blades (Kunz and Reanier 1994).

Evidence from the Yukon is limited, but there are increasing data for a Paleoindian presence in the Territory which appears to pre-date microlithic technology, except at Bluefish Caves in Northern Yukon, where microblades are dated at between 12000 and 18000 BP. Part of the problem is the limited number of radiometrically dated early-to-mid-Holocene sites of any type in the Yukon. In constructing his archaeological sequences for southwest Yukon, Workman (1978) did not recognize any pre-microlithic components or assemblages in the area, so when he obtained a date of about 7200 BP for the basal level of the Canyon site, it was arbitrarily identified as a microlithic Little Arm site, despite the absence of microblades. Diagnostic artifacts included a large round-based, lanceolate point and a burinated biface. Reviewing the assemblage, Workman stated, "The absence of microblades is troublesome but the sample is so small and the specialized activity aspect (a hunter's camp of short duration) so clear that I regard this noncorrespondence as insignificant" (1978:409).

I believe there is now sufficient evidence from other sites to warrant a reconsideration of this assessment. The small assemblage from the microlithic horizon of the Annie Lake site presumably also represents a hunter's camp of short duration; however, microblades are the most abundant artifact. Also, in addition to the absence of microblades, the basal component at Canyon is characterized by a bifacially flaked, round-based projectile point. However, Clark (1983:42) suggests that bifacially flaked projectile points are rare elements in the microblade tradition, and furthermore that round-based lanceolate points have been included (along with blades) in one of the earliest articulations of the "northern or Arctic Cordilleran complex or tradition" (Irving and Cinq-Mars 1974:77).

More recently, Clark has characterized basal Canyon as a non-microblade horizon, representing "lanceolate-point or cordilleran-derived people of the northwest interior (a vague unnamed entity)..." (Clark 1992:79). He suggests that microlithic and cordilleran-derived non-microlithic technologies were contemporaneous in the Northwest with tool traditions "waxing and waning" in "complementary apposition" (ibid.).While this reference to a "vague unnamed entity" which was "coeval with Paleoarctic bands" (ibid.) appears to indicate a change in, or re-evaluation of, Clark's position on the Northern Cordilleran, it adds an important new dimension to the interpretation of early Holocene prehistory in the Northwest. Traditionally in the Northwest, as elsewhere in the New World, technological sequences are often presented as linear, non-contemporaneous sequences with new technological traditions replacing old. However, Clark's most recent evaluation suggests that microlithic and non-microlithic "peoples" may have co-existed side-by-side in the Northwest for several thousand years, all the while maintaining distinct tool traditions.

Several other recently reported or dated Yukon sites lend support to the general argument for an early Holocene/non-microblade tradition in the Territory. Walde

(1994:27) has reported a non-microblade component in western Yukon (KaVn-2) that provided a radiocarbon date of 7810±80 BP (Beta-68509, 1 sigma calibrated date 8547 BP). Further excavations at the site in 1994 resulted in two other dates (7770±80 BP and 10130±50 BP Keary Walde personal communication 1994) for the same soil horizon, again with no microblades present. Diagnostic artifacts for the horizon include two leaf-shaped bi-points and an Agate Basin-like lanceolate point with a straight base. This site provides the oldest evidence of human occupation in glaciated regions of the Yukon. A slightly younger pre-microblade component was excavated by Hunston at Moosehide (LaVk-2) in central Yukon, near Dawson City. Here, calcined bone fragments in association with a non-diagnostic assemblage provided a radiocarbon date of 8050±100 BP (TO-1936, 1 sigma calibrated date 8979 BP). A date of 5625±80 BP (S-1002, calibrated date 6410 BP - 1 sigma) was obtained for the overlying microblade component (Jeff Hunston personal communication 1994). Lastly, following recent survey and excavations at Fish Lake, near Whitehorse, Yukon, Ruth Gotthardt (personal communication 1993) reported two sites, including a quarry site, which were characterized by a core and blade industry, lacking microblades. Unfortunately, neither of these sites can be dated; however, the apparent separation of blades and microblades in southern Yukon further supports the contention that micro and large blade tools should not necessarily be included in the same technological tradition.

The absence of microblades at a site does not provide conclusive evidence of pre-microblade or non-microblade components, as lithic assemblages from a given tradition may vary for a number of reasons including seasonality, specialized resource procurement or even sample size; therefore, the possibility exists that microblades were absent from these sites but not from the total technological inventory used by a particular cultural group. To date, it is only at the Annie Lake site that blades and microblades, albeit a very small sample of both, have been recovered in context at a stratified site.

The stratigraphic placement of blades relative to microblades at the Annie Lake site, indicates that the two tool types were not "coeval" at this site, and that blade technology preceded microblades by some unknown amount of time. It is unfortunate that only one of the two blades was recovered in undisturbed context, and while it is admittedly perilous to construct both a technological tradition and prehistoric sequence based on the provenience of a single artifact, the recovery of a macroblade from stratigraphically below the microblade horizon, in an area of reliable stratigraphic integrity, suggests that large blade technology is antecedent to microblade technology at Annie Lake. Isolated from other sites in southern Yukon, it would be reckless to overstate the significance of such a limited sample. However, the mounting evidence for a pre-microblade/Paleoindian technological tradition in glaciated regions of the Yukon indicates that the placement of blades at JcUr-3 provides collaboration for data from other sites.

Technologically, the blades recovered at the Annie Lake site appear generalized and informal, with one of the blades showing evidence of core rotation—placing the assemblage within the realm of the Northern Cordilleran Tradition, as outlined by Gotthardt (1990) above. Morphologically, they are similar to blades from the Nenana complex (Goebel et al. 1991:56 Fig.4), but bear little resemblance to more formalized blades from northern Alberta, attributed to the Early Prehistoric Period (Le Blanc and Wright 1990). This similarity to early northern blades, rather than to Paleoindian blades from the south, suggests an indigenous or more local origin for a pre-microblade technological tradition in southern Yukon, rather than a northward migrating Plano influence, an option discussed by Clark (1991:44) or a diffusion of Plano technology.

The single *in situ* blade at Annie Lake was recovered in a poorly developed palaeosol below a microblade horizon which was bracketed from about 7160 to 6200 BP. The three other dated non-microblade sites in south-central Yukon provided dates that are compatible with the interpretation of the Annie Lake data and suggest a non-microblade technological tradition was present in the area from at least 10000 to 7200 BP. The upper end of time range is constrained, in part, by the timetable for regional deglaciation and glacial lake drainage, which has been only roughly estimated at 10000 to 8000 years ago (see discussion in Chapter 2). In fact, dated evidence of the microblade horizon at Annie Lake reported here, now provides the *terminus ante quem* for Glacial Lake Carcross, and refinement of the age estimates of the lower component could extend that age further. At the other end of the time range, the non-microlithic basal Canyon component appears to be contemporaneous with the microblade horizon at Annie Lake dated 7160 BP.

Based on these four sites, this proposed early Holocene non-microblade tradition is characterized by blades, round- and straight-based and lanceolate points, bi-points, possibly burins, and an absence of microblades. Such a description, albeit highly generalized, accords well with Clark's 1983 trait list for a proposed Northern Cordilleran Tradition that included a variety of bifacial projectile points, including fluted and lanceolate points, blades, and an absence of microblades. In addition, the pre-microlithic component at KaVn-2, characterized by an Agate Basin-like point and two crude bi-points was located in a distinctive yellow silt layer, beginning approximately 40 cm below surface. According to Walde (1994b) the stratigraphic placement, tool types and obtained date of 7810 BP correspond with MacNeish's proposed pre-microlithic Kluane Complex. However, with the most recently obtained date of 10130±50 BP for the base of the yellow silts (Keary Walde 1994 personal communication), it is not clear if that proposed correspondence is still valid.

The Annie Lake data add support to the general argument for a pre-microlithic, Northern Cordilleran Tradition in southern Yukon; however, the dates obtained do not necessarily contradict Clark's recent theories of coeval existence of microlithic and "cordilleran-derived" non-microlithic technologies during the early Holocene in the Northwest (Clark 1993:79). The stratigraphic placement of blades below microblades indicates that the two technologies were not coeval at Annie Lake, but the date of 7160 BP obtained for the base of the microblade horizon at the site is contemporaneous with the supposed Northern Cordilleran component at Canyon dated at about 7200 BP. This places the two technological traditions very nearly in "complementary apposition" to use a phrase favoured by Clark.

Much of southern Yukon only became available for human occupation about 10000 to 8000 BP. Based on stratigraphic placement at JcUr-3 and supported by data from three other sites, it appears that by at least 8000 BP, the first inhabitants arrived in the southern territory carrying tool kits characterized by bifacially flaked projectile points and blades—identified here as index traits of the Northern Cordilleran Tradition. Evidence for this early tradition is minimal but continues to be found. From a regional perspective, by 8000 BP the microlithic Denali complex was well established in interior Alaska, as well as on the coast, yet the earliest evidence of microblade technology in southern Yukon is at Annie Lake at 7160 BP.

Little Arm/ Microblade Technology in Southern Yukon,

Following Workman (1978) the microlithic Little Arm phase of southern Yukon has generally been estimated to extend from approximately 8000 BP to 4500 BP. Even Workman, however, considered this a tentative projection. He stated, "The loose chronological framework adopted for the Little Arm phase is based largely on the scant radiocarbon data and subject to adjustment at both ends as knowledge increases" (ibid. :403).

The situation has changed little since Workman made this statement in 1978, but a review of the dated Little Arm sites in the Yukon suggests that the proposed time frame is based more on intuition than dated components. As an example, the data from JcUr-3 fall within this proposed temporal range, but still represents the earliest known microblade component in the Yukon, aside from Bluefish Caves. Here, the small microblade/blade related assemblage (N=9) was confined to a single, well-defined palaeosol that was bracketed to about 7160 to 6200 BP.

