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Women and hide-working at the Little John site (KdVo-6), Yukon Territory: a feminist application of use-wear analysis

Jordan Danelle Handley

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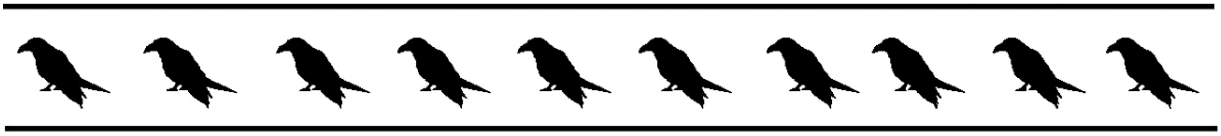

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WOMEN AND HIDE-WORKING AT THE LITTLE JOHN SITE (KDVO-6), YUKON TERRITORY: A FEMINIST APPLICATION OF USE-WEAR ANALYSIS

by

JORDAN DANELLE HANDLEY

B.A. (hons.), Simon Fraser University, 2014

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Abstract

Amongst the Indigenous peoples of northern North America, hide-processing is dominated by female labour. The toolkit used is technologically variable and frequently expedient in nature. Indigenous groups from throughout northern North America were reviewed that demonstrate this gendered division of labour. This thesis examines whether archaeological hide-working toolkits are also characterized by variability and expediency, and whether detailed analyses of hide-production activities using stone tools as proxies can illuminate the roles and contributions of women in the deep past. I examined an assemblage of 219 stone artifacts from the Little John site (KdVo-6), Yukon Territory, Canada, recovered from the Chindadn component, dating from the Late Bølling Allerød Interstadial to the Younger Dryas (14,300-11,900 RCYBP). A multi-stage lithic functional analysis was conducted to isolate hide-working tools. This analysis proceeded through: Stage I—application of ethnographic analogy to inform the sample selection and provide functional inference, Stage II—use-wear analysis to identify used tools, and deduce the use motion and worked materials of those tools, and Stage III—macroscopic analysis to attain additional functional reasoning and classify the identified toolkit. A hide-working toolkit consisting of two formal and seven expedient tools was identified. The results support the ethnographic observation that lithic hide-working toolkits can be characterized by both variability and expediency. Consistencies between the ethnographic record and the Little John Chindadn assemblage support the argument that regionally, women were likely responsible for hide-production activities in the distant past. Using a feminist-approach to use-wear analysis, this thesis was able to uphold inferences depicted and derived in the ethnographic record of northwestern North America by isolating a hide-working toolkit while also illuminating the roles and contributions of women in eastern Beringia from approximately 14,300-11,900 RCYBP.

Lay Summary

Using a feminist approach, this thesis identifies a hide-working toolkit in an archaeological assemblage of stone tools from the Little John site (KdVo-6), Yukon Territory dating to 14,300-11,900 years before present. An ethnographic literature review suggests that hide-working activities during this time: a) were likely the responsibility primarily of women, b) required a stone toolkit characterized by expediency, and c) utilized a range of different tool types. Inferences were addressed with a multi-stage lithic functional analysis that included ethnographic, microscopic, and macroscopic analytical components, resulting in the identification of a hide-working toolkit composed of nine specimens. The resulting toolkit includes a range of tool types characterized by expediency and variability. The results of this research identified a hide-working activity area at the Little John site. The expediency of the toolkit helps explain the limited visibility of women in the archaeological past and the variability conforms with a larger pattern in eastern Beringia.

Preface

This thesis is an original, unpublished, intellectual product of the author, Jordan Danelle Handley.

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Dedication

I dedicate this work to two people—Little John, a man whose legacy I aspire to honour, and Little Johnny, the man I am aspiring to raise.

1 Introduction

The archaeological record of eastern Beringia has received minimal analytical attention towards assessment of the presence, roles and contributions of women to past lifeways. It has been demonstrated in the discipline generally that gendered analyses are typically avoided, yet archaeological interpretation remains beset by gendered assumptions, particularly evident in the emphasis on male activities and their assumed male signatures (Brumbach and Jarvenpa, 1997: 45; Spencer-Wood, 2007: 29-30; 2011: 4). Whether inadvertent or inherent, this form of androcentrism has been prominent within the archaeology of big-game hunting societies (Jarvenpa and Brumbach, 2006, 2009; Miller, 2014; Waguespack 2005; Whelan 1995), including the overrepresentation of Pleistocene mega-fauna hunters that is entrenched in the interpretive narrative of eastern Beringia (Heppner 2017: 1).

Lithic analysis throughout the region has maintained a focus on hunting strategies and weapon systems to establish a cultural chronology for the earliest occupations dating to the late Pleistocene/early Holocene transition (Easton et al., 2007, 2011; Holmes, 2001; Potter et al., 2014; Rasic, 2011; Wygal, 2016). However, the resulting inter- and intra-site variability suggests that microblade and projectile point technologies may not be culturally diagnostic, supporting a re-evaluation of archaeological constructs in the region (Potter et al., 2007, 38). At the forefront of this re-evaluation is further documentation of the nature of variability through detailed studies of lithic assemblages including formal and expedient tool types (Goebel and Buvit, 2011, 23; Potter et al. 2007, 38). Some have addressed this variability through technological and typological analyses at the inter- and intra-site levels (Heidenreich, 2012; Younie and Gillespie, 2016), but such analyses remain limited within the region (Wygal, 2018: 294). Additionally, culturally diagnostic tools or toolkits functioning in subsistence activities beyond food procurement have not

received comparable attention. A gendered approach to lithic analysis, including functional analyses of non-hunting lithic technologies, remains an underutilized approach from which regional understandings of technological organization and cultural adaptations in early eastern Beringia may be advanced.

Archaeology relies on material proxies to make inferences about cultural and natural phenomena not directly observable, including but not limited to identity constructs such as gender. The archaeology of gender and hide production has gained significant traction as a research pursuit by feminist scholars within precontact North American archaeology (Kehoe, 2005; Klokkernes, 2010; Rielly, 2015; Ruth, 2013; Ryan, 2016; Schieber, 2005). Although both the direct evidence of gender, as well as the products of hide production, are largely absent in the archaeological record, their associated toolkits can serve as proxies for exploring the activities of women, furthering our understandings of gendered activities and the role of women in the formation of archaeological assemblages. A lithic form and function analysis, informed by the ethnographic record, of formal and expedient tools has the potential to address current regional interests while also documenting the under-represented contributions of women to hunter-gatherer-forager lifeways. Such an endeavour continues to develop the archaeological methodology needed for social identity categories such as gender, and in this case women specifically, to be accepted amongst the array of inferential and abductive inquiries into the otherwise unobservable aspects of past human organization and behaviour within the discipline.

The Little John site (KdVo-6) is located in the southwestern Yukon Territory in a region unglaciated at the end of the Pleistocene. Human occupation of the site has been recorded from approximately 14,100 cal BP, by a founding population of highly mobile hunter-gatherers, through to the present-day Upper Tanana-speaking *Dineh* (Easton et al., 2018). A diverse assemblage of

faunal remains and lithic artifacts recovered within a fine-scale chronology suggests it was a multi-component seasonal camp wherein a range of subsistence activities were carried out, making it an ideal case study for the application of a gendered lithic analysis for both the documentation of women in the region's distant past and the exploration of hide-processing technology to advance our understanding of its technological organization in Eastern Beringia.

1.1 Research Objectives

Ethnographic literature detailing hide-working activities in northwestern North America suggests that a wide range of stone tools, some formal and others expedient in nature, functioned in varying stages of production both within and between cultural groups. This range of tools aligns with Shott's proposal (1995: 54) to reconceptualize hide-working as a "class of activity" encompassing a diverse "subset of specific actions" requiring a variable toolkit. However, this larger hide-working toolkit, including detailed analyses of expedient technology, has not received the same technological attention archaeologists have applied to hunting toolkits. My thesis will address this important gap in lithic analyses.

My thesis examines whether a hide-working toolkit, as documented in the ethnographic literature of northwestern North America, can be identified within the lithic assemblage of the regionally defined Chindadn component—dating from the Late Bølling Allerød Interstadial to the Younger Dryas (14,300-11,900 RCYBP)—at the Little John site. My approach was to assess the general nature of this toolkit and whether it is characterized by technological variability, as suggested by the ethnographic literature, and the subsequent implications of the archaeological visibility of hide-working activities. I then assessed whether this toolkit could be used to further understandings of the technological organization and activities taking place during the Chindadn

occupation. Lastly, I explored whether this toolkit can be used to illuminate and document the roles and activities of women within eastern Beringia's most distant past.

1.2 Thesis Organization

The following Section 2 presents the archaeological background of this study. It begins with an introduction of the site within the larger eastern Beringian context followed by background on the Little John site including the surrounding landscape, glacial history, site layout, proposed chronology for the early occupations, and the chronostratigraphy. Section 3 is an ethnographic analysis of gendered practices in hide production. It relies on homoplastic inference, a type-level analogical inference linking the co-occurrence of specific traits between two or more groups to establish confidence in the likelihood of a shared feature, or cultural phenomenon (Currie, 2016) to assess the potentiality of hide-processing activities as a female enterprise in the distant past. The review is comprised of Indigenous populations from throughout the Arctic and western Subarctic regions of North America.

Section 4 presents the methods for the subsequent three-stage functional lithic analysis proposed to achieve the objective of identifying a hide-working toolkit within the Chindadn sub-assemblage at the Little John site. This includes: ethnographic analogy (Stage I), lithic use-wear analysis (Stage II), and form-function macroscopic lithic analysis (Stage III). Section 5 presents the data selection process, as well as the subsequent analysis and results. Section 6 is an interpretive discussion of the results, and Section 7 presents concluding remarks on the contributions of the study and of continued feminist archaeological research in Eastern Beringia.

2 Archaeological Background

The Little John site (KdVo-6) is a multi-component seasonal camp located 12 km northwest of the village of Beaver Creek, Yukon Territory, and 2 km east of the international

boundary with Alaska. It is located on the upper reach of *Cheejil Niik* (/grayling creek/ English Mirror Creek) – the easternmost headwaters of the Tanana River drainage. Although the cultural significance of Little John has long been locally recognized, the archaeological antiquity of the site was only acknowledged in 2002. As part of a multi-disciplinary initiative, the Scottie Creek Borderlands Culture History Project led by Norman Alexander Easton of the Yukon College, with a cohort of field-school students, and White River First Nation member Joseph (Tommy) Johnny—eldest son of the late Little John (a resident Upper Tanana elder), began archaeological survey of the region, which included initial testing of Little John's hunting camp.

Subsequent intensive archaeological investigations through to 2017 established the initial cultural occupation of the site from ca. 14,300 cal BP by a founding population of eastern Beringian hunter-gatherer-foragers, through to the present-day Upper Tanana-speaking *Dineh* (Easton et al., 2018). It is recognized as the second oldest site in northern North America (Easton et al., 2011; Potter et al., 2014, 2017), with the basal level and assemblage leading to new hypotheses on the technological organization of the earliest known archaeological culture occupying eastern Beringia (Easton et al. 2020).

2.1 A Brief Overview of Eastern Beringian Archaeology

Geographically, Beringia is the ancient landmass encompassing unglaciated areas of northeast Asia, northwest North America, and the land bridge between, now mostly inundated by the Bering Sea that connected the two during the Last Glacial Maximum (LGM) between ca. 30,000 to 12,000 cal. BP (Goebel and Buvit, 2011). Eastern Beringia of Alaska and Yukon is a area of migration into and subsequent peopling of the New World (Goebel and Buvit, 2011, Potter et al., 2014, 2017).

Archaeological research in eastern Beringia has been impeded by the vast and remote

northern landscape and by the small group size and highly mobile nature of these early peoples. As such, understandings of the overall cultural chronology, including technological organization and adaptations during the terminal Pleistocene remain equivocal and contested within the discipline. One general consensus, amidst efforts to define a culture-historical framework, is the high degree of technological variability exhibited in the region during the late Pleistocene/early Holocene transition (Goebel and Buvit, 2011: 23; Potter et al., 2007: 38).

The earliest widely recognized evidence of human occupation is from chronozone (CZ) 4b of the Swan Point site on the Tanana River at Shaw Creek dated to 14,200-13,800 cal. years BP (Graf et al., 2019; Holmes, 2007). Within CZ-4b—a microblade technology comparable to the Diuktai Culture of western Beringia has been recovered. This uses the Yubetsu technique of producing microblade cores on a prepared biface, unlike later North American microblade industries (Gómez Coutouly, 2011; Holmes, 2011). Above this lie two components assigned to the Chindadn complex dating 13,500 - 12,000 cal. years BP. Originally defined by Cook (1969) at the Healy Lake site, the Chindadn complex is typified by the presence of tear-drop bifaces, the absence of microblade technology, and a general emphasis on bifacial technology. This complex also has western Beringian antecedents found at Berelekh and Nikita Lake 1 (Pitulko, 2016). Additional diagnostic materials include triangular and subtriangular shaped bifaces, blades, end-scrapers, side-scrapers, wedges, perforators, and large cobble tools. Sites exhibiting these temporal and typological requirements have been identified in the Nenana Valley (where they are designated the Nenana Complex (Hoffecker et al., 1988) at Dry Creek (Powers et al., 2017), Moose Creek (Pearson, 1999), and Walker Road (Goebel et al., 1996); the Tanana River Valley at Healy Lake (Sattler et al., 2011, Younie and Gillespie, 2016), Broken Mammoth (Holmes, 1996), Swan Point (Potter et al., 2014), Little John (Easton and Mackay, 2008), and the Teklanika Valley at Owl

Ridge (Hoffecker et al., 1996).

The Denali complex, dating to 11,500-9,500 years ago (i.e., late/post Younger Dyas), was originally defined by West (1967) based on sites from the north Alaska Range (Donelly Ridge, Teklanika, and Campus, the latter subsequently identified as middle Holocene in age, see Mobley, 1991). It is characterized by microblade technology including wedge-shaped cores and transverse "Donelly burins". In addition to the river valleys occupied during the Chindadn/Nenana complex, the Denali complex is well-known from the Brooks Range, where similar assemblages at Onion Portage were the basis for the definition of the American Paleoarctic Tradition (Anderson, 1968, 1970, 1988), and have come to be additionally recognized in a large range of ecological contexts throughout the region including maritime, transitional, interior, montane, northern, central, and coastal Alaska and Yukon (Easton, 2015: 46). Importantly, Denali microblade cores, although sharing a similar morphology with earlier Yubetsu microcores (i.e., wedge-shaped when exhausted) are produced on unifacially modified flakes, a method unique to North America (Gómez Coutouly and Holmes, 2018).

The relationship between the two "complexes" remains at the forefront of archaeological research in the region today. Some maintain that the two "complexes" are temporally continuous and should be lumped together within a larger singular tradition (Holmes, 2001; Potter, 2008; Potter et al., 2013; West, 1996; Wygal, 2018). Others suggest that the Chindadn/Nenana and Denali are distinct, either contemporaneous or separate, and that the technological variability is therefore, culturally significant (Ackerman 2007, 2011; Dixon, 1999). Research addressing variability includes approaches such as land-use strategies, seasonality, manufacturing techniques, and hafting styles. The refined chrono-stratigraphy of the Little John site, outlined in the following section, supports a technological and temporal distinction between the Chindadn and Denali

complexes (Easton et al. 2011) and suggests further distinction of an earlier component that is contemporaneous with but technologically distinctive from Swan Point's CZ-4b (Easton et al. 2020).

2.2 The Little John Site

Measuring approximately 55 x 65 m^2, the Little John site is situated on a knoll with a north-to-south vantage point of the Mirror Creek Valley and the Nutzotin and Wrangell-St. Elias Mountain chain to the south (Figure 1). The knoll feature is geologically complex and archaeological materials have been recovered from the overlook, the eroding hillsides, and the deep sedimentary basins surrounding it, resulting in discontinuous and variable stratigraphy across the site. The nature of this formation has resulted in distinctive chrono-stratigraphic descriptions specific to five defined areas (Figure 2) within the site and has elicited a series of dating techniques, including a rigorous radiocarbon chronology for one of the predominant areas, to establish temporal correlations across the overlook.

The site overlays a basal regolith comprised of the contact between metasedimentary rocks of the Triassic Mirror Creek Formation and mafic intrusive rocks assigned to the Triassic Snag Creek suite. The Snag Creek rocks are resistant to weathering and form a linear NW-SE trending ridge that defines the SW edge of the site. Above this bedrock is sparse glacial till assigned to "the Mirror Creek glacial advance (corresponding to the central Yukon's Reid and North American Illinoian glacial events), variously dated to the Late Illinoian – MIS 6, c. 140,000 BP (Bostock, 1965; Krinsley, 1965) or the Early Wisconsin – MIS 4, c. 70,000 BP (Denton, 1974; Hughes et al., 1989). However, the Late Wisconsin advance of glacial ice, identified locally as the McCauley glacial advance (corresponding to the central Yukon's McConnell and the North American Wisconsin glacial periods), ended at McCauley Ridge, some 50 kilometers southeast, and began a

rapid recession at about 13,500 BP; by 11,000 BP the region was ice-free to at least the White River, some 150 kilometers to the southeast (Rampton 1971)" (See Easton, 2012:13).

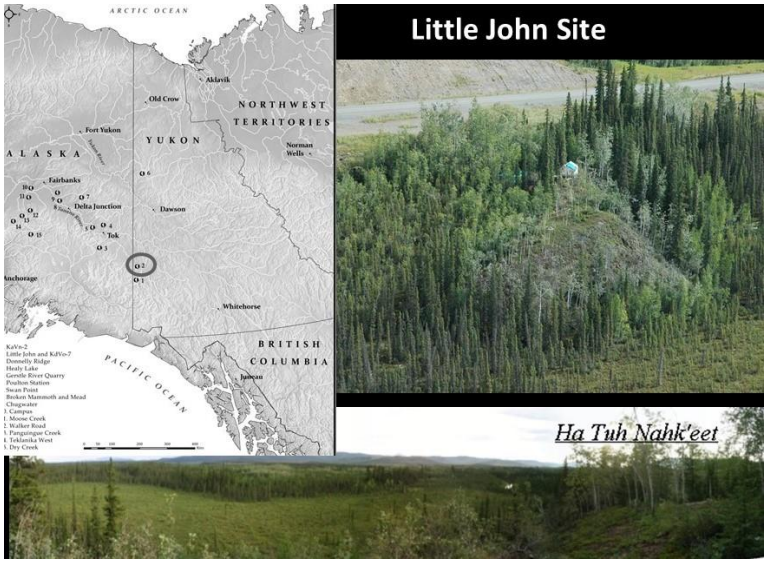

Figure 1. Regional and situated location of the Little John site (Courtesy of N.A. Easton).

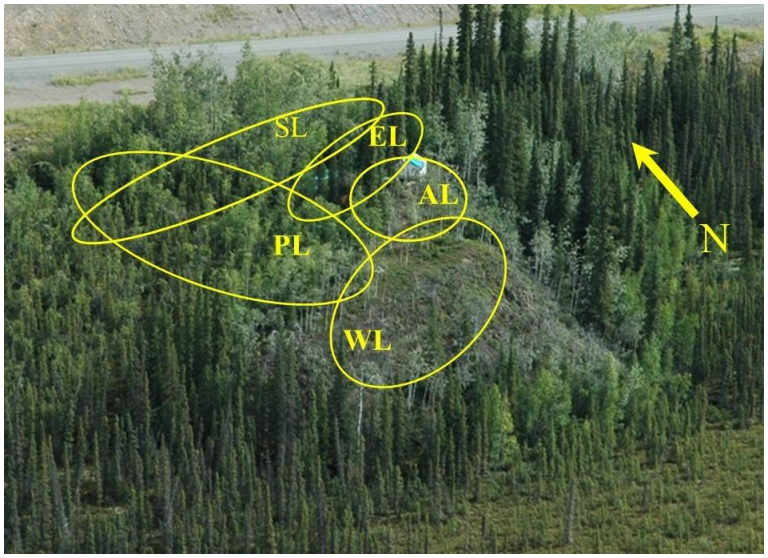

Figure 2. Arial photograph of the Little John site identifying site lobes (Easton et al. 2020).

The basal cultural sediments are post LGM loess deposits of Allerod, Younger Dryas, and Milankovich Thermal Maximum in age. Above the loess are brunisol soils, ranging from 10 - 20 cm in depth, that may be interceded by deposits of volcanic ash, currently presumed to date to the

second eruption of the White River Volcano approximately 1,200 BP[1]. The stratigraphy is then capped by an organic O/A horizon of variable depth from 2 to 3 cm of organic mat to 30 cm of sphagnum organics in shaded areas.

The site has been divided into stratigraphic zones that recognize the variable depositional processes across the site defining differential stratigraphic sequences (Figure 2). To the north is the *swale lobe (SL)* capped by an estimated 50 to 60 ft of loess between bedrock and the brunisol horizon. The *permafrost lobe (PL)*, where permafrost is encountered mere centimeters below surface, is the north-facing slope of the knoll. The *apex lobe (AL)* exhibits large cobbles throughout the brunisol and loess deposits and is centrally located, running north-to-south. The *west lobe (WL)*, situated on the southwestern hillside, is comprised of conflated deposits ranging from 5 to 40 cms in depth (Figure 3). Lastly, the *east lobe (EL)* is the central portion of the site grading into the deep swale lobe (Figure 2). The loess below brunisol in this area is interspersed with a series of undulating paleosol strata, designated the Paleosol Complex (Figure 4). Cultural materials are concentrated in the west and east lobes. The majority of lithic artifacts have been recovered in the former with faunal remains and bone artifacts in the latter.

2.2.1 Chrono-stratigraphy of the Chinadan Component

The Little John site presents temporally and stratigraphically distinct Chindadn complex type artifacts below characteristic Denali complex artifacts (Easton et al., 2011), evidenced by a series of 46 radiocarbon dates (Figure 3; Appendix 1; Easton et al., 2018, 2020). The Denali Complex dates to the post Younger Dryas Occupation Period (OP) III (11,100 – 10,500 cal. BP). In the west lobe, it is recovered in the lower B2 stratum and in the east lobe from Paleosol 1 (P-1) and the upper Paleosol Complex 1 (PC1-P2). Classic Chindadn Complex (Chindadn Bifaces Type

[1] Research to definitively associate the ash deposit to one of the two White River Volcano eruptions is currently in.

1 and 2) technology is found in OP I-b (13,080 – 12,000 cal. BP), while a single late Chindadn Type 3 biface lies within the OP II deposits (12,000 – 11,200 cal. BP) (Homes, 2014). In the eastern lobe, OP I-b is associated with the Late Allerod and Early Younger Dryas climatic period. It is limited to the Loess Below Paleosol Complex stratum, which also holds an Early Allerod OP I-a dated to c. 14,000 cal. BP. OP II, from the Late Younger Dryas to the post Younger Dryas (12,000-11,000 cal. BP) is limited to Paleosol Complex 2 and 3 (PC2-P3 and PC3-P4) dating from 11,190-11,400 cal. BP. The extensive Chindadn technology found in the basal loess strata of the West Lobe can be grouped with the East Lobe OP I-b dates based on morphological grounds.

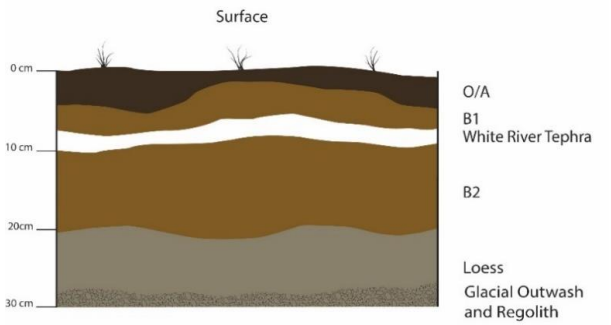

Figure 3. Stratigraphic profile representative of the west lobe (Courtesy Michael Grooms).