Elsewhere in the Territory, it appears that there are as few as three reported Little Arm sites possessing microblades that have yielded dates that and are considered valid. I have chosen the presence of microblades as the defining characteristic of the Little Arm phase, because other tool types included by Workman (1978:415) in this phase may also be applied to other traditions, and sometimes more appropriately so. At present, the earliest recognized microblade component is at Bluefish Caves in northern Yukon with an antiquity of greater than 12000 BP (Cinq-Mars 1985). Other radiometrically dated sites include Otter Falls in southwestern Yukon (JgVf-2) dated at 4570±150 BP (Workman 1978:248) and Moosehide (LaVk-2) in central Yukon dated at 5625±80 BP (Jeff Hunston personal communication 1994).

There are, however, at least as many dated microblade components that fall outside of Workman's proposed range. It appears that a number of researchers have received radiocarbon dates for microblade components that have been rejected as being too recent to be considered reliable; or because of the young date they find other justifications for considering a sample anomalous or contaminated. A brief review of these contradictory dates indicates that we should not be complacent in determining the temporal range of the Little Arm phase in Yukon.

The following is a brief survey of relatively recent dates obtained in association with apparent Little Arm components. Site reports, stratigraphic integrity and artifact provenience of these sites have not been closely scrutinized and dates are being presented here at face value. Anomalous dates for microblade components which have been discounted by individual researchers for reasons of stratigraphic incompatibility have been omitted here.

MacNeish (1964) obtained a date of 3220±140 BP for a microblade horizon at Little Arm (JiVs-1) and a date 3100±70 BP for the Pelly Farm site (KfVd-2). As stated previously, Workman (1978:256, 403) dismissed these dates as too recent. Hunston's (1977) criticism that the Pelly Farm site collection actually lacked microblades is perhaps more damning; however, the possibility exists that the few diagnostic artifacts reported by MacNeish have gone missing from the collection over the years. At the Gladstone site (JhVg-1), a date of 1890±50 BP was obtained for a charcoal sample midway between a Little Arm and a more recent Gladstone component (for definition of Gladstone see MacNeish 1964); however, Morlan rejected this date as too recent (Lowdon et al. 1973). Another recent date of 1870±180 BP was reported for an apparent microblade component at the Rock River site in northern Yukon (Gotthardt 1990:41,237); however, once again this was considered too recent to be a valid date (Ruth Gotthardt personal communication

1994). And finally, Clark obtained a date of about 1600 BP for a significant microblade component at Frenchman Lake (KeVd-2) in central Yukon. He dismissed this date as too young and suggested the date was obtained from a burned root (Donald Clark personal communication 1994).

Given that microblades have been reported at Alaskan sites in components dated to as recently as 1000 AD (Shinkwin 1979), the possibility should not be discounted that some or all of these recent Yukon dates are valid. Also Workman's (1978:256) suggestion that the terminal date for Little Arm is established by the absence of microblades at the Chimi site (JjVi-7) at 2900±130 BP should be subjected to close scrutiny. Clearly, there is a need for more field work to define the spatial and temporal boundaries of technological traditions during the early and mid-Holocene in Yukon, as it is extremely difficult to construct coherent archaeological sequences based on as few as three or four dated sites.

Northern Archaic/Taye Lake

The Northern Archaic/Taye Lake assemblage was the most significant component at JcUr-3, composed of almost 15000 artifacts, encompassing three palaeosols (B1-B3), representing at least three periods of occupation. Radiometric dates obtained from two apparent hearths provided dates of about 1490 BP for the B1 Horizon and about 2795 BP for the top of the B2 horizon. The B3 horizon was not successfully dated and is estimated to represent an occupation about 5000 years old.

The vast majority of artifacts recovered within the Northern Archaic/Taye Lake period at the Annie Lake site was unmodified debitage, primarily located in the B1 horizon. However, a number of tools were also recovered within the three horizons, including 12 complete or fragmentary projectile points. These points, constituting 17 percent of the total tool assemblage, provide a possible indicator of site function during this period from 1500 to 5000 years ago, suggesting that the Annie Lake site was a relatively specialized hunting/kill processing camp, probably for sheep, goats and caribou, based on ethnographic information of recent site function.

In the absence of well stratified and well dated sites, projectile points are frequently used as chronological markers in Yukon archaeology. The co-association of various projectile points and stratified and dated palaeosols at JcUr-3 provided the opportunity to explore further and substantiate relationships between point types and time. In addition, the recovery of an apparent Annie Lake point type with a small assemblage of related artifacts, permitted a stratified assessment of Greer's proposed Annie Lake complex (Greer 1993). This proved to be an elusive component at the site and results of the assessment are tentative.

Generally, the stratigraphic and chronological provenience of projectile points accorded well with the broad temporal framework presented by Workman (1978). The earliest evidence of side-notched points at JcUr-3 was a notched concave-based point fragment recovered from the base of the B3 palaeosol. Although undated, this layer has been estimated to be older than 5000 years, making it comparable in antiquity to a notched point from Canyon dated to about 4700 BP, which represents the earliest known Northern Archaic component in the territory. Other point types fell within the temporal range suggested by Workman, although in many cases this range spanned several millennia. It is interesting to note that in some cases, specifically with the shallow, notched, weakly shouldered points (PN3), and possibly the small, convex-bladed multi-notched point (PN2), dates accorded these point types at Annie Lake show a 1000 to 2000 year lag behind first appearances in central Alaska, consistent with the apparent time lag between the first arrival of the Northern Archaic Tradition in that state, and first arrival in the Yukon (cf., Anderson 1968).

Most other tool types within these horizons proved to have less interpretive value. Endscrapers considered by Anderson (1968b:14) to be typical Northern Archaic tools were recovered throughout the deposits and appeared to have little temporal or diagnostic sensitivity. Generally it appeared that most of the tools found within the B1 and B2 horizons of the Northern Archaic component were often expedient and fairly crudely made, with little emphasis on the selection of fine-grained raw material. This may be a tautological statement, however, with raw material determining both the time and energy an individual was willing to put into tool manufacture. However, even when raw materials were of fine-grained cherts, as in the case of several projectile points, flaking patterns were generalized, having little marginal retouch, often with thick cross-sections and generally lacking in artistry. The exception to this subjective interpretation were the tools in the B3 horizon which contained, among other things, artifacts attributed to the Annie Lake complex.

The Annie Lake Complex

Following excavations at the Annie Lake site in 1982, Greer (1993) reported a previously unrecognized projectile point type, which she identified as an Annie Lake point. This characteristic deeply concave-based lanceolate point represents the critical index trait of a proposed Annie Lake complex (ibid.), which Greer assigned to a component located stratigraphically below the Taye Lake horizon at that locality. However, soil development and stratigraphic separation was poor in that area and Greer was only moderately successful in associating artifacts with this complex other than the diagnostic projectile point assemblage, that included two complete and three fragmentary Annie Lake points. Based on technological characteristics of the point type and its position below the Taye Lake component, Greer proposed a new, local, mid-Holocene technological complex that she placed temporally between Little Arm and the Taye Lake phase of the Northern Archaic Tradition. The characteristic point type for this complex is defined as a lanceolate point lacking side notches, but with a basal notch or concavity that is more than 1.5 mm deep (ibid. :26).

These points are relatively rare in Yukon archaeology and have seldom been discovered in buried context. Greer reports seven deeply concave-based point types from southern Yukon, with a total of only 18 points having a basal concavity greater than 1.5 mm (ibid. :37 Fig. 5). While previously confined to southern Yukon, the range of the point technology has expanded in recent years with the recovery of two probable Annie Lake points in surface context near Carmacks, in central Yukon (Donald Clark personal communication 1992) and in the Ogilvie Mountains in northern Yukon (Ruth Gotthardt personal communication 1993). For representative samples see Plate 6:1.

Plate 6:1 Concave-Based Projectile Points From Yukon Top Row (L-R) JcUr-3:962, JcUr-3:37, LeVh-7:1, JkUx-5:17, JeUs-5:x. Bottom Row (L-R) JdVa-5:x; JcUr-3:867, JcUr-3:944, JcUr-3:2788

At the outset of the 1992 excavations, I had hoped to be able to shed light on the relationship of this proposed Annie Lake complex to the known archaeological sequences for the Yukon, and while the stratigraphic integrity necessary for chronological and relational refinements was present in the 1992 excavations, the artifact assemblage was extremely meagre. Only eight tools, or tool fragments, and approximately 240 flakes, primarily retouch flakes, have been assigned to the B3 horizon. Based on their presence in this level, these artifacts have been assigned to the Annie Lake complex component (see Plate 6:2). Based on this stratigraphic context, it is possible to refine the temporal placement of the complex; however, its significance is still uncertain. The tool assemblage for B3 consists of: a probable Annie Lake point (2788); a concave-based side-notch point base (2807); a large, broad biface (2800); a biface fragment (2826); and three small scrapers (2792 and 2809), one having a graver spur, (2804). A very small, rounded point tip, JcUr-3:1853 may belong to this level, but as it was recovered in the screen and its provenience is uncertain. This horizon was not successfully dated and can only be bracketed at sometime between 2900 BP and 6200 BP. It is presumed here to be slightly older than 5000 years old (see discussion of Stratigraphic Placement and Chronology of Annie Lake point, Chapter 5).

The concave-based side-notched point fragment is perhaps the most important element in this assemblage for understanding the place of the Annie Lake complex in existing archaeological sequences for the Yukon. This artifact was recovered at the base of the B3 horizon, 30 cm below the surface in square N8W4. It was located stratigraphically below the Annie Lake point, which was recovered at the top of B3, 25 cm below surface in square N7W3. These two squares, N7W3 and N8W3, were located in the centre of the gully area and their relative stratigraphic placement forms the basis for the interpretation of stratigraphic relationships elsewhere at the site; therefore, the provenience of the two artifacts is considered valid. This side-notched point fragment represents a "type fossil" for the Northern Archaic Tradition (cf., Anderson 1968) and its appearance below the Annie Lake point appears to indicate that the proposed Annie Lake

Plate 6:2 Annie Lake Complex Artifacts from JcUr-3, 1992. Top Row (L-R) JcUr-3:2788, 2807, 1853, 2800. Bottom Row (L-R) JcUr-3:2792, 2809, 2804, 2827.

complex component falls within the range of the Northern Archaic Tradition. However, the Taye Lake phase is the first defined technological phase of the Northern Archaic in southern Yukon, and as suggested by Greer, the Annie Lake complex appears to precede that phase and to represent a previously unrecognized technological complex, that may exist within the broad framework of the Northern Archaic.