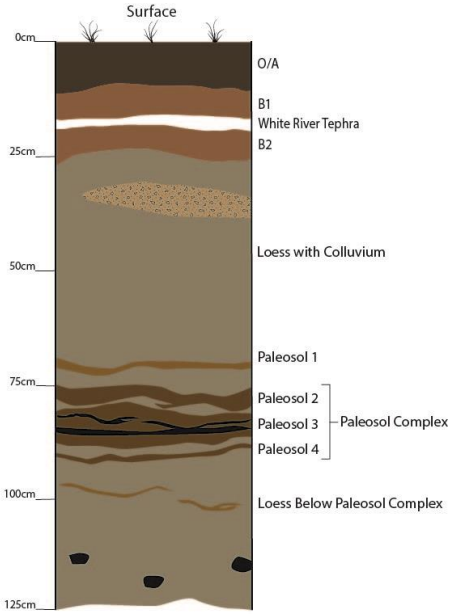

Figure 4. Stratigraphic profile representative of the east lobe (Courtesy Michael Grooms).

OP I-a is the earliest dated occupation at the site, consisting of artifacts and fauna in the East Lobe Loess Below Paleosol Complex stratum and dated to the early Allerod Interstadial Four OP I-a radiocarbon dates range from 13,730-14,156 cal. BP. These dates are comparable to the earliest component at Swan Point (Figure 5)[2]. Associated cultural materials are exclusively expedient and include a flake core, retouched split pebbles, utilized flakes, cobble choppers, hammerstones, and culturally modified bison and wapiti faunal remains. Given that the OP I-a assemblage lacks diagnostic materials, cultural associations remain equivocal. Considering the wide 2-sigma distribution of the earliest dates, Easton et al. (2020) argue that they are best interpreted as representing an occupation ca. 14,000 Cal BP, reasoning it is at this point that the tails of distribution best overlap. In addition, they suggest three hypotheses to account for the cultural nature of OP I-a (Easton et al. 2020):

1. Based on similarity of dates of occupation, OP I-a is an ephemeral expression of basal Swan Point Dyuktai, lacking evidence of microblade technology.

2. The basal West Lobe Loess assemblage represents a deflated mixed assemblage of formed tools deposited during both OP I-a and OP I-b, indicating that the Chindadn complex at Little John spans the Early and Late Allerod.

3. The OP I-a assemblage represents a unique currently unrecognized cultural complex.

The remainder of this study seeks to isolate a hide-working toolkit within the Little John Chindadn assemblage recovered from OP II-b (Basal Loess/PC2-P3 and PC3), OP IIa (Basal Loess/Loess below Paleosol Complex-P5) and conservatively includes the materials from OP I-a and b (Basal Loess/Loess below Paleosol Complex-P6), but excludes the Denali materials (OPIII).

[2] A standard phase model using OxCal v4.2 was applied in the construction of a summed probability distribution for the Little John radiocarbon dates which was compared to available dates from the Yukon-Alaska borderlands and the Tanana River Basin regions respectively (See Brown et al.2019).

It will also evaluate the inference that this was likely a female enterprise in the distant past. While my research will not resolve the Chindadn-Denali debate, it presents an alternative approach to lithic analyses in the region from which technological variability can be further defined and detailed while simultaneously illuminating the roles and contributions of women to eastern Beringian lifeways.

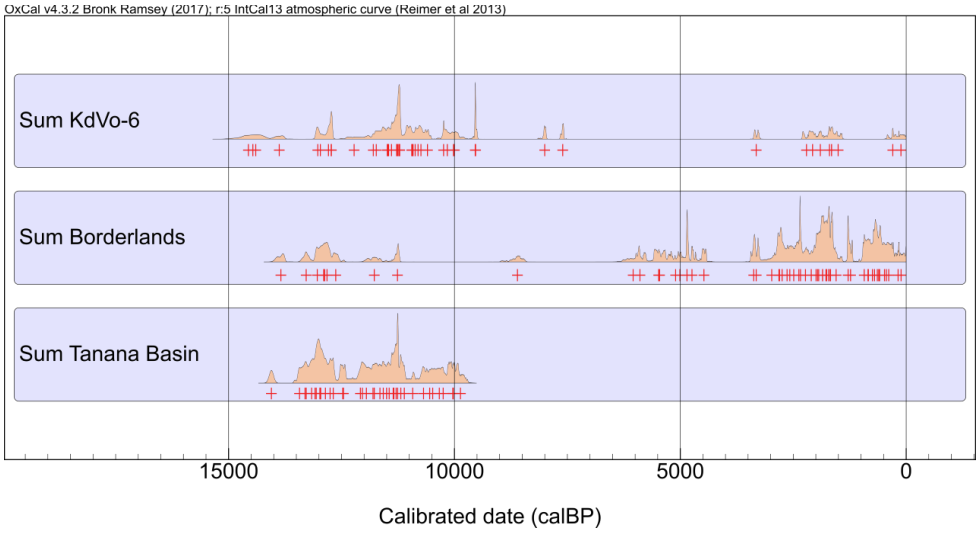

Figure 5. Summed probability distributions for radiocarbon dates of the Little John site, Yukon-Alaska borderlands region, and Tanana River Basin (Courtesy Thomas J. Brown).

3 An Ethnographic Review of Women and Hide Production in North America

A division of labour wherein women were predominantly or dominantly responsible for the production of hides is characteristic of North American Indigenous populations exhibiting subsistence practices dependent on procurement of large game (Driver and Massey, 1957:343-344; see also Albright, 1984, Pokotylo and Hanks, 1989). Using ethnographic inference, I suggest that this was a characteristic of such societies in the distant past. Furthermore, I argue that the material culture used in hide production activities as ethnographically reported is a useful proxy to investigate the roles and contributions of women in the archaeological past within the North American context.

Analogies are based on the premise that if two things are similar in one or more contexts, they are likely to be similar in others (Deal 2017, 35). The application of ethnographic analogies to make inferences on archaeological subjects has received substantial critique (Lyman and O'Brien 2001, Schmidt 2010), with analogies being acknowledged to degrade as the antiquity of the archaeological subject increases. From even a critical perspective, however, it is typically maintained that ethnographic analogies are useful in the formation of testable hypotheses. Contra to criticism, it has been suggested that used in a strategic or controlled manner, ethnographic analogy is not inherently faulty and maintains inferential value beyond hypothesis formation (Jarvenpa and Brumbach 2015; Wylie 1985, 1988, 1989). Further, Currie (2016) reports that the application and reliance of comparative data within archaeology is not unlike other sciences such as biology. He attributes the primary difference in the application of analogy to the high degree of internal skepticism confronted by the former.

In consideration of this, I structure my argument and application of ethnographic analogy using *homoplastic inference*–a type-level analogical inference linking the co-occurrence of specific traits between two or more groups to establish confidence in the likelihood of a shared feature, or cultural phenomenon (see Currie 2016). The *feature* of this analysis is hide production as a set of activities carried out predominantly or exclusively by women. The *traits* that overlap to link the archaeological context—occupants of the Little John site dating to the Chindadn component, to the ethnographic context—analogous Indigenous groups from northern North America, include; 1) climatic context; 2) subsistence strategy; 3) geophysical landscape, and; 4) cultural affinity and/or relatedness.

The following subsections review the ethnographic literature of hide working amongst Indigenous peoples from two geographic regions: 1) the Arctic—Inuit and Yup'ik and 2) the

western Subarctic—Dene. Inuit and Yup'ik are viable cultural analogues to past Little John occupants based on the mutual compatibility of trait one—a northern climate and trait two—a subsistence strategy focused on the procurement of large mammals. The Dene territory and past occupants of Little John exhibit traits one through four to varying degrees of likeness. The Dene inhabit comparable environments, are large-game hunting societies, occupy the same or similar geophysical landscapes and may be ethnically related to the occupants of the Little John site.

I argue that it is reasonable to infer that female occupants at the Little John site between 14,300-11,900 RCYBP were predominantly, if not solely responsible for processing hides. I also demonstrate that hide-working toolkits are more diverse and variable than often depicted in traditional approaches to archaeology. Exploration and documentation of this variation has the potential to reveal significantly more knowledge on the technological organization of eastern Beringia generally, and hide-working practices and contributions of women to these lifeways, specifically.

3.1 Women and Hide-Production

The Arctic physical environment is dynamic due to its longitudinal expansiveness across northern North America which includes numerous subzones characterized by combinations of sea and tundra. Three geophysical factors are suggested to define the climatic boundary of this region—average July temperatures of 10 ° C, the boreal forest treeline, and continuous permafrost (Stager and McSkimming 1984, 27). These are the result of low heat energy and correspond with paleoclimatic features of the study area during the terminal Pleistocene. The Arctic climate delimits the degree of plant food gathering opportunity, in turn heightening dependencies on hunted animal foods. Traditionally, Inuit and Yup'ik utilize marine and terrestrial mammals, while the subsistence of past Little John occupants relied heavily on terrestrial game evidenced by the

abundance of medium and large faunal remains recovered (Yesner et al. 2011). Dependency on hunted migratory game is a marked feature of Arctic peoples in general, and past Little John inhabitants.

Much of the ethnographic literature explicitly describes hide processing as practiced principally by women (Aksaajuq Otak 2005; Arima 1984; Balikci 1984; Boas 1888, Collins et al., 1945, Giddings, 1952:Lantis 1984: Larsen and Rainey, 1948; Murdoch 1967; Murdoch, 1892, Oswalt and Vanstone 1967: Vanstone 1989). The Subarctic *Dene* share many common traits with past occupants of the Little John site. Most notably, the physical landscape connects those of the past to contemporary descendant populations—most evident for the *Upper-Tanana* speaking *Dene* and neighbouring relatives. While the current subarctic climate differs from the terminal Pleistocene paleoclimate, regions of markedly uniform environment suggest that some aspects transcend time. These include permafrost and tundra (although discontinuous), extreme seasonal fluctuations, and considerable aridity (Gardner, 1981).

Hunting of large migratory game is the primary feature of the subsistence economy for past and present populations. The traditional subsistence economy of contemporary peoples also includes the gathering of plant resources that would not have been available in this region in the preceding late Pleistocene/early Holocene. The biological relatedness of contemporary northern *Dene* and the eastern Beringian population (see Potter et al., 2017) that occupied Little John between 14,300-11,900 RCYBP is inconclusive. However, mounting genetic (Fraught, 2017; Llamas et al., 2016, 2017; Raghavan et al., 2015; Reich et al., 2012; Skoglund and Reich, 2016; Tamm et al., 2007) and linguistic data (Ives et al., 2010; Vajda, 2010) strongly support the possibility of a descendent relationship between contemporary *Dene* of North America and an east Asian population. A detailed review of this literature is beyond the scope of the current analysis.

Therefore, recent research supports analogical relevance between modern *Dene* populations and early occupants of Little John in terms of cultural affinity.

The ethnographic literature for the Dene indicates that women held primary responsibility for hide processing (Albright 1984; de Laguna and McClellan 1981; Helm and June 1961; Honigmann 1946, 1949; Janes 1983; Lane 1981; McKennan 1959; Murdoch 1967; Osgood 1937, 1940, 1971; Pokotylo and Hanks 1989; Reilly 2015).

3.2 The Hide-working Process and Toolkit

This ethnographic review also suggests that though techniques and tools used in hide-working often vary (Table 1), the overall process bears marked similarities, and activities can be grouped into three general stages (Table 2)[3]. The initial stage includes the immediate preparation of skin including the removal of the skin (skinning) and subsequent removal of flesh from the skin (fleshing). The intermediate stage consists of thinning the skin to an even thickness and dehairing of the hide, if desired. The final stage is dominated by the softening of the skin which is achieved in two ways, a cyclical process of soaking, drying and smoking the skin, and the scraping of a dry skin. Additionally, the maintenance and manufacture of hide-products can be included in this final stage.

Presently, hide-working is accomplished predominantly by use of metal tools and much of the ethnographic literature reports on this metal hide-working toolkit. Traditionally, however, this toolkit consisted of stone and bone tools. Table 1 reports on descriptions of the stone tools used in hide-working activities for various Indigenous peoples across North America from ethnographic and ethnoarchaeological literature that acknowledges the role as the dominant processors of hide.[4]

[3] For a detailed account from a traditional perspective see Tom (1981) and an ethnoarchaeological perspective see Albright (1984).
[4] See Hepner 2017 for a detailed feminist analysis on the bone hide-working toolkit from the Broken River site.

Table 1. Stone tools with ethnographically observed functions in hide-working.

Tool	Described Use/Function	Reference	Culture Group	Quotation
Adze	Scraping	De Laguna and Horton 1947	Tena	In our discussion of planing adzes (p. 121) we mentioned five blades which might have been used for scrapers or fleshers, and it is also possible that some of the other small blades described as adze blades would not have been used as scrapers (128)
	Scraping	De Laguna and Horton 1947	Tena	In addition to the seven scrapers from Bonasila, there is also a very large scraper or cleaver of andesite, with curved edge, measuring 29 x 19 cm (Pl. Xii, *3*) (128).
	Fleshing	De Laguna and Horton 1947	Tena	As a flesher . . . the Tena use a bent or straight iron blade, sometimes with a notched edge, hafted in a curved wooden handle (Pl. XVII, *3-6*). The corresponding tool, used before the introduction of steel is represented by the thin adz-like scraper blade (see p. 121) and by chipped end scrapers (127).
	Scraping	De Laguna 1947	Eskimo	Of fifteen blades, eleven were probably for adzes and four, for either small adzes of scrapers (150). . . . the specimen is usually roughly finished, the cutting edge generally shows a good polish. With two exceptions, the blades are flat. One of these has a high facetted back (Pl. XXV, *23*, R) like the specimen from Hologochaket (Pl. XI, *5*); the other is a fragment of an adze or scraper blade with slight facets (150). The Adz-like character of the Eskimo scraper is further exhibited by the fact that exactly the same type of small celt may be used for both the scraper and the adz (187).
	Scraping	De Laguna and Horton	Old Bering Sea	Those of the Old Bering Sea Culture are of hard rock, shaped like a planing adz blade, except that polished edge meets the lower surface at an abrupt angle, sometimes almost at a right angle (186).
Whetstone	Scraping	De Laguna and Horton 1947	Tena	A whetstone from Old Fish Camp, with one end roughly chipped, was also mentioned as a possible scraper (128).
	Softening	Murdoch 1892	Iñupiat	This is then rubbed down with a flat piece of sandstone or gypsum, and finally chalk, so that when finished it seems like pipeclayed leather. All furs are prepared in the same way (300).
"Chi Tho"; ulo-shaped scraper; hide softener; tabular biface	Scraping	De Laguna and Horton 1947	Tena	Two ulo-shaped scrapers of chipped slate come from Jackson Creek on the Yukon above Tanana. One of these is a roughly worked oval slab (Pl. XIII, *19*), the other is neatly chipped with a curved scraping edge and a straight back (Pl. XIII, *17*) (39). These are chips and sharp-edged slabs of andesite picked up on the beach and often utilized without further shaping. The crude workmanship of those that have been retouched, of which Hrdlicka secured a number, suggested at first that they might have belonged to an early culture at the site. I believe, however, that they are no different from other ulo-shaped scrapers of the Tena (128). These tools [ulo-shaped scrapers] were used unhafted, or, according to Jette, were hafted in an ulo handle (187).
	Fine skin work	Osgoode 1940	Ingalik	Small ulus with thin blades are used on fine skin work, etc. (90).
	Softening	McKennan 1959	Upper Tanana	After being soaked and wrung out, the skin is hung over a transverse pole and scraped and worked thoroughly with an ulu shaped implement of slate. This scraping is the most important part of the process for upon it depends the ultimate softness of the leather. When the skin has been worked dry it is put to soak after which it is given another scraping. After this has been repeated several times, the skin assumes an exceedingly soft texture (83). A second and cruder form is used for working skins. The latter is often a semicircular piece of thin slate without a handle of any kind (66).
	Softening/ Dressing	Albright 1984	Tahltan	This tool is usually made from a coarse-grained basalt pebble, the manufacture of which is described below. The dressing tool is used with two hands, one grasping the hafted stone pushes with some force against the skin, the other hand grasping the end of the handle pulls towards the body as illustrated in Figure 21. The tool is worked against the hide in a downward or sideways motion (56-57). All tools have cortex remaining on their dorsal surfaces. The manufacture of a new tool takes about ten minutes (57). Dressing stones appear to have a long life span. Two or three hides can be dressed with a tool before it requires resharpening (57-58). Although the stone material is abundant and the method of manufacture fairly simple, many stone dressing tools appear to be highly curated. Several tools observed in 1979 and 1980 were reputed to be 100 years old (58).
	Softening	Reilly 2015	Kaska	This is a tool that is used to soften hides (Figure 2-5). Often constructed from a tabular stone, it is bifacially worked along one or more margins by removing flakes from both the dorsal and ventral (top and bottom) faces, typically resulting in a characteristic D-shape. The stone scraper is usually inserted into a wooden haft; and is worked over the hide, stretching and

				scraping, until the hide takes on a soft and somewhat "fluffy" texture (18).
	Fleshing	Rainey 1939	Upper Tanana	One of the native women at Gulkana obligingly made several for us in the following manner: a flat oval pebble selected from the beach was struck so that a thin, discoidal flake was detached; the edge of the flake was then battered against another stone to produce a blunt, retouched edge. In the Upper Tanana dialect these tools are called *tchi-tho* (360).
	Drying	Honigmann 1946	Slave	After having been smoked once, the hide was again washed and the water pressed out with a stone finishing stick made by hafting a piece of soft stone in a long wooden handle (53).
	Softening	Honigmann 1949	Kaska	The skin is now again lashed to a stretching frame and softened by being scraped with a chipped stone or dull axe blade set in a wooden handle. . . . The stone end is then rubbed against the hide with as much pressure as possible (Pl. 8,D) (78).
	Softening	Osgoode 1940	Ingalik	-It is simply a piece of rock or stone found on a beach, either river-borne or a piece broken off from the bluff. …perhaps 6 inches long. It is used just as found, except for a piece of tanned skin, which serves as a holder to save the hand (81). -The flat rough side of the stone is rubbed over the skin, which is laid over the work board. The stone is rubbed back and forth . . .The skin being tanned is dry, and the stone as it rubs back and forth makes a loud noise (81).
End-Scraper	Fleshing	De Laguna and Horton 1947	Tena	As a flesher . . . the Tena use a bent or straight iron blade, sometimes with a notched edge, hafted in a curved wooden handle (Pl. XVII, *3-6*). The corresponding tool, used before the introduction of steel is represented by the thin adz-like scraper blade (see p. 121) and by chipped end scrapers (127).
	Fleshing	Murdoch 1892	Iñupiat	For removing bits of flesh, fat, etc., from a "green" skin, and for "breaking the grain" and removing the subcutaneous tissue from a dried skin, the women, who appear to do most if not all of this work, use a tool consisting of a blunt stone blade, mounted in a short, thick haft of wood or ivory, ... The skin is laid upon the thigh and thoroughly scraped with (294) this tool, which is grasped firmly in the right hand and pushed from the worker (295). This specimen is very neatly made and polished, and all the edges are rounded off (295).
	Scraping	Osgoode 1940	Ingalik	This tool is made from a black, slate-like stone found on the beach (argillite), spruce root (near the trunk), babiche lashing line, and a piece of caribou skin (79). When scraping heavy caribou skins or fish skins, the action of the tool sounds like a steel file on metal (80).
Side-Scraper	Not listed (Inferred "scraping")	De Laguna and Horton 1947	Tena	Some of the largest end scraper blades, especially those which are rather poorly made, cannot easily be distinguished from the large side scrapers which I discuss below as ulo-shaped scrapers (186).
	Not listed	Rainey 1939	Campus Site	. . . semi-lunar side scrapers retouched on one face only, . . . (383).
Cobble Scraper	Not listed (Inferred "scraping")	Nelson 1989	St. Michael, Norton Sound	. . . rounded, boulder-like piece of granite about 5 inches in its longest diameter for rubbing and softening skins; the lower surface is smoother and polished by use (116).
Flake Tool	Softening small skins/ Resoftening existing hide	Albright 1984	Tahltan	However, within every woman's workbag or collection of tools there are one or two smaller stone dressing tools which are best described as cortex spall or flake tools. These are hand held and used for dressing smaller kills, which require little work to soften them. They are also used to resoften articles of clothing or robes after washing or cleaning (58).
Knives	Fleshing	Reilly 2015	Kaska	Stone implements such as knives can be used for removing flesh from hides in addition to bone fleshers (personal observation 2012), though they are more commonly thought of as tools used for butchering (124).
	Not Listed (hide-working; general)	Murdoch 1892	Iñupiat	With these tools and their knives, they do all the work of preparing skins for clothing, boat covers, etc. (299).

Table 2. Ethnographically observed tools functioning in hide production activities.

Stage	**Initial Stage: Processing/ Preparation**		**Intermediate Stage: Processing**		**Final Stage: Processing/ Maintenance**			**Other**	
Activity	**Butchering**	**Fleshing**	**Dehairing**	**Thinning**	**Softening**	**Working Existing Hide Products**	**Working Small Skins**	**Scraping-Generalized**	**Not specified**
Adze		X		X				X	
Cobble Scraper	X	X	X						X
Endscraper		X	X			X	X	X	
Flake Tool								X	
Hide Softener	X	X	X		X			X	
Knives	X	X							X
Sidescraper									X
Whetstone					X			X	

(after Reilly 2015 and Shultz 1992)

Tables 1 and 2 supports multifunctionality as another characteristic of hide-working tools wherein a tool may have been used to accomplish multiple tasks within the hide-working process. Additionally, culturally dependent applications of specific tools throughout the hide-working process is another possible factor contributing to the variable use of individual tool types. As such, the remainder of this section focuses on the technological organization of the lithic hide-working toolkit as it is reported on in the ethnographic literature.

3.2.1 Arctic Hide-working Toolkit

The hallmark of Inuit and Yup'ik women's toolkits is the ulu, often referred to by early ethnographers as the woman's knife. Cross-culturally and temporally, the ulu has many variations in raw material, size, shape and haft style. However, they are generally semi-lunar knives. Prior to European contact the blades were usually manufactured from stone with wood, or bone hafts. Ulus are multifunctional tools used in multiple stages for diverse functions such as cutting hair, working snow and ice, and processing fish (Frink et al. 2003). In hide working they are used for skinning animals, dehairing skins, and cutting skins. Boas (1888: 517-518) described the ulu amongst the Central *Inuit* as used in initial hide production stages, and the preparation and cleaning of skins, while Frink (2005: 94) notes its utility amongst the Central Alaskan *Yupik* primarily for the

processing of marine mammals.

The remaining lithic hide-working toolkit is markedly variable particularly in scraper types. Two main classes of scrapers, two-handed scrapers, often manufactured from bone, but also taking the form of stone bits hafted to transverse poles, and one-handed scrapers exhibiting a higher degree of variability are used. The Central Alaskan *Yupik* employed expedient coarse-grained stone scrapers or "boulder chips" to scrape the inner surface of fresh hides and for hair removal (Oswalt and Vanstone, 1967: 97). They also employ flaked scraper blades, including both end- and side-scrapers. Such scrapers are made of "flint" and are un-hafted, while ground stone and metal scrapers are hafted (Oswalt and VanStone, 1967: 97). Sandstone scrapers are specifically used to process fish skin (Oswalt and VanStone, 1967: 97). Vanstone (1989: 32) identifies the use of slate end-scrapers in the first stages of hide preparation amongst the *Nunivak Cup'ig* with wood and bone scrapers being used to soften skin in later stages.

Two detailed technological accounts of hide-working come from literature on the *Iñupiat*. Larsen and Rainey (1948: 48) note various kinds of scrapers used in the preparation of skins by the *Tikigagmuit*, maintaining that scraper variability is reflective of craft specialization. They begin by noting that stone is used in both single- and two-handed scrapers, and that the latter had multiple functions throughout the hide-working process (Larsen and Rainey, 1948: 89-90). Four types of end-scrapers are also identified: snub-nosed scrapers, "long slender" scrapers made on flakes, and two rare forms—the spatula-shaped scraper and S-shaped scraper. Larsen and Rainey (1948: 104-106) report the largest variety of scrapers are amongst side-scrapers, and hypothesize that some were used for hide processing, but the majority were used to process bone and wood and belonged to men. The final lithic tool class Larsen and Rainey (1948: 105) describe are discoidal blades; some are classified as knives, and others scrapers, the latter identifiable by subtriangular or oval

outlines. Larsen and Rainey (1948: 88) maintain that what are traditionally identified as discoidal knives are actually and "obviously" skin scrapers (see also Fewkes, 1898).