The presence of both a side-notched point and an Annie Lake point in the same palaeosol horizon does present some problems of interpretation, as it was not possible to distinguish other technological or stratigraphic differences within the palaeosol. However, taking the small artifact assemblage from this soil unit as a homogeneous collection, and including the projectile points and two other tools excavated by Greer in 1982, it is possible to detect subtle technological differences that distinguish artifacts at this level from the Taye Lake horizon, aside from the diagnostic concave base of the points. Because of the small sample size, it is only possible to make comparisons in general terms rather than with statistical data, and it is hoped that comments made here will promote discussion and further debate on the issue of an Annie Lake complex.

Generally, the lithic assemblage from this B3 horizon is characterized by thin, well made tools (or fragments) of high quality raw material, with the debitage suggesting retouch or maintenance of existing tools rather than manufacture of new ones. The source of the raw materials is not known, but several of the tools from the small collection are made of the same material, including two endscrapers recovered more than 70 m apart from 1982 and 1992 excavations (437 and 2804). The small size of several of the scrapers indicates significant conservation or curation of raw materials. This characterization of a technological horizon dominated by well made tools displaying considerable raw material curation is also applicable to the underlying microlithic horizon, but stands in contrast to the assemblage of the overlying Taye Lake phase (B1). Within that horizon, tools were often less well made, and coarser-grained raw materials predominated. There were also considerably more expedient tools, as well as short term usage of shatter and sharp flakes.

The B1 and Humus horizons were also characterized by an abundance of flakes in an early stage of reduction, which were completely absent in B3.

When Greer (1993:39) explored the morphological similarities of the Annie Lake point with points from outside of the Yukon, she found similar styles identified as McKean points in the Plains regions and Shuswap Type 2 points in the Canadian Plateau region of British Columbia. Based on these comparisons and the suggestion of a possible common economic subsistence base (i.e., bison hunting), Greer proposed that "external contact or information exchange" may have occurred between southern Yukon and the Canadian Plateau or Plains regions (ibid. :40).

In light of the data from the 1992 excavations, which provide a slightly better insight into the overall lithic technology of the Annie Lake complex, it is possible to speculate on the nature of this external contact between the regions. Migration of people and technological diffusion of ideas or traditions are the most common vehicles for explaining parallel technologies, with independent invention a less likely, but not impossible third option. The first possibility to be considered here is population migration.

Criteria such as the small component size, extensive lithic curation and the emphasis on high quality raw materials have been used in other areas to characterize technological assemblages produced by colonizing or highly mobile populations. Kelly and Todd (1988:237) identified similar site patterns for Paleoindians colonizing North America. They assumed that these early inhabitants were highly mobile and moved frequently into new landscapes; unfamiliar with raw material sources there, they carried their own stone with them, often for long distances. Lithic components were often small, befitting a mobile population, and characterized by high quality raw materials and tools which had long, variable-use lives. These tool types were predominantly bifaces, which the authors argue were more durable, could be resharpened often, produced many usable flake edges and minimized the amount of stone carried (ibid.). As populations became established, lithic assemblages changed, with components becoming larger, reflecting more frequent and intensive use of sites; and collections showed a decline in long use-life tools and more emphasis on task specific and/or expedient tools (ibid. :240).

While Kelly and Todd's interpretation is based on trying to explicate a Paleoindian model, the general principles for the development of technological sequences from colonizing to established populations may be applicable to situations such as those found at the Annie Lake site. Here, stratigraphically lower components are small and characterized by high quality raw materials and workmanship. As we move forward in time, the assemblages become larger, tools are of poorer workmanship, and there is increased emphasis on expedient tools in the upper levels. There also appears to be a greater emphasis on bifacial technology in the B3/Annie Lake complex horizon than in other levels. In this situation, rather than representing an initial colonization, the better made assemblage suggests that a new population entered to the area. While this model may be somewhat simplistic, the idea of a population replacement in southern Yukon at the end of the Little Arm phase, immediately prior to the proposed appearance of the Annie Lake complex, has was previously proposed by Workman (1978:416); and it is possible that Greer's Annie Lake complex represents a re-colonization of the area rather than an initial colonization.

The relationship between the Annie Lake points and the single side-notched point found at the base of B3 begs some interesting questions, however. Workman proposed that the Northern Archaic Tradition, characterized by side-notched points, arrived in the Yukon via a population migration from central and northeastern Alaska about 5000 years ago (ibid.), a proposition that is consistent with the foregoing interpretation of the Annie Lake complex assemblage and with Anderson's (1968) suggestion of a Northern Archaic population replacement at Onion Portage in central Alaska about 1000 years earlier. However, Anderson also identified some of the hallmark traits of Northern Archaic as: crude workmanship, minimal flaking and retouching of tools and selection of coarse-grained stone (Anderson 1968b:21). This pattern does not become evident at JcUr-3 until after the Annie Lake horizon, suggesting that the Annie Lake complex represents a technological anomaly within the Northern Archaic Tradition, and possibly reflects the characteristics of Kelly and Todd's (1988) colonizing (or newly arrived) populations, i.e., high quality raw materials, multi-purpose tools and extensive curation.

The co-association of notched point technology within a lithic tradition emphasizing high quality workmanship and selection of fine-grained raw materials is perhaps more indicative of technological diffusion than population migration. The single example of a notched point within the B3 horizon at JcUr-3 is a basal fragment of a small, well made concave-based notched point, of fine-grained siliceous material. The age of this horizon has been estimated at about 5000 years, making the Annie Lake complex approximately contemporaneous with the microblade component at Otter Falls (JgVf-2), only 150 km northwest of Annie Lake, which was dated at 4570±150 BP (Workman 1978:248). Clark (1991:40) reports the co-association of a concave-based point and microblades at a small exposed site near Champagne, which lies between Otter Falls and Annie Lake. Unfortunately, this surface site is undated and the relationship between the tool types is uncertain; however, the possibility exists that the Annie Lake complex is, in fact, a late Little Arm phase component where notched points had been recently introduced. The absence of microblades from the B3 horizon, which represents a time that they are known to have been in the region, may be related to site function and/or seasonality, or may indicate that the Annie Lake complex represented a technological transition moving away from microblades towards notched/concave-based points.

Whether through diffusion or migration, the origin of these deeply concave-based Annie Lake points is also problematic. If the Northern Archaic Tradition arrived in Yukon via Alaska at about the same time as the first appearance of Annie Lake point types, then Alaska would be the logical place to look for earlier examples of deeply concave-based points. However, similar point types have not been reported in neighbouring Alaska, although, as indicated by Greer (1993:37), the Annie Lake point is only one of a wide range of concave-based lanceolate points that have been recovered in Yukon and Alaska. There are gross morphological similarities with some concave-based, fluted points from Alaska (cf., Clark 1991:38 Fig. 3), which are generally considered to be Paleoindian artifacts. It is noteworthy that a deeply concave-based point recovered at Marshall Creek

(JfVi-1) was originally identified as Paleoindian (Damp and Van Dyke 1982), but is now considered a mid-Holocene Annie Lake point (Greer 1993:35, Greer and Le Blanc 1983:33). Given the temporal separation between Paleoindian traditions and the Annie Lake complex, such fluted points are unlikely to be immediate precursors of Annie Lake points. However, in reviewing northern fluted points, Clark noted that two sites which had produced concave-based fluted points (Girl's Hill and Putu), had been dated at about 4400 BP and 6090 BP respectively. Additionally, at Girl's Hill, the fluted point was found in association with microblades (see Clark 1991:39 for discussion of dates). Although there is no evidence of fluting on any of the concave-based points from southern Yukon, there may be a link between these recently dated fluted point components in Alaska and the Annie Lake material. The co-association of the two tools types in Alaska also places this hybrid microlithic/Paleoindian component at about the time of the first appearance of Northern Archaic technology.

Greer (1993) indicated external links between southern Yukon and the Canadian Plateau and the Plains regions. However, an estimated age of 5000 years for the Annie Lake component at JcUr-3, as argued here, suggests that it predates the Shuswap horizon in the Canadian Plateau by approximately 1000 years and appears to be at least contemporaneous with, if not antecedent to, the first appearance of McKean points on the Plains (see Greer 1993:39). In light of these dates, Greer's proposed external contact or information exchange between southern Yukon and the Canadian Plateau or the Plains regions (ibid. :40) may have emanated from the Yukon.

Finally, while it is unlikely that Annie Lake points developed independently of outside influences, the possibility must be considered. Given the extremely small sample of deeply concave-based points (N=7) in southern Yukon, the manufacture of such points may have been very localized in both time and space. In fact, Greer observed that several of the points are so similar stylistically that they may even have been made by the same individual (Sheila Greer personal communication 1992). It is feasible that the similarities between Annie Lake points and McKean and Shuswap points are coincidental, with a few deeply concave-based points arising as a local manifestation of a generalized technological trend towards unnotched, concave-based lanceolate points.

The uncertainty of this situation underscores the dilemma of defining technological sequences based solely on projectile point types. Morphological similarities between point types that are widely separated in time and space do little to advance our understanding of archaeological traditions. And despite attempts by Greer (1993:33) and others (cf., Workman 1978) to define the technological attributes that give rise to point categories, like the Annie Lake point, there is such a degree of overlap in attributes, so much individual/aesthetic variation, and variation resulting from raw material selection that gross morphology still provides the basis of comparison.