Lastly, the material culture of the Kobuk River *Iñupiat* are reported as being more similar to northern Dene than Arctic peoples (Giddings, 1952: 1). Giddings (1952: 82) states "The cutting and preparing of skins for the making of clothing was undoubtedly accomplished in part by means of the tools that also had uses in other processes. . .". This is evidenced by the prevalence of the *tci-tho*, a crude stone scraper generally attributed to hide softening in the subarctic but, widely documented as multifunctional, including use as a whetstone, grinding stone, and/or cutting implement. Giddings (1952: 80) describes the *tci-tho* among the Kobuk River *Iñupiat* as averaging 3 inches in diameter, ground flat on each face and crudely flaked by means of direct hard-hammer percussion. They can be made of schist, slate or igneous rock, and are typically oval to sub-oval in outline (Giddings, 1952: 80).

3.2.2 Western Subarctic Hide-working Toolkit

The *Dene* hide-working toolkit exhibits considerable technological variability in its entirety and also between sub-populations. A variety of scraper forms are present with any combination of bone or stone, hafted or un-hafted, single- or double-handed use along a continuum of expediency to formality. The ulu is also prevalent among multiple *Dene*-speaking groups. De Laguna and Horton (1947: 128) report ulu scrapers from the *Koyukon* manufactured from slate, sandstone, or andesite, varying in size from 8-10.5 cm x 10-16 cm, and oval to sub-oval in outline, used for skin softening and for finishing work of soft and fine skins (De Laguna and Horton, 1947: 127-128). Ulu scrapers are also reported for *Deg Xinag* by Osgood (1940: 89-90) for fine skin work and are often hafted to spruce root handles either by slotting or lashing with babiche. A typical ulu blade measures roughly 8 cm x 9 cm, with 6.4 cm extending beyond the handle (Osgood, 1940: 89-90). He reports that a woman will have about three ulus of varying shape and

size (Osgood, 1940: 89-90). Lastly, McKennan (1959) documents the ulu scraper among the *Upper Tanana*. He does not provide comparable metric data but details its function as a softener, stating this is the most critical part of the process (McKennan 1959: 84).

Rainey's (1939) report on the *Upper Tanana,* does not mention the ulu scraper but instead focuses on the *tci-tho*. The *tci-tho* is most commonly known for its application in the softening stage of hide-production and has many names throughout the literature, including linguistically differentiated terms like *tsētél* (Reilly, 2015: 18), or *tthete* (Pokotylo and Hanks, 1989: 56). Technomorphologically it is referred to as a tabular biface (Le Blanc, 1984; Workman, 1978). Rainey (1939: 360) describes the manufacture of this tool: ". . . a flat oval pebble selected from the beach [was] struck so that a thin, disc-like flake was detached; the edge of the flake was then battered against another stone to produce a blunt, retouched edge". Pokotylo and Hanks (1989: 56) similarly describe the *tthete* as hafted cortex spall flakes with marginal bifacial retouch. Albright (1984: 58) describes two varieties of cortex spall flake tools, one hafted for the softening of skins and the other un-hafted, used to dress smaller skins and resoften existing garments.

While the *tci-tho* has been argued to also function as a fleshing knife (Reilly 2015: 119), it is mostly closely associated with later stages of production, predominantly the softening stage. Ethnographic descriptions of the ulu scraper suggest there may be overlap between these scraper types particularly in their outline morphology, function within the hide-working process, and morphological diversity within the tool type. It seems possible that they may be cultural variants of an antecedent tool type (see discussions by De Laguna and Horton, 1947: 182-186; McKennan 1959: 66-67).

The least referenced scraper type in the subarctic literature is the end-scraper. De Laguna and Horton (1947: 127) report an adze-like scraper used to remove fat and dehair frozen hides

among the *Koyukon*, suggesting utilization during intermediate stages of hide production. The desire for haired products, such as blankets, winter clothing, robes and moccasins, may reflect the low frequency of end-scrapers, including the ethnographic observation of their use and the material recovery of them in subarctic archaeological contexts (Reilly, 2015: 119). One last tool type described for the Koyukon is a whetstone said to be used for hide-working (De Laguna and Horton, 1947: 127). The utilization of whetstones in hide production remains archaeologically unverified but, would clearly serve a necessary purpose of re-sharpening bone and ground stone edge scrapers.

The toolkit associated with *Dene* hide-working highlights the *tci-tho* and the ulu. Both are archaeologically recognized as typifying the late prehistoric period while such characteristic scraper implements are lesser described for earlier complexes. Further investigation of scraper variability in the distant past has the potential to better illuminate hide-working activities and tools among earlier cultural complexes.

3.3 Conclusion: Archaeological Implications for the Little John Site

This review of the ethnographic record aligns with Driver and Massey's (1957) proposition that female oriented hide production is characteristic of Indigenous peoples throughout North America, as well as with recent investigations into the correlation of environment and subsistence strategies with gendered divisions of hide production (Ruth 2013). I sought to demonstrate in the current review that gendered divisions of labour in the processing of hide is a practice that extends into the distant past, particularly within the current study region, is a reasonable argument. The glacial conditions which define the terminal Pleistocene and the dependence upon migratory mega-fauna support the proposition that early occupants of the Little John site would have employed strategic divisions of labour in regards to hide production similar to the historical and

contemporary peoples occupying the region today and in historic times.

While this review identified a strong pattern of female-dominated hide production, it also illuminated considerable inter- and intra-cultural variability, particularly in hide production practices and associated technology. This review suggests a wide range of stone tools were used in various stages of hide production. Archaeologically, however, identification of hide processing activities has often been reduced to the presence or absence of end-scrapers (Shott, 1995) and is presented as static through time and cross-culturally. Hide-working technological variability has received little attention in the recent and distant past. Not only does the analytical investigation of hide production have the potential to give prominence to the contributions of women to hunter-gatherer lifeways while also expanding understandings of these activities in the past, but it also signifies an additional avenue to investigate the technological variation which currently characterizes the archaeology of Eastern Beringia.

4 Methods

Technological approaches to and the reliability of lithic use-wear analysis were entrenched in debate in its early years (Keeley 1974, Newcomer et al. 1986, Odell 1975) but it is now acknowledged as an analytical technique within archaeology useful for the interpretation of tool function. Researchers support the use of all lines of evidence available for functional interpretation (Odell, 2001: 50), including the combination of low- and high-powered techniques (Hodgson, 2017; King, 2018; Latoree et al., 2017; Lemorini et al., 2016; Miller, 2014; Stevens et al., 2010, Wiederhold and Pevny, 2014). Analysts also maintain that macroscopic and microscopic approaches to lithic analysis are complementary for functional interpretations of stone tools (Grace, 1996; LeMoine, 1997; Odell, 1979, 2001; Shott, 1995).

I conducted a multi-stage functional analysis implementing three lines of analytical

evidence with a concentration on lithic use-wear analysis, with the objective of assessing whether a hide-working toolkit existed within the Chindadn component of the Little John site. This analysis was designed to explore the wide range of tool types indicated by the ethnographic record to have functioned within hide-working activities and to alleviate preconceived functional connotations imbedded in traditional lithic classification systems.

Beginning with Stage I—Ethnographic Analysis and Sample Selection, I applied the ethnographic evidence presented in Section 3 in the creation of a comprehensive sampling strategy wherein all analyzed samples[5] from OP I and OP II were organized into broad artifact classes (bifacial tools, cores, flakes', flake tools, and modified pebbles and cobbles). This strategy circumvents potential functional assumptions associated with typological or technological sampling approaches. The following Stage II—Microscopic Analysis, constitutes the most substantive component of the analysis. I first applied low- and high-powered magnification using a hand-held digital microscope to microscopically identify used tools within the study sample and define the used edges or areas of the identified tools. Following this, I conducted a detailed use-wear analysis on the resulting tool sample to identify specimens exhibiting evidence of having functioned in hide-working activities. In the final stage, Stage III—Macroscopic Analysis, I analyzed and recorded form-function variables at the macroscopic level for three interrelated reasons: to explore additional functional evidence visible at this level; to assess the potential utility of macroscopically visible attributes in the identification of hide-working toolkits, and to characterize the overall nature of the resulting hide-working toolkit. This analysis employed microscopic use-wear characteristics as the primary dataset to interpret tool function and identify

[5] The timing of the sample selection for this analysis corresponded with the establishment of the recent chronostratigraphy. As such, not all lithic materials had been reassigned into updated occupation periods. This study sampled from all analyzed artifacts reflective of the current site chronology. It is maintained that the study includes the vast majority of these materials and is nonetheless reflective of the assemblage.

potential hide-working tools. Ethnographic analogues and macroscopic variables serve as corroborative or complimentary data, generally. Individual methodologies for the three stages are detailed in the remainder of this section.

4.1 Stage I: Ethnographic Analysis and Sample Selection

The 'end scraper', a tool exhibiting steep-angled unifacial retouch on the distal margin, has long maintained a functional connotation within archaeology as morphologically typifying hide-working (Shott, 1995: 53). The potential hide-working toolkit variability suggested in Section 3 and in Table 1 is addressed in the sample strategy by analyzing a wide range of lithic artifacts, including formal and expedient tools, as well as modified pebbles and cobbles, cores, and a sample of debitage. This strategy addresses and circumvents pre-existing assumptions associated with stone tool function and explores aspects of hide-working as it is documented in the ethnographic record.

4.2 Stage II: Microscopic Analysis

4.2.1 Sample Preparation

In preparation of microscopic analysis, the study assemblage was first cleaned using a hand-held Cavitron Ultrasonic to remove sediments and residues adhering to tool surfaces and working edges. The duration of cleaning time was dependent upon the size of the artifact and ranged from 5-15 minutes. The study sample was then left to air dry. Latex gloves were used during this stage to avoid the potential accumulation of handling residues, which can obscure micro-wear patterns, particularly polish.

4.2.2 Comparative Experimental Assemblage

The interpretation of microwear relies on comparative lithic tools of known function. I manufactured three stone scrapers, two of basalt and one of obsidian, and conducted a hide-scraping experiment. Using push and push-pull motions I used the scrapers to soften commercially

tanned hide for 90 minutes each[6]. Tools were analyzed at 15-minute intervals at varying magnifications, and the accumulation of microwear was photographed and recorded using a handheld-digital microscope (Appendix 2). The results of this experiment are comparable to the results of others (Brink, 1978; Hodgson, 2017) and form the diagnostic criteria used to identify wear amongst the study assemblage. The predominant use-wear characteristics observed include: 1) dull to moderately-dull greasy polish (Figure 6); 2) extensive edge rounding—most prevalent on projections, arrises, and within flake scars (Figure 7), and 3) unifacial scarring on the non-contact surface (Figure 7).

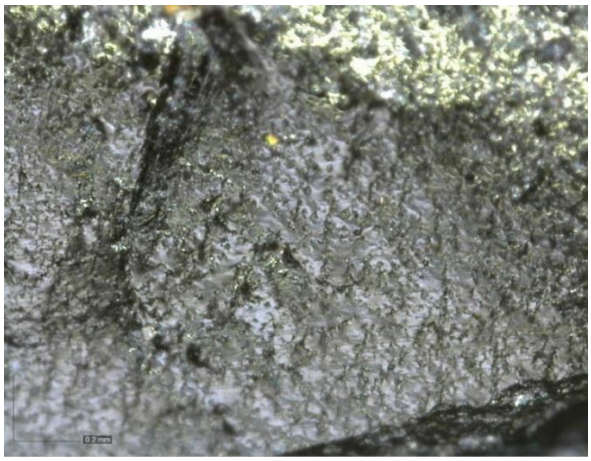

Figure 6. Dull greasy polish observed on experimental obsidian scraper (225x).