It was principally because the technological attributes of Annie Lake were not completely understood that Greer chose the term "complex" to describe the assemblage. With the limited additional data from the 1992 excavations at JcUr-3, there is further support for the concept of a previously unrecognized technological complex in southern Yukon. Regardless of the origin of the complex or nature of external contact, there appears to have been a transition in lithic technology at JcUr-3 at about 5000 years ago (B3 horizon). At that time, microblades are absent at the site, notched points and distinctive deeply concave-based lanceolate points are introduced, along with an emphasis on using high quality raw materials to manufacture bifacial forms; coupled with, extensive tool curation and emphasis on bifacial technology. This component is small at Annie Lake and of unknown duration. By at least 2900 BP (the top of the B2 horizon), lithic assemblages are characterized by notched- and straight-based points, a deterioration in workmanship, a tendency towards coarse-grained raw materials and an increase in the use of expedient tools. Based on the limited available data, there appears to be some justification for Greer's notion of a previously unrecognized technological complex in southern Yukon. However, given the prevailing interpretation that the first appearance of notched points represents the beginning of the Northern Archaic Tradition (Anderson 1968, 1968b; Workman 1978), it appears that this so-called Annie Lake technological complex represents as an anomaly within the Northern Archaic, and should possibly be included in the archaeological sequence of southern Yukon antecedent to the Taye Lake phase. These conclusions are tentative, based on the extremely small amount of pertinent data, and stress the need for more work in this area.

Northern Archaic/Late Prehistoric

The Late Prehistoric component at JcUr-3 is represented by artifacts recovered above the White River ash, found throughout the site. Workman (1978:362) considered the Late Prehistoric period an extension of the Northern Archaic Tradition and divided it into two phases, the Aishihik and Bennett Lake phases, with the former extending from the fall of the White River ash until the first appearance of European trade goods in native assemblages. The final phase, Bennett Lake, lasted less than a century in southern Yukon, beginning in the mid-1800s and ending earlier this century. However, in recent years there has been a movement away from the use of these phase names towards a more regional, and generalized, Late Prehistoric categorization with clear affiliations to modern Athapaskan groups (cf., Greer 1983, Gotthardt 1993). The distinction is a moot one at JcUr-3, however, as there were no Euro-Canadian trade goods recovered at the site. Here, as at many sites in southern Yukon, sedimentation subsequent to the White River ash fall has been extremely meagre, generally amounting to less than five centimetres over the past 1250 years. Even at a well stratified site such as Annie Lake, there is little vertical separation between artifacts in the post-ash level, and no attempt was made to separate or date features within this horizon.

This thin post-ash horizon and corresponding lack of chronological control within the Late Prehistoric period obscures the possible impact of the White River ash fall on indigenous populations. Despite the magnitude and catastrophic nature of the White River eruption (cf., Derry 1975 , Workman 1974) there appears to be little archaeological evidence to suggest that resident populations were either replaced or displaced for any great period of time (Workman 1978). And while I have argued elsewhere (Hare 1992:36) that the effect of the ashfall was probably greater than suggested by Workman, the lack of substantial post-ash sedimentation makes it difficult to estimate the period of time that people may have been absent from the area, if at all.

As observed elsewhere in southern Yukon by Workman (1978), generally the Late Prehistoric lithic assemblage at JcUr-3 reflected a continuation of patterns established below the ash, in the B1 horizon. Tools were often expedient and made of the same coarse-grained raw materials found in the underlying level. Approximately 523 pieces of unmodified debitage were recovered at this horizon, primarily of early and middle stages of lithic reduction. Fourteen modified implements were assigned to this period; however, it must be recognized that a few artifacts recovered within the White River ash were assigned to either the B1 or Humus, based on observed patterns of distribution or raw material, and it is therefore possible that some misidentifications have occurred. This small assemblage consisted of four small projectile points/point preforms, a biface fragment, a quartz crystal endscraper, an endscraper fragment, two tabular scrapers, three unifacial scrapers, a hammerstone and an exhausted flake core.

Three of the points/preforms (JcUr-3 :2900, 2824 and 2828) appear to be standardized variants of diminutive side-notched points, a characteristic implement of the Late Prehistoric. These arrow points are fashioned on thick, triangular cross-sectioned flakes with flaking largely limited to margins. Only one of the three, JcUr-3:2900, is finished and on this point, side-notching actually consists of a slight narrowing or waisting of the lateral margins. This point type was not included in Workman's (1978) classification and inventory of southwestern Yukon artifacts, but given its small size and minimal side-notching, it is not out of place either technologically or chronologically with Workman's PN5 (diminutive side-notched point) category. The presence of tabular scrapers, JcUr-3:2844 and 2857, in the Late Prehistoric component of the site also corresponds with the known temporal distribution of these probable skin working implements (see Clark 1981:119 Fig. 6).

The Late Prehistoric component at JcUr-3 also included some archaeological features which were either absent or poorly represented in other horizons at the site. Most striking was the abundance of fire-cracked rock (FCR) in the post-ash level. While only three apparent hearth features were identified in this level, based on the co-association of FCR, calcined bone and charcoal, FCR was recovered in virtually all squares above the ash. It was also present in small quantities in the B1 horizon but very little was recovered below that level. However, faunal remains were abundant in only one test square, N30E3, approximately 20 m northeast of the main gully area, where several hundred pieces of decomposed and calcined small to medium-sized mammal bones were collected. The scarcity of faunal remains elsewhere at the site, even within the vicinity of concentrations of FCR suggests that either decomposition of bones was rapid at the site, with the two apparent hearths at N8W4 and N7W12 representing older occupations than N30E3, or that FCR has cultural significance that extends beyond cooking fires.

A small concentration of powdered ochre was collected from the humus around N9W4, adjacent to a presumed hearth. According to McClellan (1975:256), ochre had many uses to people of southern Yukon and was frequently employed in the dressing and staining of hides. As two tabular (hide) scrapers were recovered in the same vicinity, it is possible that the FCR was connected with the production of hides at the site, perhaps being used to boil moose brains used in the tanning process. The absence of FCR from levels below B1 may indicate a technological difference in the treating of hides, or simply a difference in site function in earlier times. Another notable feature of the Late Prehistoric component was the presence of a fragmented scallop shell, recovered in the humus at N9W3. In addition to providing evidence of trade or external contact with coastal Alaska, some 120 km distant, the relatively robust state of the shell, combined with the absence of any historic artifacts, suggests an occupation immediately predating European contact in the late 1800s. Given the long history of occupation at the Annie Lake site, it would appear that the sudden arrival of thousands of gold seekers at the turn of the century had a profound effect on traditional economies and seasonal rounds. And while the Annie Lake region has continued to be an important resource area for Carcross-Tagish people throughout most of this century (Hare and Greer 1994), this particular site apparently ceased to be attractive soon before the introduction of European trade goods. Possibly it was the appearance of firearms which caused people to view and utilize the landscape differently.

Plate 6:3 Scallop Shell from JcUr-3, 1992 indicating coastal trade in the Late Prehistoric

Chapter Seven

Summary and Conclusions

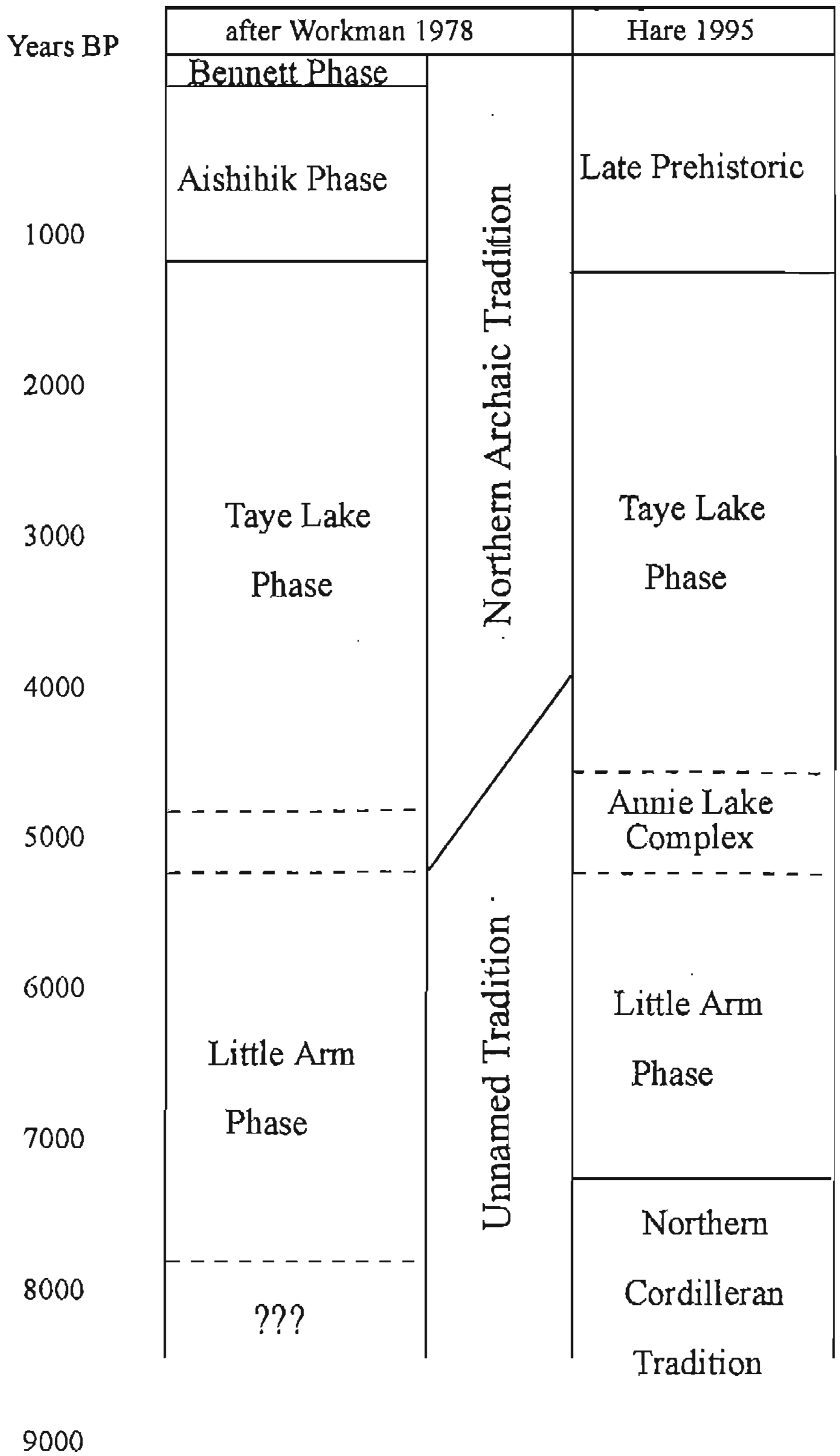
Well stratified, multicomponent sites are uncommon in subarctic archaeology. The discovery in 1991 of a new, well stratified locality at JcUr-3, on the northern shore of Annie Lake in south-central Yukon, which contained a large quantity of lithic artifacts in association with datable organics, provided a rare opportunity to refine and contribute to existing archaeological interpretations for the region.

JcUr-3, the Annie Lake site, has proven to have had a long period of human occupation, dating back to early Holocene times. While the diagnostic tool assemblage is small, it appears that all of the known technological traditions for the southern Yukon are represented at the site. Following as many as 8000 years of episodic occupation, it seems that the site was abruptly abandoned just before the time of contact with Euro-Canadians.

Based upon detailed excavations and collections analysis at the Annie Lake site, it is suggested here that the existing prehistoric technological and chronological sequences for southern Yukon be revised to include an early Holocene Northern Cordilleran Tradition, which preceded the microlithic Little Arm phase, as defined by Workman (1978). Furthermore, results of the 1992 excavations provide tentative endorsement for the inclusion of an Annie Lake technological complex in the southern Yukon sequence (see Greer 1993). It is argued here that there is justification for such a technological complex within the broad temporal range of the Northern Archaic Tradition, preceding the Taye Lake phase of southern Yukon (Workman 1978). See Table 6 for comparison with Workman's proposed technological sequences.

The presence of large, informal blades isolated from, and stratigraphically below microblades at JcUr-3 contributes to the increasing body of evidence for a pre-microblade horizon in southern Yukon. And while the absence of microblades at a site or horizon does not conclusively prove they are not present within a given technological tradition, it now appears that at the four oldest known sites in southern and central Yukon (basal

Table 6. Technological Sequences for Southern Yukon



Canyon JfVg-1, Beaver Creek KaVn-2, Moosehide LaVk-2 and basal Annie Lake JcUr-3), all predate 7200 BP and all are lacking microblades. Based on the collective assemblages from these four sites, the proposed Northern Cordilleran tradition is characterized by large informal blade technology, round-based lanceolate points, burins and an absence of microblades. This tentative assemblage corresponds well with the proposed Northern Cordilleran Tradition toolkit, defined by Clark (1983).

In recognition of Clark (1992:79), it must be noted that this proposed sequence for southern Yukon is not necessarily applicable to other areas of the far Northwest; however. Clark has suggested that a "cordilleran derived" non-microblade tradition may have existed contemporaneously in "apposition" with a microblade-bearing culture throughout the region. In southern Yukon, the Northern Cordilleran Tradition appears now to be the earliest postglacial technological tradition, but in other areas, such as Bluefish Cave in northern Yukon, and central Alaska, microblade technologies appear to precede that first appearance of the Northern Cordilleran in southern Yukon. However, given the broad morphological similarities between blades from Annie Lake and those of the 11000 BP Nenana complex (Goebel et al. 1991) and the apparent dissimilarities with the Early prehistoric period, Clovis-like blades of northern Alberta (see Le Blanc and Wright 1990), it is unlikely that the Northern Cordilleran Tradition is derived from southern-based Plano influences. Instead, it is probable that the roots of Northern Cordilleran are to be found in the indigenous northwestern Paleoindian tradition.

The evidence for a proposed Annie Lake technological complex is more uncertain. The estimated dates for a so-called Annie Lake horizon at JcUr-3 lie at the early end of Greer's (1993) proposed age range for the complex, ca. 5000 years old; however, the presence of a single-side notched point stratigraphically below a probable Annie Lake point indicates that the complex falls within the temporal sphere of the Northern Archaic Tradition.

Greer (1993) defined the Annie Lake complex based on presence of deeply concave-based lanceolate points, placed stratigraphically below typical Taye Lake phase artifacts at JcUr-3. Technologically, the small lithic assemblage from this horizon at the Annie Lake site is characterized by thin, well made tools of high quality raw materials, with a debitage suggesting extensive curation and maintenance of tools. These characteristics are at odds with Anderson's hallmark traits of the Northern Archaic in Alaska, which he defines as crude workmanship, minimal flaking and retouch, and selection of coarse-grained raw materials (Anderson 1968b:21). They also stand in contrast to the overlying lithic assemblages at JcUr-3, which are dominated by expedient and roughly made tools that are considered typical of the Taye Lake phase.

Thus, while it appears the proposed Annie Lake complex falls within the temporal range of the Northern Archaic, it is also apparent that it is technologically distinctive within that tradition. Given the very small lithic assemblage recovered from the so-called Annie Lake complex horizon at JcUr-3, conclusions can only be tentatively reached.

The origins of this culture complex are uncertain, possibly linked to a small colonizing population (as discussed in the previous chapter) or, and perhaps more likely, the Annie Lake complex represents diffusion of early Northern Archaic traits into an indigenous microlithic tradition.

Given the limited data set from which technological sequences are formed in the North American Northwest generally and southern Yukon specifically, it is clear that more work needs to be done to support or refute these propositions. However, in view of recent improvements in radiometric dating, especially in the quantities of carbon needed to obtain reliable radiometric dates, it is possible that much of the evidence needed to resolve these debates already lies in archaeological labs and storage cabinets from previous excavations in the Yukon and Alaska.

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Appendix 1

Lithic Tool Assemblage from JcUr-3, 1992

1	Art. No.	Field No.	Raw Material	Segment	Plaform Type	Tool Type	FlakeScar	Length	Width	Thick	Weight	Edge Ang	Square	BS Cm	BA Cm	B Level	N	W
2	2797	21	GREY CHERT	MEDIAL	N/A OR ABSENT	PROJ.POINT P6	21-30	2.34	1.85	.85	4.83		N6W12	8	3	1	4	2
3	2806	36	GREY/GREEN CHERT	MEDIAL	N/A OR ABSENT	PROJ.POINT P6	11-20	1.91	1.76	.87	4.03		N8W5	18	9	1	7	7
4	2803	134,135	VESIC.BLACK CHERT	PROXIMAL	N/A OR ABSENT	PROJ.POINT PN3	31-40	4.69	2.4	1.06	14.1		N9W4	9	4	1	3	44
5	2802	28,29	GREY CHERT	PROXIMAL	N/A OR ABSENT	PROJ.POINT PN3	31-40	5.88	2.45	.89	12.6		N9W3	12	3	1	58	35
6	2816	87,124	GREY CHERT	PROXIMAL	N/A OR ABSENT	PROJ.POINT PN3	21-30	3.95	2.16	.76	6.42		N9W43	9	3	1	68	70
7	2788	1	GREY CHERT	DISTAL	N/A OR ABSENT	PROJ.POINT P3	31-40	3.12	2.59	.55	3.18		N7W4	25	21	3	22	10
8	2807	46	BROWN SILICEOUS	PROXIMAL	N/A OR ABSENT	PROJ.POINT PN2	11-20	1.04	1.97	.45	1.08		N8W4	30	26	3	95	20
9	2810	41	GREY CHERT	PROXIMAL	N/A OR ABSENT	PROJ.POINT PSBg	11-20	1.69	2.07	.73	2.94		N8W4	20	16	2	61	71
10	2831		GREY/GREEN CHERT	DISTAL	N/A OR ABSENT	PROJ.POINT PFT	4-10	.88	.71	.23	.1		N7W12	48	43	5		
11	2827	15	VESIC.BLACK CHERT	MEDIAL	N/A OR ABSENT	PROJ.POINT PFM	4-10	2.43	2.29	.64	3.69		N8W6	18	4	1	40	84
12	2900	16	VITREOUS GREY CHERT	DISTAL	N/A OR ABSENT	PROJ.POINT PN5	31-40	2.33	1.23	.69	1.78		N10W4	2			69	18
13	2824	10	VITREOUS GREY CHERT	DISTAL	N/A OR ABSENT	PROJ.POINT PN5	11-20	2.38	1.18	.72	1.61		N9W6	5			24	23
14	2796	1	DARK GREY CHERT	DISTAL	SINGLE FACET	PROJ.PREFORM	21-30	3.8	1.69	.57	3.59		N6W12	2			16	35
15	2800	10,92	BLACK CHERT	PROXIMAL	BATTERED	BIFACE BS2	31-40	7.34	4.5	1.11	40.2		N7W3	20	15	3	18	24
16	2839	8	QUARTZ CRYSTAL	PROXIMAL	BATTERED	SCRAPER ES3	11-20	2.52	2.78	.9	6.09	75	N10W26	1			12	27
17	2792	21	BLACK CHERT	COMPLETE	2 FACETS	SCRAPER ES5	4-10	1.7	2.06	.4	1.68	66	N6W11	25	21	3	67	38
18	2819	94	GREY SILICEOUS	COMPLETE	2 FACETS	SCRAPER ES5	4-10	3.37	2.74	.38	3.29	65	N9W5	15	9	2	47	40
19	2812	13	VESIC.BLACK CHERT	COMPLETE	N/A OR ABSENT	ROUGH BIFACE BS1	21-30	5.79	3.68	.95	25		N9W3	9	1	1	71	43
20	2790	12	VESIC.BLACK CHERT	LATERAL	N/A OR ABSENT	ROUGH BIFACE BI	4-10	4.85	3.88	.99	14.9		N7W9	6	2	1	48	23
21	2828	13	VESIC.BLACK CHERT	COMPLETE	BIFACE MARGIN	PROJ.PREFORM PN5	11-20	3.08	1.62	.57	2.81		N8W5	4			98	46
22	2838		DARK GREY CHERT	COMPLETE	SINGLE FACET	BLADE	4-10	6.74	3.14	1.03	21.9	43	N11W3	56	48	6	93	11
23	2798	44	GREY/GREEN CHERT	MEDIAL	N/A OR ABSENT	BLADE	4-10	7.2	3.16	1.03	21.8	48	N6W12	29	23	3	30	80
24	2811	47,62	GREY/GREEN CHERT	OTHER	SINGLE FACET	RETOUCH/USE UTM2	41+	6.07	4.24	.39	10.9	38	N8W4	43	37	4	42	49
25	2856		GREY/GREEN CHERT	DISTAL	N/A OR ABSENT	MICROBLADE M	2	1.74	.58	.19	1.74	32	R1TEST	50	44	5		
26	2784	1	GREY/GREEN CHERT	DISTAL	N/A OR ABSENT	MICROBLADE M	2	.91	.59	.12	.08		N7W4	60	57	5	72	34
27	2781	13	GREY/GREEN CHERT	PROXIMAL	2 FACETS	MICROBLADE M	3	2.39	.83	.23	.57	38	N7W3	35	31	5	5	50
28	2789	16	VESIC. BLACK CHERT	LATERAL	N/A OR ABSENT	BIFACE BI	4-10	2.62	3.15	1.86	15.4	63	N7W9	12	4	1	3	62
29	2791	2,3	GREY/GREEN CHERT	PROXIMAL	2 FACETS	MICROBLADE M	2	2.23	.9	.19	.43	24	N7W9	66	61	5	83	80
30	2786		BROWN SILICEOUS	PROXIMAL	BATTERED	BLADE RELATED M	2	.62	.62	.17	.06	26	N7W3	42	37	5		
31	2804	96	GREY CHERT	COMPLETE	2 FACETS	SCRAPER ESSA	21-30	2.76	2.68	.43	3.68		N9W5	21	14	3	67	77
32	1853		GREY CHERT	PROXIMAL	N/A OR ABSENT	POINT TIP PFT	11-20	.92	.91	.32	.2		N8W5			2		
33	1826	56	GREY SILICEOUS	LATERAL	SINGLE FACET	BIFACE BII	4-10	3.35	2.43	.72	7.26		N9W6	15	5	3	99	81
34	2793	48	BLACK OBSIDIAN	COMPLETE	CORTEX	UNKNOWN	21-30	4.41	3.16	1	14.8		N6W12	36	26	5	41	50
35	2659	185	VESIC.BLACK CHERT	UNKNOWN	N/A OR ABSENT	ROUGH BIFACE BI	11-20	4.1	2.79	1.39	14.9		N10W5	8	1	1	70	5
36	2817	135	VESIC.BLACK CHERT	PROXIMAL	SINGLE FACET	ROUGH BIFACE BII	11-20	3.75	6.52	1.05	24.5		N9W4	12	4	1	60	28
37	2400	118	VESIC.BLACK CHERT	LATERAL	N/A OR ABSENT	ROUGH BIFACE BI	4-10	3.97	2.07	.89	6.22		N10W4			1		
38	2836	228	VESIC.BLACK CHERT	OTHER	SINGLE FACET	ROUGH BIFACE BII	11-20	4.35	2.28	1.1	10.8		N10W26	3				
39	2668	6	VITREOUS GREY CHERT	LATERAL	SINGLE FACET	RETOUCH/USE UTS1	11-20	2.5	1.31	.51	1.56	52	N10W26				64	23
40	2780		DARK GREY CHERT	UNKNOWN	N/A OR ABSENT	RETOUCH/USE UTS1	4-10	1.91	1.42	.35	.8	53	N6W136			4		