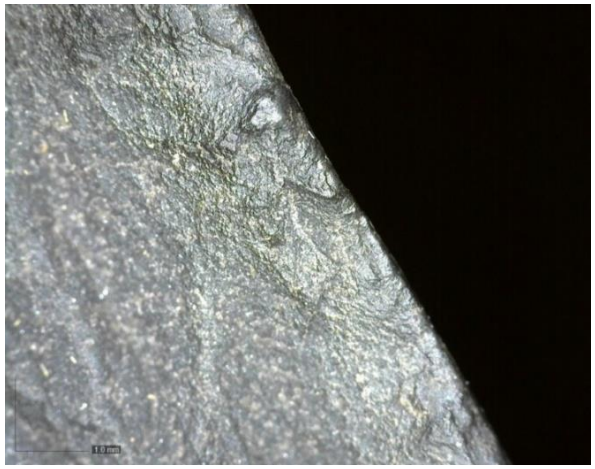

Figure 7. Edge rounding, unifacial scarring, and dull greasy polish observed on experimental basaltic scraper (50x).

[6] The experiment was constrained to available lithic and hide materials at the time of study.

4.2.3 Microscopic Use-wear Methods and Materials

The two main objectives of use-wear analysis are to: 1) determine if an artifact has been used as a tool; and 2) infer the function of that tool including a) method of use (use motion) and b) contact material (worked material). The first objective was accomplished by identifying used edges using low-powered magnification (10-100 x); the second objective was addressed using both low- and high-powered magnification (100-200 x). The intent was to infer whether or not a tool was used in hide production and thus, I focused on traits characteristic of associated activities within that process. This analysis was carried out using a Dino-Lite Premier AM4113T, a digital microscope with up to 250 x optical magnification. The resulting microphotographs were analyzed at an image quality of approximately 1.3 megapixels and interpreted based upon their independent characteristics and comparison to the experimental specimens and diagnostic characteristics agreed upon within the literature (Hayden, 1979; Hodgson, 2017; Miller, 2014; Schultz, 1992).

4.2.3.1 Identification of Used Stone Tools—Working Edges

To identify whether an artifact was or was not used as a tool, I applied low-powered magnification to address regularly recurring attributes that constitute edge damage. The determination of edge damage as a result of use followed standards developed by Grace (1989) and applied by others (Wiederhold and Pevny, 2014). These criteria are: 1) fractures on edges with potential to be working edges, and the absence of fractures on low potential and/or prominent edges; 2) fractures on a potential working edge exhibit a clustered pattern, and; 3) corroborating evidence of use-wear (i.e., rounding, polishing, and/or striations). Such criteria are less applicable on tools exhibiting intentional retouch given the challenge of distinguishing between fractures resulting from manufacture and maintenance versus tool use. However, retouch is an evidently strong indicator of a working edge and determination of use of that edge relied on the presence of corroborating use-wear evidence.

4.2.3.2 Identification of Hide-Working Tools—Method of Use and Contact Material

Artifacts exhibiting evidence of use were analyzed at varying magnifications to document the presence or absence of use-wear traits to identify the method of use and the material worked, which were used to infer whether the tool was employed in hide processing activities. In alignment with the proposition that hide-working encompasses a range of activities, I analyzed the method of use independently of the contact material. The method of use is defined as the physical motion applied during tool use. Methods of use relevant to hide working-activities potentially include: 1) cutting; 2) sawing/slicing; 3) scraping/planing; 4) graving; 5) adzing, and 6) abrading (Odell and Odell-Vereecken, 1980). Determination of use method relies primarily on two types of wear—scarring and striations, including: their location; direction; nature and extent. Table 3 presents use-wear characteristics diagnostic of methods of use typical of hide-working (Appendix 3).

Table 3. Use-wear characteristics for inferring methods of use relevant to hide processing.

Method of Use	**Use-Wear Characteristic**	
	Striations	**Scarring**
Cutting	Located near working edge with a parallel distribution	Located on both surfaces of working edge
Sawing/Slicing	Unifacial and slanted or diagonal working edge	Located more heavily on one surface
Scraping/Planing	If present, perpendicular to working edge and opposite scarred surface **Planing; more abrasive wear on contact surface*	Exclusively unifacial, typically occurs over a wide area **Projections are worn first and extensively*
Graving	May be longitudinal, transverse or both, is exclusive to a working tip as opposed to an edge	Scarring is highly variable
Adzing	Unifacial and perpendicular working edge	Unifacial scarring
Abrading	N/A	**Wear is primarily abrasive and located on surface, not working edge*

(after Odell and Odell-Vereecken 1980)

Identification of the worked material relied largely on the analysis of polish including lustre, texture, and extent. Additional attributes analyzed include: 1) striations; 2) edge damage; 3) contact area, and 4) fracture type. Use-wear characteristics for inferring hide materials relied on criteria originally summarized by Miller (2013), derived from observations made by Keeley (1980) and Yerkes (1983) and further supplemented by Brink (1978). These criteria are provided in Table 4 (Appendix 4).

Table 4. Use-wear characteristics for inferring hide materials.

Use-Wear Characteristic	Worked Material	
	Meat/Fresh Hide	**Dry Hide**
Polish Lustre	Relatively Dull	Dull
Polish Texture	Rough bumpy polish	Greasy polish
Polish Nature	*unknown*	Includes pits 50x larger than bone polish
Extent of Polish	Over entire surface	Over entire surface
Striations	Few narrow, deep striations	Diffuse shallow striations
Edge Damage	Minimal edge damage	Extensive rounding of edge
Contact Area	Broad	Broad
Fracture Type	Bending	Bending

(after Miller, 2013; see also; Brink, 1978; Keeley, 1980; Yerkes, 1983)

4.3 Stage III: Macroscopic Lithic Analysis

The microwear analysis was complimented by a macroscopic component to measure a suite of morphological form-function variables following Andrefsky's (2005) analytical approach to identifying and/or measuring attributes potentially related to function. Only tools confidently assigned or remaining ambiguous following microwear analysis were macroscopically analyzed. This component of the analysis varied between tool classes, however, broad categories of related attributes examined include: 1) overall shape and size of each tool; 2) working edge(s) of tools, and 3) raw material qualities (Appendix 5). The macroscopic component served to further explore attributes potentially indicative of function maintained in the preceding microscopic analysis and informed the technological range of tool types in the resultant hide-working toolkit. Additionally, artifact classification vis-à-vis macroscopic analysis will illuminate the general nature of the hide-working assemblage.

5 Data, Analysis, and Results

5.1 Stage I—Ethnographic Analysis

5.1.1 Data and Sample Selection

My sample selection process began with a visual examination of the Chindadn assemblage recovered at the Little John site. The assemblage had been previously catalogued and analyzed for

various research objectives over the past 18 years. To account for potential incommensurability between existing artifactual classification and ethnographic descriptions of hide-working tools, the possibility of misidentification, and the hypothesized variability of the potential hide-working toolkit, my study sample consisted of a wide range of lithic artifact types. To accomplish this, I first recategorized these artifacts into five general artifact classes: 1) bifacial tools (n=14, 6.4%); 2) cores (n=6, 2.7%); 3) flakes[7] (n=103, 47.0%); 4) flake tools (n=44, 20.1%), and; 5) modified pebbles and cobbles[8] (n=52, 23.7%). The flake class was sampled based on size—all flakes over 2 cm in length were included, for a total sample of 219. The flake sample allowed me to address whether any flake tools had been misidentified as flakes vis-à-vis traditional macroscopic approaches when the assemblage was first catalogued (Young and Bamforth 1990).

5.2 Stage II—Microscopic Analysis

5.2.1 Data and Sub-Sample Selection

The initial study sample was comprised of 219 artifacts, ranging across broad classes of tool- and non-tool artifacts. I refined this sample into a used-tool sub-sample by applying the methodology outlined in Section 4 (sub-section 4.2.3.1). I analyzed each artifact for corroborating use-wear traits characteristic of used tools. This resulted in a tool sub-assemblage of 60 artifacts, or 27.4% of the initial study sample (Appendix 6). At this stage, I identified the number of active parts (APs)[9], otherwise referred to as used edges or employable units, present on each artifact, and defined their location(s) (Appendix 7) for all 60 tools identified.

5.2.2 Analysis and Results

I then conducted the functional use-wear component of the analysis on the 60 used tools,

[7] The flake class includes both flake fragments and complete flakes.
[8] The modified pebble/cobble class excludes hammerstones.
[9] The term “active part” is used after Claude et al. 2015 Lemorini et al. 2016 Rotts and Plisson 2014

inferring the method of use and the contact material (Appendices 8 and 9). A total of nine (15.0%) tools comprise the resulting hide-working assemblage. Seven show evidence of having been applied solely in a scraping/planning method evidenced by a general pattern consisting of the presence of striations perpendicular to tool edges on the surface opposite unimarginal retouch/scarring. One is inferred to be a combination tool being applied in two methods, graving and sawing/slicing. The final tool is also a combination tool used to scrape/plane and saw/slice. The graving function is inferred generally by the absence of striations and scarring with the active parts bearing a manufactured projection. One is interpreted as being used to scrape/plane and saw/slice based upon the presence of striations both parallel and perpendicular to the working edges. Variations of the general use method pattern are presented per individual tool in the following sub-section.

As stated, it is inferred that all nine tools processed hides generally. Specifically, seven have characteristics consistent with the processing of dry hide and two of fresh hide. Tools used to process dry hides typically exhibit dull greasy polish, long, shallow, and/or diffuse striations, and edge rounding, rounding of projections with extensive removal of flake scars. Alternatively, wet hide processing leads to moderately dull polish with a pitted or rough appearance and moderate edge rounding, rounding of projections and removal of flake scars. Table 4 summarizes the use-wear results of contact material and method of use for the hide-working toolkit identified.

5.2.2.1 KdVo-6:96

KdVo-6:96 exhibits three active parts. AP1 is defined as the distal margin, AP2 as lateral margin 1 (left) and AP3 as lateral margin 2 (right). Use-wear characteristics observed on all three active parts are consistent with a scraping method of use and a worked material of dry hide (Figure 8; Appendix 10—Figures 10.1 and 10.2). All three active parts exhibit polish that is dull and greasy

in appearance on both faces. Edge damage, including edge rounding, rounding of projections, and the removal of flakes is consistently interpreted as extensive in nature. Scarring is unimarginally present on the dorsal surface of AP1 and AP2 and discontinuously bimarginal on AP3. Striations are visible on the ventral surface of AP1-3 with variations of direction and appearance. AP1 exhibits few, shallow striations perpendicular to the working edge. AP2 striations are also few and shallow, but parallel and diagonal the working edge. AP3 exhibits striations that are few, deep and diagonal to the working edge.

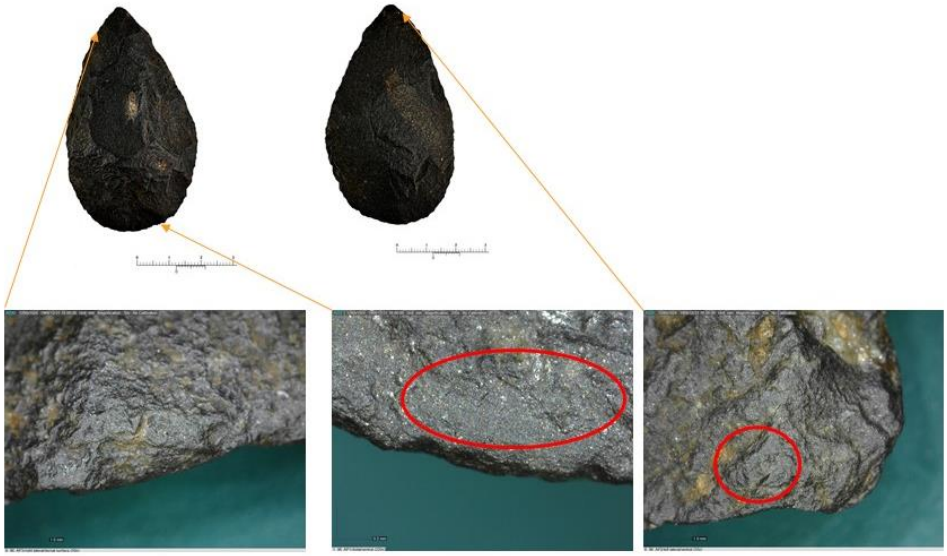

Figure 8. Macro- and micro-photographs of KdVo-6:96

(a. greasy dull polish, extensive edge rounding, rounding of projections/flake scars (50x) b. perpendicular striations, edge rounding, rounding of projections and flake scars (220x) c. striations perpendicular/diagonal the working edge (50x))

Given these characteristics, it appears KdVo-6:96 was utilized on both the convex end and opposing pointed end with slightly different motions for the singular purpose of processing hide. AP1 shows evidence of having been used in longitudinal push-pull motion, and AP2 and AP3 show evidence of use in a semi-circular scraping motion. The direction of wear is most apparent on AP2, where the point is more heavily rounded on the left margin with prominent rounding up and towards the point, suggesting that this AP was more heavily used.