1	Comments
2	THICK BICONVEX STRAIGHT EDGED POINT. VARIABLE FLAKING PATTERN. MEDIAL FRAG.
3	2 MEDIAL FRAGMENTS, ONE FROM SCREEN. THICK BICONVEX STRAIGHT EDGED POINT.
4	2 FRAGS. TIP MISSING. USE WEAR ON DISTAL BREAK MARGIN/BURIN. LONG STEM/SIDE NOTCH. GROUND CONVEX BASE. (PBRg)
5	3 FRAGS.TIP MISSING.MINOR USE ON DISTAL BREAK. ASYMMETRICAL LONG STEM/SIDE NOTCHES,POSSIBLY BARBED.HEAT SPALLED.GROUND STRAIGHT BASE.(PBSg)
6	3 FRAGS. TIP MISSING. ASYMMETRICAL SIDE NOTCHES. HEAT SPALLING.ASYMMETRY SUGGESTS REWORKING AFTER PROJ.TIP BROKE.GROUND STRAIGHT BASE.(PBSg)
7	MEDIAL TO TIP. OBLIQUE LAMELLAR FLAKING, POSSIBLE ALTERNATE FLAKE REMOVAL PATTERN. PRESUMED TO BE TOP OF A CONCAVE BASE (P3) ANNIE LAKE POINT
8	BASE OF CONCAVE BASED NOTCHED POINT. NO EVIDENCE OF GRINDING.(PN2) SAME LEVEL AS ANNIE LAKE POINT.RANDOM FLAKING. BEIGE PATINA.
9	BASE OF STRAIGHT BASED POINT. SOME GRINDING PRESENT. SOME BATTERING OF LATERAL EDGES, HAFTED? RAPIDLY TAPERS FROM BASE TO BREAK.
10	SMALL BIFACIALLY WORKED POINT TIP FROM MICROBLADE HORIZON. ON SPECKLED GREY/GREEN CHERT. APPEARS FINELY WORKED.
11	POSSIBLE MEDIAL SECTION OF A UNIFACIAL PROJECTILE POINT. THIN, PARALLEL SIDES. MAY ALSO BE A UNIFACIAL KNIFE EDGE.
12	ABOVE ASH. SMALL BIFACIALLY WORKED LEAF SHAPED PROJECTILE POINT, BASE MISSING. WAISTED RATHER THAN NOTCHED. SINGLE ARRIS ON DORSAL SURFACE.
13	WITHIN ASH. INCIPIENT BIFACIALLY WORKED PROJECTILE POINT, BASE MISSING OR BADLY BATTERED.SIMILAR JcUr-3:2900.SINGLE ARRIS ON DORSAL SIDE.
14	HUMUS. INCIPIENT PROJ.POINT, BIFACIALLY WORKED, BUT NOT ON ALL MARGINS, TIP MISSING. COARSE, GRANULAR CHERT MATERIAL.CORTEX ON VENTRAL SIDE.
15	LARGE BIFACE FROM B2/3 HORIZ.3 FRAGS-2FROM N7W3,1-N9W5 B2.STEEP INVASIVE FLAKING ON R.MARGIN.LITTLE FLAKING ON VENTRAL SIDE.HEAT SPALLED.
16	HEAVILY USED QUARTZ CRYSTAL ENDSCRAPER.FALLS WITHIN RANGE OF ES3-UNUSUAL FROM ABOVE ASH. WORKING EDGE BATTERED TO OBSCURITY.UNIFACIALLY FLAKED.
17	SMALL ENDSCRAPER WITH GRAVER SPUR ON LEFT MARGIN.WITHIN RANGE OF ES3.HAFTED? STRATIG.DISTURBED BUT LIKELY RELATED TO JcUr-3:2793 CA.6200BP.
18	FAN SHAPED ENDSCRAPER. WITHIN RANGE ES3. USE WEAR EVIDENT ALONG CHORD. NO EVIDENCE OF LATERAL SIDE USE. ASSOC. WITH BOULDER FEATURE CA 1480 BP.
19	BIFACE PREFORM OR BLANK WITH CONVEX EDGES. POSSIBLE USE WEAR ON RIGHT MARGIN. CONTAINS DORSAL CONCAVITY WHICH MADE FURTHER WORKING DIFFICULT.
20	CRUDE BIFACE EDGE ON A THICK FLAKE FRAGMENT.
21	SMALL PROJ.PREFORM SIMILAR TO 2824&2900.BIFACIAL NIBBLING ON VENTRAL SIDE.KEELED FLAKE/CORTEX AT DISTAL END.NO CORRELATION WITH WORKMAN.
22	LARGE BLADE W/SINGLE ARRIS/PARALLEL SIDES, POINTED DISTAL END. USE WEAR ON LEFT MARGIN PLATFORM ANGLE 112.EVIDENCE OF PLATFORM PREP.
23	LARGE BLADE W/ SINGLE ARRIS. NEGATIVE FLAKE SCAR AT DISTAL END.PARALLEL SIDES, PIPOLAR PLAT. SCARS.USE WEAR ON LEFT AND RIGHT PROX.MARGIN.
24	LARGE FLAKE UTILIZED ON ALL MARGINS. LEFT DISTAL CORNER MISSING.3 FRAGMENTS,2@B5,1@ B4.AT N8W4 IN ASSOC.W/CHARCOAL 6200 BP. BEIGE PATINA.
25	MICROBLADE-DOUBLE RUNNING INTO SINGLE ARRIS. PARALLEL SIDES - TAPERS TOWARDS DISTAL END. FROM BOTTOM OF DEEP RED LENS IN 1991 TEST PIT.
26	MICROBLADE-DOUBLE ARRIS. PARALLEL SIDES, CURVILINEAR PROFILE.FEATHERED TERMINATION. PLATFORM MISSING. SPECKLED GREY/GREEN CHERT MATCHES W/2831.
27	MICROBLADE-SINGLE RUNNING INTO DOUBLE ARRIS. PARALLEL SIDES, WIDER TOWARDS DISTAL END. NO EVIDENCE OF USE WEAR.FROM SCREEN PROBABLY B5.
28	EDGE FRAG OF THICK/CRUDE BIFACE.OVERALL SHAPE UNDETERMINED. EVIDENCE OF USE WEAR ALONG EDGE. BLI - UNCLASSIFIABLE BIFACE FRAGMENT.
29	2 FRAGMENTS OF MICROBLADE.DISTAL END MISSING.SINGLE ARRIS WITH PARALLEL ARRISES VISIBLE AT EDGES OF SIDES.STRAIGHT LONGITUDINAL PROFILE.
30	PROXIMAL END OF A PROBABLE MICROBLADE. MADE A SILICEOUS BROWN CHERT. 2 ARRISES. BATTERED PLATFORM. NO EVIDENCE OF USE WEAR.
31	THUMB SIZE SCRAPER/GRAVER SPUR.CONVEX LEFT MARGIN,CONCAVE PROX.MARGIN.RETOUCH WITH USE WEAR.POLISHED GRAVER SPUR AT PROX.END OF LEFT MARGIN.
32	FROM SCREEN. SMALL BIFACIALLY WORKED ROUNDED POINT TIP. POINT SHAPE INDETERMINATE.
33	RIGHT DISTAL PORTION OF A BIFACE. PATINA SUGGESTS GREATER AGE THAN PROVENIENCE.PROBABLY REPRESENTS ABOUT 1/3 OF FINISHED LENGTH. WW'S BII.
34	HEAVILY BATTERED LARGE OBSID.FLAKE.COLUMNAR BI-DIRECTIONAL TRANSVERSE SCARS ON DISTAL END.OPPOSED LATERAL NOTCHES.CA.6200 BP.STRATA DISTURBED.
35	CRUDE BIFACE FRAGMENT OF COARSE GRAINED CHERT.BEST DESCRIBED AS A BIFACIALLY WORKED FLAKE. CHARCOAL FROM THIS HORIZON DATED TO 1420 BP.
36	BIFACE FRAG.OF COARSE GRAINED CHERT W/ BOULDER FEATURE.PROBABLY 1/3 OF FINISHED LENGTH.USE WEAR ON RIGHT MARGIN.CA.1420 BP.
37	SMALL PORTION OF BIFACE OF COARSE GRAINED CHERT W/ BOULDER FEATURE.BIFACE EDGE QUITE BATTERED.PART OF A FINISHED TOOL? CA 1420 BP.
38	BASAL PORTION OF LEAF SHAPED? BIFACE OF COARSE GRAINED CHERT.IN ASH BUT SAME RAW MAT AS B1 IN.TRANSVERSE/DIAGONAL FRACTURE.
39	SURFACE. SHALLOW MARGINAL RETOUCH AND POLISH ON LEFT EDGE. FEATHER TERMINATION AT DISTAL END WITH POSSIBLE GRAVER SPUR ON LEFT SIDE.
40	B4? FROM SCREEN. VERY SMALL POTLID FLAKE WITH MINOR USE WEAR/RETOUCH. POSSIBLY FROM MICROBLADE HORIZON.