Table 5. Microwear results of the hide-working toolkit from the Chindadn component at the Little John site.

Catalogue No.	Context			AP No.	Striations	Polish (dull and greasy)	Edge damage			
	Lobe	Unit	Depth				Rounding	Projection Rounding	Removal of Flake scars	Scarring
KdVo-6:96	west	S10W17	19 cm dbs	1	few, shallow, perpendicular, on ventral	yes-on ventral and dorsal	extensive	extensive	extensive	unimarginal
				2	few, shallow, parallel/diagonal, on ventral	yes-on ventral and dorsal	extensive	extensive	extensive	unimarginal
				3	few, deep, diagonal, on ventral	yes-on ventral and dorsal	extensive	extensive	extensive	bimarginal
KdVo-6:139	west	S08W17	34 cm dbs	1	parallel/perpendicular, on ventral edge	yes-on edge and ventral	extensive	extensive	extensive	unimarginal step on dorsal
				2	few parallel/ many perpendicular, on ventral edge	yes-on projections and ventral surface	extensive	extensive	moderate	unimarginal step on dorsal; bimarginal near point
KdVo-6:146	west	S09W30	56 cm dbs	1	absent	Yes	extensive	extensive	n/a	unimarginal on ventral
				2	absent	Yes	extensive	extensive	n/a	unimarginal on ventral
				3	few, shallow, perpendicular	Yes	extensive	extensive	n/a	unimarginal on ventral
KdVo-6:388	west	S10W18	19 cm dbs	1	many, shallow, perpendicular	Yes	moderate	moderate	moderate	unimarginal step and feather
KdVo-6:746	west	S10W14	26 cm dbs	1	shallow, perpendicular	moderately dull-pitted/rough, minimally developed	moderate	moderate	modertae	unimarginal on dorsal, few irregular scars on ventral
				3	shallow, perpendicular and diagonal	moderately dull-pitted/rough, minimally developed	moderate	moderate	moderate	unimarginal on dorsal, few irregular scars on ventral
KdVo-6:750	west	S09W15	13-50 cm dbs	1	absent	moderately dull-pitted/ rough	extensive	extensive	moderate	unimarginal step and feather
				2	absent	moderately dull-pitted/ rough	moderate	moderate	minimal	bimarginal step and feather
KdVo-6:1486	west	S18W09	27 cm dbs	1	long, diffuse, shallow, perpendicular	yes-on surface and edge	extensive	extensive	minimal	bimarginal step and feather
				2	absent	yes-on surface and edge	extensive	extensive	minimal	unimarginal step and feather
				3	few, long, shallow, diffuse, perpendicular	yes-on surface and edge	extensive	extensive	minimal	bimarginal step and feather
				4	long, diffuse, shallow, perpendicular	yes-on surface and edge	extensive	n/a	n/a	absent
KdVo-6:2063	east	N17W09	80-90 cm dbs	1	absent	yes-on surface and edge	extensive	extensive	minimal	unimarginal step and feather
KdVo-6:2789	west	S14W14	19 cm dbs	1	few, long, diffuse, shallow, perpendicular	yes-on surface and edge	extensive	extensive	n/a	absent
				2	few, long, shallow, diffuse, parallel	yes-on surface and edge	extensive	extensive	n/a	absent
				3	absent	yes-minimally developed	extensive	extensive	moderate	unimarginal

5.2.2.2 KdVo-6:139

Two active parts were identified on KdVo-6:139. AP1 is the straight margin and AP2 is the convex margin. Both show evidence of use in a scraping motion, and possibly a cutting or sawing motion, to process dry hide (Appendix 10 Figures 10.3 and 10.4). AP1 exhibits striations parallel and perpendicular near the working edge of the ventral surface. Dull greasy polish is present on the edge and ventral surface. Edge rounding, projection rounding and removal of flake scars are interpreted as extensive; scarring is unimarginal and characterized by step terminations located on the opposing surface of striations. AP2 exhibits some differences. Striations are primarily perpendicular but some parallel striations are observable. Projections and the ventral surface exhibit dull greasy polish. The rounding of the edge and of projections is extensive while the removal of flake scars is moderate. Scarring is predominantly unimarginal with bimarginal scars occurring towards the outer margins. Additionally, the edges of both active parts potentially bear bright polish. Without a larger experimental program, the causal contact material (or materials) resulting in the bright polish cannot be conclusively determined. However, its presence indicates a multi-functional aspect to the tool, and the parallel striations may be related to non-hide-working activities.

5.2.2.3 KdVo-6:146

KdVo-6:146 exhibits three active parts; AP1 is the left lateral, AP2 is the right lateral, and AP3 is the distal margin. Striations are not visible on AP1 or AP2 but are exhibited as few, shallow and perpendicular to the working edge of one surface on AP3. Dull greasy polish is observed on all the three active parts. Edge and projection rounding are consistently interpreted as extensive for AP1-3. Scarring is unimarginal and located on the surface opposite the striations (as visible on AP3) while flake scar removal is absent, which may be the result of raw material properties. The

use-wear characteristics are more substantive on AP3 than AP1 and AP2 suggesting that the distal end was used more intensively. Cumulatively, all active parts identified on KdVo-6:146 are consistent with scraping dry hide (Appendix 10—Figure 10.5).

5.2.2.4 KdVo-6:388

One AP was identified on KdVo-6:388 located on the left lateral margin, which exhibits use-wear traits characteristic of scraping dry hide (Appendix 10—Figures 10.6 and 10.7). Characteristics include shallow striations perpendicular to the working edge, dull and greasy polish moderately developed within flake scars. Additionally, edge damage consists of moderate edge rounding, rounding of projections and removal of flake scars.

5.2.2.5 KdVo-6:746

Three active parts were identified on KdVo-6:746. AP1 is one portion of the right lateral margin (right lateral 1). AP 2 is a secondary portion of the right lateral margin (right lateral 2). AP1 and AP3 show evidence of having been used to scrape fresh hide, while AP2 shows characteristics suggestive of haft wear (Appendix 10—Figures 10.8 and 10.9). AP1 exhibits shallow striations perpendicular the working edge and minimally developed polish that is moderately dull and greasy with a rough and pitted appearance. Edge damage, including rounding of edges, rounding of projections and removal of flake scars are all interpreted as moderate. Continuous unimarginal scarring is exhibited on the surface opposite striations where a few irregular scars are present. The edge damage and polish on AP3 directly compares to AP1. Striations exhibited on AP3, however, are both perpendicular and diagonal the working edge.

5.2.2.6 KdVo-6:750

KdVo-6:750 exhibits two active parts. AP1 is located on the left lateral margin and AP2 on the right lateral. Similar to KdVo-6:746, both active parts present use-wear evidence consistent

with fresh hide scraping (Appendix 11—Figures 10.10 and 10.11). Both AP1 and AP2 lack visible striations and exhibit a moderately dull polish with a rough and pitted appearance. However, the edge damage somewhat differs between the two. AP1 exhibits unimarginal scarring, edge rounding and rounding of projections that is extensive and moderate removal of flake scars. Edge damage on AP2 exhibits bimarginal retouch, moderate edge rounding and rounding of projections and minimal removal of flake scars. These differences may result from AP1 being used more intensively or edge damage may have accumulated at a slower rate on AP2 due to a sharper working edge resulting from bimarginal as opposed to unimarginal modification.

5.2.2.7 KdVo-6:1486

Four active parts were identified on KdVo-6:1486: AP1 is the left lateral, AP2 is the right lateral, AP3 is the modified (distal) end and AP4 is the unmodified (proximal) end. All four active parts bear evidence consistent with dry hide scraping (Appendix 10—Figures 10.12 and 10.13). All four active parts exhibit polish that is dull and greasy in appearance. AP1 exhibits striations that are few, shallow, diffuse, and located perpendicular the working edge. Edge damage consists of edge rounding and rounding of projections that is interpreted as extensive and the removal of flake scars as minimal. Visible scarring on AP1 is limited to bimarginal macro-flake removal. AP2 does not exhibit visible striations, and edge damage is consistent with AP2 except for scarring which is unimarginal. AP3 also exhibits striations that are few, shallow, diffuse, and located perpendicular to the working edge. Edge rounding and rounding of projections are extensive while removal of flake scars is minimal. Scarring presents as macro-flake removal and is bimarginal. Lastly, AP4 exhibits striations that are few, shallow, diffuse, and located perpendicular to the working edge. Edge rounding is considered extensive, and an absence of post-detachment modification to this margin results in the absence of projection rounding, removal of flake scars,

and scarring.

5.2.2.8 KdVo-6:2063

One AP was identified on KdVo-6:2063, defined as the split or modified edge and face of the tool. Striations and flake scars are absent on this tool, making the presence of wear minimal or marginal. However, edge rounding and rounding of projections is extensive and polish that is dull and greasy is present (Appendix 10—Figures 10.14 and 10.15), supporting its function as a hide-working implement.

5.2.2.9 KdVo-6:2789

Three active parts were identified on KdVo-6:2789. AP1 is lateral margin one, AP2 is the opposing lateral margin, and AP3 is a projection on the same lateral margin as AP1. AP1 and AP2 show evidence of sawing or slicing dry hide, indicated by striations both perpendicular and parallel the working margin, and characterized as few, shallow and diffuse. Additionally, both AP1 and AP2 exhibit extensive edge rounding and rounding of projections, an absence of scarring and the removal of flake scars, and the presence of dull greasy polish (Appendix 10—Figures 10.16 and 10.17). Alternatively, use-wear observed on AP3 is consistent with graving, indicated by the lack of striations, discontinuous unimarginal flake scars, dull greasy polish, and extensive edge rounding and rounding of projections on both surfaces, and a moderate removal of flake scars.

5.3 Stage III—Macroscopic Analysis

The following subsection analyzes macroscopic form-function attributes to characterize the nature of the proposed toolkit and for additional evidence, which may aid microscopic functional interpretations. Artifact class frequencies include five within the flake tool class and four within the pebble/cobble tool class. Of the flake tools, two are complete retouched obsidian flakes, one is manufactured from basaltic flake shatter (Figure 9), and two are formally modified

basaltic flakes unifacially modified with continuous unimarginal and discontinuous bimarginal retouch (Figure 8). Of the pebble/cobble tool class, two are retouched pebble/cobble flakes, one is a modified split pebble, and one is a unifacially modified cobble (Figure 9).

The size and nature of the resulting hide-working toolkit (n=9) limits overall toolkit patterning, however, some observations are apparent. Three of the flake tools (Kdvo-6:746, KdVo-6:750, and KdVo-6:2789) are relatively small and range closely in size from 28.4-34.3 mm in length, 21.2-46 mm in width, and 5.7-7.8 mm in thickness. One of the basaltic flake tools (KdVo-6-139) is substantially larger than all other hide-working tools measuring 153.6 mm in length and 77.1 mm in width. The pebble/cobble tools range in length from 49.2-122.2 mm, in width from 33.7-47.7 mm, and in thickness from 10.7-19.2 mm. Table 6 summarizes data on classification, raw material properties and dimensions for the hide production tools (see Appendix 12).

Table 6. Macroscopic analysis—classification, raw material, and dimension data.