1	Art. No.	Field No.	Raw Material	Segment	Plaform Type	Tool Type	FlakeScar	Length	Width	Thick	Weight	Edge Ang	Square	BS Cm	BA Cm	B Level	N	W
41	2808	11	GREY CHERT	UNKNOWN	N/A OR ABSENT	BIFACE BII	4-10	1.95	2.44	.84	3.32		N8W3			1		
42	2852	2	GRANITE	COMPLETE	N/A OR ABSENT	HAMMERSTONE H	N/A	9.19	5.18	2.33	160		N7W4	61		5	95	0
43	2785		GREY/GREEN CHERT	COMPLETE	SINGLE FACET	MICROBLADE M	3	1.14	.5	.11	.07		N7W4			5		
44	3001		GREY/GREEN CHERT	COMPLETE	SINGLE FACET	MICROBLADE M	3	1.19	.5	.11	.07		N7W4			5		
45	2782	2	GREY SILICEOUS	MEDIAL	N/A OR ABSENT	MICROBLADE M	3	1.91	.73	.21	.39	37	N7W2			5		
46	2787	3	BROWN SILICEOUS	PROXIMAL	BATTERED	BLADE RELATED M	3	.61	.62	.17	.07		N7W9	66	61	5	85	82
47	2821	67	GREY/GREEN CHERT	UNKNOWN	N/A OR ABSENT	SCRAPER UTM1	11-20	6.06	3.78	.69	14.7	48	N9W5	8	3	1	70	90
48	2783		GREY SILICEOUS	DISTAL	N/A OR ABSENT	SCRAPER ES3	4-10	2.06	1.96	.21	1.63		N6W12			4		
49	2826	36	BLACK CHERT	OTHER	N/A OR ABSENT	SCRAPER UTM2	11-20	7.2	5.35	.46	13.4	71	N9W8	5		1		
50	1489	3	VITREOUS GREY CHERT	COMPLETE	2 FACETS	RETOUCH/USE UTS1	4-10	1.91	2.4	.53	2.2	62	N7W12			1	55	10
51	2820		GREY CHERT	DISTAL	N/A OR ABSENT	SCRAPER ES5	11-20	1.91	2.4	.22	2.2	62	N10W5			1		
52	2848		GREY CHERT	LATERAL	N/A OR ABSENT	BIFACE	4-10	1	1.05	.51	.68		N10W4					
53	2809	44	GREY SILICEOUS	OTHER	SINGLE FACET	SCRAPER ESSAI	4-10	2.02	2.45	.38	1.59	41	N8W4	25	21	3	78	78
54	2044	9	VITREOUS GREY CHERT	UNKNOWN	N/A OR ABSENT	UNKNOWN	4-10	2.49	1.78	.43	1.52		N8W4			1	67	82
55	1246	2	BLACK OBSIDIAN	PROXIMAL	BATTERED	RETOUCH/USE UTM1	4-10	1.66	1.43	.27	.62	60	N6W12				35	23
56	2282	50	VESIC.BLACK CHERT	PROXIMAL	SINGLE FACET	RETOUCH/USE UTS2	4-10	3.48	2.83	.43	4.25	70	N10W5	8	1	1	50	67
57	2835	31	BLACK CHERT	COMPLETE	3+ FACETS	RETOUCH/USE UTM1	2	2.72	2.97	.52	3.28	42	N10W26	4	1	1	35	67
58	2829	45	BLACK OBSIDIAN	DISTAL	N/A OR ABSENT	SCRAPER UTI	4-10	.44	.92	.14	.44		N9W6	10	2	1		
59	2830		BLACK CHERT	COMPLETE	SINGLE FACET	CORE/FRAG. MCDI	4-10	1.61	1.22	.54	1.02		N8W27			1		
60	2801	5	SLATE	UNKNOWN	N/A OR ABSENT	RETOUCH/USE TU	N/A	4.73	3.73	.51	14.3		N6W13	3	0	1	92	44
61	2833	64	COARSE BLACK CHERT	COMPLETE	SINGLE FACET	SCRAPER UTM1	4-10	8.02	2.25	1.05	18.8	53	N10W6	8	1	1	73	36
62	2849	1	GRANITE	COMPLETE	N/A OR ABSENT	HAMMERSTONE H	N/A	9.51	4	3.64	219		N7W16	2			87	35
63	2844	1	SLATE	LATERAL	N/A OR ABSENT	SCRAPER TU	4-10	6.12	3.57	.43	10.5		N11W3	1			30	80
64	2845	3	VITREOUS GREY CHERT		N/A OR ABSENT	CORE/FRAGM. FCR	31-40	3.87	3.28	2	32		N8W5	2			14	62
65	2846	11	VITREOUS GREY CHERT		N/A OR ABSENT	CORE/FRAG. FCR	21-30	2.93	2.73	1.87	19.5		N30E3	1				
66	2841	84	COARSE BLACK CHERT		BATTERED	CORE/FRAG. FCR	11-20	3.97	3.2	1.41	19.6		N10W4			1		
67	2840	864	VESIC.BLACK CHERT		CORTEX	CORE/FRAG. FCR	11-20	5.42	2.9	2.1	27.6		N10W4			1		
68	2842	27	VESIC.BLACK CHERT			CORE/FRAG. FCR	4-10	9.33	4.23	2.05	58.7		N10W26	3				
69	2843	27	VESIC.BLACK CHERT			CORE/FRAG. FCR	4-10	3.69	4.63	1.95	28.1		N7W9	3				
70	2851	A	GRANITE	COMPLETE	N/A OR ABSENT	HAMMERSTONE H	N/A	8.73	6.73	4.84	338		N8W4	8	3	1		
71	2850	155	GRANITE •	COMPLETE	N/A OR ABSENT	HAMMERSTONE H	N/A	7.27	6.5	3.56	229		N9W4	29	24	2	14	85
72	2855		GRANITE	COMPLETE	N/A OR ABSENT	HAMMERSTONE H	N/A	13.4	6.72	4.39	574		N7W4	5			85	27
73	2853		GRANITE	UNKNOWN	N/A OR ABSENT	CORE/FRAG. FCR	4-10	9.83	6.52	2.92	208		N8W5	27	22	2	85	30
74	2857		GRANITE	COMPLETE	N/A OR ABSENT	SCRAPER TB1	11-20	11.9	9.53	.94	135							
75	2813	135	SLATE	LATERAL	N/A OR ABSENT	SCRAPER TU	4-10	7.01	5.04	1.06	37	68	N9W4	9	2	1	3	12
76	2598		GREY/GREEN CHERT	COMPLETE	SINGLE FACET	SCRAPER ESI	4-10	2.35	1.22	.5	1.39	43	N7W16	2			73	37
77	2834	123	GREY/GREEN CHERT	PROXIMAL	N/A OR ABSENT	SCRAPER UTM1	11-20	2.65	2.54	.27	1.8		N9W5	9	3	1	40	22
78	2795		BROWN SILICEOUS	MEDIAL	N/A OR ABSENT	SCRAPER UTM1	11-20	4.97	2.99	.41	8.32		N8W12	30	23	4		

1	Comments
41	SMALL FRAGMENT OF BIFACE MARGIN, POSSIBLY LEFT DISTAL END WITH BASE. FEATHER TERMINATION ON RIGHT MARGIN W/ NO RETOUCH OR USE WEAR.
42	SMALL HAMMERSTONE ON A FLAT RIVER COBBLE. PECKED ALMOST FLAT AT ONE END.RECOVERED FROM MICROBLADE HORIZON.
43	IN SCREEN.SMALL COMPLETE MICROBLADE,SHORT AND CURVILINEAR-PROBABLY NOT USEABLE.SOME BATTERING ON PLATFORM.SPECKLED GREY/GREEN CHERT.
44	IN SCREEN W/ #2785.SMALL COMPLETE MICROBLADE, SHORT AND CURVILINEAR-NOT USEABLE. RAW MATERIAL ALSO SPECKLED GREY/GREEN CHERT.
45	MICROBLADE FOUND IN SCREEN.THICK W/ SINGLE ARRIS OBSCURED TOWARDS DISTAL END. USE WEAR POLISH ON RIGHT MARGIN. PLATFORM SNAPPED OFF.
46	PROBABLY BATTERED PLATFORM END OF MICROBLADE. UNUSUAL RAW MATERIAL. TWO ARRISES. DEEPLY BURIED IN ASSOCIATION WITH AN INDISPUTABLE MICROBLADE.
47	MULTIPURPOSE TOOL ON A FLAKE. RIGHT AND LEFT MARGINS RETOUCHED WITH A UTILIZED GRAVER ON RIGHT PROXIMAL CORNER.BANDED GREY CHERT.
48	SMALL THUMB SCRAPER ON A BLADE? WITH 2 ARRISSES.SIMILAR RAW MATERIAL TO SEVERAL OTHER ARTIFACTS FROM N6W12/13.STRATA DISTURBED.
49	WITHIN AND BELOW ASH. 3 PIECES OF A LARGE SCRAPER ON A LARGE FLAT FLAKE. ESSA2.POSSIBLE SPOKESHAVE ON R.MARGIN BUT MAY BE NON-CULTURAL.
50	WITHIN HUMUS. SMALL IRREGULAR FLAKE W/MINOR USE WEAR ON DISTAL EDGE. POSSIBLE SPOKESHAVE.
51	FROM SCREEN. THUMBNAIL END SCRAPER W/ LATERAL RETOUCH. WW'S ES5.
52	FROM HUMUS. SMALL EDGE FRAGMENT OF A BIFACE, POSSIBLY THE HAFTED PORTION OF A PROJECTILE POINT. HIGH QUALITY CHERT.
53	SMALL THIN END/SIDE SCRAPER ON THE ROUNDED CORNER OF THE VENTRAL SIDE OF A FLAKE. PROBABLY WW'S ES3.
54	SHATTERED PIECE OF FINE GRAIN CHERT WITH BIFACIAL SHAPING AT ONE END AND EVIDENCE OF BATTERING AT OTHER. POSSIBLE PIECE ESQUILLE FRAG.
55	FROM HUMUS. MINOR USE WEAR ON MARGIN OF SMALL OBSIDIAN FLAKE. FLAKES REMOVED FROM DORSAL SIDE.
56	USE WEAR ON THIN COARSE GRAINED CHERT. MAY BE NON-CULTURAL IN ORIGIN.
57	MINOR USE WEAR ON DISTAL FEATHERED EDGE. POSSIBLE CORTEX ON DORSAL SURFACE.
58	TINY UNIFACIAL FRAGMENT OF AN OBSIDIAN SCRAPER.
59	IN SCREEN.VERY SMALL SCRAPER EDGE ON MICROBLADE CORE TABLET? BATTERING ON LEFT MARGIN OF TABLET.THREE BLADE FACETS EVIDENT ON FACE.
60	BROAD, FLAT UTILIZED SLATE FRAGMENT. USE WEAR ON BOTH LATERAL EDGES. ONLY EXAMPLE OF THIS RAW MATERIAL. NOT QUITE A CHI THO.
61	SAME SQUARE/TWO CM VERTICAL SEPARATION. CRUDE UNIFACE ON A COARSE BLOCKY FLAKE.SCRAPER EDGE ON ROUNDED DISTAL EDGE.CORTEX?
62	SURFACE/HUMUS. BLOCKY, WEDGE SHAPED HAMMERSTONE. PECKED AT NARROW END OF WEDGE. FITS WELL IN HAND.
63	SURFACE/HUMUS. SMALL, FLAT FRAGMENT OF A CHI THO. BADLY FRACTURED AND FLAKING. APPEARS TO BE ABOUT 1/4 OF FINISHED SIZE.
64	SURFACE/HUMUS. EXHAUSTED CORE OF GREY CHERT. SOME EVIDENCE OF CORTEX.
65	SURFACE/HUMUS. EXHAUSTED CORE OF GREY CHERT. SOME EVIDENCE OF CORTEX.
66	TOP OF B1. CORE FRAGMENT OF BLACK CHERT. POSSIBLE CORE REJUVENATION FRAGMENT.
67	TOP OF B1. CORE FRAGMENT OF VESICULAR BLACK CHERT. SOME CORTEX PRESENT.
68	WITHIN THE ASH. LONG ANGULAR CORE FRAGMENT OF VESICULAR CHERT. A FEW, LARGE FLAKE REMOVALS.
69	ABOVE ASH. ANGULAR CORE FRAGMENT OF VESICULAR CHERT. A FEW, LARGE FLAKE REMOVALS.
70	IN B1 WITH BOULDER FEATURE. ROUNDED 3 CORNER HAMMERSTONE WITH EVIDENCE OF PECKING ON ALL 3 CORNERS. FITS WELL IN HAND.
71	IN B2. SLIGHTLY PECKED AND POSSIBLY BURNED ROUND COBBLE.
72	HUMUS. LONG ROUNDED HAMMERSTONE WITH ONE LARGE FLAKE REMOVED. CLEARLY PECKED AT ONE END.
73	FRACTURED GRANITE COBBLE WITH SEVERAL LARGE FLAKES REMOVED. CONSIDERABLE BATTERING ALONG ONE EDGE.
74	SURFACE FIND NEAR N7W4.COARSE TABULAR SCRAPER. BIFACIALLY FLAKED ALONG DISTAL EDGE.
75	UNIFACIAL SIDE SCRAPER ON SLATE/SHALE. HEAVY USE WEAR DAMAGE ALONG RIGHT LATERAL MARGIN. FEATHERED EDGE TERMINATION ON LEFT MARGIN.
76	UNIFACIAL END SCRAPER ON A SMALL CHERT FLAKE. BURINATED MARGIN ON LEFT SIDE, SPALLED , FEATHER TERMINATION ON RIGHT SIDE. FOUND ABOVE ASH.
77	SMALL UNIFACIALLY RETOUCHED FLAKE ON GREY/GREEN CHERT.
78	UNIFACIALLY RETOUCHED FLAKE ON BROWN SILICEOUS MATERIAL. SEE DISCUSSION CHAPTER 6.

Appendix II

Analytical Methods For Soil Analysis at JcUr-3, the Annie Lake Site:
prepared by A.E.S. Smith, Agriculture Canada

pH ($CaCl_2$) - [84-002] a measure of soil acidity. The procedure measures pH in calcium chloride to approximate the conditions of the soil solution.

%C - [84-013] a measure of the amount of organic matter in the soil. The more organic matter the more likely the horizon existed for a longer period of time and was not subjected to erosion before subsequent burial.

%N - [84-013] similar to %C as all N comes from the decay of organic materials. The ratio of C to N indicates degree of decomposition. In this case >=10, indicating what little organic matter is present is well decomposed humus (excluding the charcoal which is not measures by these treatments.)

Oxalate-extractable Fe and Al - [84-011] a measure of the degree of chemical weathering of primary minerals that exist in the soil as oxides and hydroxides, or, complexed with organic acids. The oxalate extracting procedures measures the total amount of these weathering-derived forms and allows comparison between horizons and across different soils.

Total CEC - [84-007] another measure of the maturity of a horizon. Normally cation exchange capacity (CEC) results from clay and organic matter in the soil. Because most horizons are low in both clay and organic matter, only the two surface horizons contain appreciable CEC.

%Sand, silt and clay -0 [26/1-8] particle sizes determined by pipette method. Sand 2-0.5mm, silt 0.05-0.002mm, clay <0.002mm.

Class - soil texture class according to Expert Committee on Soil Survey 1987. Used to compare horizons. Limited usually to studies in pedology. Pedologists use different class limits and names for sedimentary deposits.

Reference for analytical procedures: The number [ ] refers to the method as outlined in:

Sheldrick, B.H. (ed) 1984. Analytical methods manual, Land Resource Research Institute. LRRI Contribution No. 84-30. Research Branch, Agriculture Canada, 110p.

Interpretation:

Each sequence shows some soil formation and as such can probably be described as a paleosol. However the degree of preservation and the rather short intervals represented here mean that all of the sequences represent juvenile pedological expression. Saying that there are three paleosols in this profile is technically okay but sort of stretching the term a little.

Because we have no definitive buried surface layers (forest floor layers or A horizons), we can't be sure that what we are seeing in each paleosol is truncated or a full expression of a buried soil.

Sequence IV is the oldest development and the IV Cgj horizon represents the chemical condition of the parent material (I.e. pH of 5.2-5.3, low C, N, ext Fe and Al, CEC. Any decrease in pH or increase in the other chemical properties signifies the impact of weathering. Using CEC as an indicator, sequence IV is moderately well developed, sequence II is best developed and sequence III is least developed (or preserved).

A wild speculation would be that the time interval represented by sequence II was the wettest and generated the most chemical weathering over the few thousand years that the soil was formed. Sequence IV is somewhat similar to sequence I in degree of development, but is by far the thickest B horizon development. Sequence III is either very juvenile or has been truncated. All soils are sands and the percentage of silt and clay tends to increase slightly towards the surface of each sequence.