	Classification		**Raw Material**		**Dimensions**			
Artifact	**Artifact Class**	**Artifact Type**	**Raw Material**	**Cortex**	**Length (mm)**	**Width (mm)**	**Thickness (mm)**	**Weight (gms)**
KdVo-6:96	Flake tool	Uniface w/bimarginal retouch	Basaltic	absent	67.1	39.9	13.1	31.4
KdVo-6:139	Flake tool	Uniface w/bimarginal retouch	Basaltic	absent	153.6	77.1	15.6	222
KdVo-6:146	Pebble/cobble tool	Retouched pebble flake	Unknown	present	71.3	40.6	10.7	30.3
KdVo-6:388	Pebble/cobble tool	Retouched pebble flake	Greenstone	present	70	33.7	16.7	46.5
KdVo-6:746	Flake tool	Retouched complete flake	Obsidian	absent	29.8	28.3	7	4.7
KdVo-6:750	Flake tool	Retouched complete flake	Obsidian	absent	34.3	21.2	5.7	3.8
KdVo-6:1486	Pebble/cobble tool	Cobble w/bimarginal retouch	Unknown	present	122.2	47.7	18	150.8
KdVo-6:2063	Pebble/cobble tool	Modified split cobble	Unknown	present	49.2	41.8	19.2	56.1
KdVo-6:2789	Flake tool	Retouched combination tool	Basaltic	absent	28.4	46	7.8	10.7

The microscopic analysis identified 22 active parts on the 9 tools; 21 of these exhibit characteristics associated with hide-processing activities. Macroscopic analysis of these active parts revealed additional variability (Table 7, Appendix 11). The highest frequency in the number

Table 7. Macroscopic analysis—active parts data.

Artifact	AP No.	Edge Morphology	Edge Length	Edge Angle	Retouch Location	Retouch Type	Retouch Pattern
KdVo-6:96	1	convex	73.9	44	unimarginal on dorsal surface	combo.; primarily step, few feather	continuous
	2	straight	48.5	50	unimarginal on dorsal surface	combo.; primarily step, few feather	continuous
	3	straight	46.1	44	combination; bimarginal and unimarginal	combo.; primarily step, few feather	continuous
KdVo-6:139	1	straight	148.7	47	unimarginal on dorsal surface	combo.; primarily step, few feather	continuous
	2	convex	258.9	37	bimarginal	feathered	combo.; continuous feather, discontinuous step
KdVo-6:146	1	straight	64.1	94	absent	feathered	continuous
	2	straight	61.3	64	bimarginal	feathered	continuous
	3	convex	51.3	47	bimarginal	feathered	combo.; continuous unimarginal on ventral; discontinous bimarginal on medial portion
KdVo-6:388	1	concave	35.8	38	unimarginal on ventral	Feathered	continuous
KdVo-6:746	1	straight	33.5	67	combo.; primarily unimarginal on dorsal, small bimarginal area	feathered	combo.; continuous unimarginal; discontinuous bimarginal
	3	convex	35.8	43	unimarginal	feathered	continuous
KdVo-6:750	1	straight	34.3	36	bimarginal	feathered	continuous
	2	convex	35.8	43	unimarginal	feathered	continuous
KdVo-6:1486	1	straight	78.3	70	bimarginal	feathered	discontinuous
	2	straight	36.9	81	unimarginal	combo.; feather and step	continuous
	3	convex	59.2	70	bimarginal	combo.; feather and step	combo.; continuous on ventral, discontinuous on dorsal
	4	convex	122.6	n/a	n/a	n/a	n/a
KdVo-6:2063	1	flat	76	n/a	n/a	n/a	n/a
KdVo-6:2789	1	convex	19.8	32	unimarginal	feathered	continuous
	2	straight	13.9	33	unimarginal	feathered	continuous
	3	convex	11	40	unimarginal	feathered	discontinuous

of active parts per tool is 3 (n=4), followed by one and two (n=2, respectively), and lastly, 4 (n=1). The active edge morphology includes an equally high frequency of straight (n=10) and convex (n=9) edges. One active part has a concave edge and the final active part is a flat face (as opposed to an edge). Both the concave edge and flat face are pebble/cobble tools. Retouch is typically unimarginal (n=10), followed by bimarginal (n=6). Combination uni- and bi-marginal retouch accounts for edges, which are continuously unimarginal with discontinuous bimarginal retouch. Two active parts bear combination retouch. Lastly, three active parts do no exhibit retouch. Edge length measurements reflect the convexities and concavities of the edge and range from 11.0-258.9

mm. The average edge length is 57.7 mm[10]. A total of 12 active parts fall within a length range of 20 mm from 34.3-64.1 mm. Edge angles in this assemblage range from 33-94° with a concentration occurring between 32-47° (n=13, 68.4%).

5.4 Results

The macroscopic analysis provided multiple observations from which the overall nature of the toolkit can be generally characterized and further assessed from a functional perspective. First, all hide-working tools are represented by two tool classes, flake tools (n=5) and pebble/cobble tools (n=4). Second, only two artifacts exhibit significant post-detachment modification (KdVo-6:96 and KdVo-6:139). Both are formal tools: "stone tools made as a result of extra effort in their production" (Andrefsky 2005, 256), often made to conform to design requirements. The remaining seven tools are informal or expedient: "stone tools made in a casual manner with only minor design constraints." (Andrefsky 2005, 256). The following sub-section describes each of the resulting formal and expedient toolkits.

5.4.1 Formal Hide-working Toolkit

KdVo-6:96 and KdVo-6:139 are both unifaces, exhibiting areas of bimarginal retouch manufactured from flakes of a fine-grained basaltic stone (Figure 9). KdVo-96 has a tear-drop outline and KdVo-6:139 is semi-lunar in shape. Both are regionally-defined as diagnostic artifacts of the Chindadn complex, and exhibit nearly identical use-wear patterning. They have extensive edge damage including edge rounding, rounding of projections, and all but one AP exhibits extensive removal of flake scars. Additionally, both exhibit well-developed polish on tools edges and faces and comparable locations, directions, and appearance of striations. Comparatively, they appear to have been used intensively. Microscopic data suggest that, in addition to processing hide,

[10] Two active parts identified on pebble/cobble tools do not have associated edges/edge angles.

KdVo-6:139 was a multi-functional tool, although additional functions are beyond the scope of the current analysis. KdVo-6:96 was used for the singular purpose of processing dry-hide.

Figure 9. Photograph of the hide-working formal tool assemblage.
(from left to right-KdVo-6:96, KdVo-6:139)

5.4.2 Expedient Hide-working Toolkit

A total of seven artifacts within the resulting hide-working toolkit are defined as expedient tools; four are pebble/cobble tools and the remaining three are edge-modified flakes (Figure 10). Compared to the formal toolkit, the expedient toolkit exhibits more variation in use-wear patterns. Striations range from a combination of absent and present (n=2), absent (n=2), to present (n=3). Edge rounding and rounding of projections have equal distributions, including a combination of extensive and moderate (n=1), extensive (n=4) and moderate (n=2). Scarring is the most variable, suggesting this attribute is not a good characteristic for identifying hide working. Two tools exhibit bimarginal scarring and five have unimarginal scarring. The removal of flake scars range from absent (n=2), moderate (n=3), minimal (n=1), to a combinations of the three (n=2).

Difference in raw material types is likely the primary explanation for differential accumulation and/or visibility of use-wear traits. This is best evidenced by KdVo-6:749 and

KdVo-750, both of which were manufactured from obsidian and account for much of the observed overall variability of use-wear traits within the assemblage. Additionally, both tools were interpreted as scrapers of fresh or wet hide suggesting that the condition of the contact material also affects the development of visible use-wear, and that raw lithic material affects tool design and use. Finally, the expedient nature of these tools suggests their use-life as a tool may have been shorter and possibly more variable than the intensively used tools in the formal toolkit assemblage.

Figure 10. Photograph of the hide-working expedient tool assemblage.
(from left to right- KdVo-6:750; KdVo-6:749; KdVo-6:388; KdVo-6:2789; KdVo-6:2063; KdVo-6:146; KdVo-6: 1486)

6 Discussion

A hide-working toolkit including expedient as well as formed tool types, as documented in the ethnographic literature of northwestern North America, was identified within the lithic assemblage of the Chindadn component—dating from the Late Bølling Allerød Interstadial to the Younger Dryas (14,300-11,900 cal. RCY—at the Little John site. The resulting hide-working toolkit furthers our understanding of the technological organization and activities during the Chindadn occupation. Of the total Chindadn tool assemblage identified in this analysis (n=60),

15.0% are attributed to hide-working activities. Eight of these tools were recovered in the west lobe and one from the east lobe. Located on a south-facing bluff, the west lobe would have provided ample sunlight and aridity for processing hides. Past research (Yesner et al. 2011) indicates that the east lobe was a locus for butchering and meat processing, where such activities were sheltered from the elements. Preliminary interpretations of the west lobe suggest that it functioned as a game lookout where an undefined range of day-to-day activities were carried out. This inference is supported by the presence of small hearth features and a diversity of lithic tools and debitage recovered in higher quantities than in other lobes. The results of this study definitively associate the west lobe knoll with hide-processing activities, during the Chindadn occupation.

The toolkit is characterized by technological variability. It is primarily expedient (n=7), but formal tools are also present (n=2). The expedient toolkit is comprised of three specimens from the flake tool class and four from the pebble/cobble tool class. A range of expedient tool types is recognized as well, from split cobbles and retouched pebble/cobbles and pebble/cobble flakes to retouched complete obsidian flakes and retouched flake shatter. Microscopic wear patterns are quite variable as well. This may be attributed to raw material differences and to likely differences associated with tool use duration and specificities of the hide-working activity. The formal toolkit, although consisting of only two specimens, show differences in size and morphology but similarities in raw material, post-detachment modification and microwear development.

Raw material consistencies are noted and suggested here to correspond with reduction techniques, however, the sample is too small to test the significance of this observation. KdVo-6:746 and KdVo-6:750 are both small complete flakes exhibiting marginal retouch on the dorsal surface of lateral margins and both were manufactured from Wiki Peak obsidian, a source located approximately 60 km from the site (Reuther et al. 2011). Additionally, comparable manufacturing

techniques were exhibited between KdVo-6:96 and KdVo-6:139. Both are manufactured from large prepared flakes, exhibit unifacial modification and predominantly unimarginal retouch, with smaller portions of one tool edge exhibiting bimarginal retouch. Further, both were manufactured from a single basaltic source material with an unknown location, tentatively designated Andesite Group A (Handley 2012).

Several implications for the archaeological visibility of hide-working activities were noted. Initial cataloguing of the Little John assemblage, following traditional approaches to lithic analysis, identified six "scrapers" in the total Chindadn assemblage (KdVo-6:146, KdVo-6:149, KdVo-6:746, KdVo-6:750, KdVo-6:1732, and KdVo-6:2920). Half of these were identified here as having functioned in hide-working activities, indicating alternative materials (i.e., bone, wood, or antler) were also be scrapped. Microwear analysis identified an additional five artifacts as used in scraping/planning activities related to hide-processing. Notably, no formal end-scrapers were identified in the identified hide-working toolkit or the Chindadn assemblage. The ethnographic record maintains end-scrapers were utilized in the removal of hair and/or the thinning of hides. It is possible that hair was a desirable feature for products being manufactured at that time.

While edge angle is a commonly used characteristic for identifying function (Andrefsky 2005, Wilmsen 1970), others have challenged the effectiveness of this measure to identify hide-working (Siegel 1985). This analysis challenges the use of edge angle for the identification of hide-working tools and activities. Only one AP exhibits an edge angle conforming to the 75-90° range proposed by Andrefsky to typify hide-scraping, (2005,160), while three active parts have edge angles within the 46-55° range maintained by Wilmsen (1970, 71). Edge angles in this assemblage range from 33-94° (see Table 6, with a concentration occurring between 32-47° (n=12, 63.2%).

Traditional macroscopic analysis was able to identify possible relationships between raw

material source, lithic reduction techniques, and hide-working activities following microscopic analysis. I maintain that when utilized independently, traditional approaches to lithic analysis are ineffective in the identification hide-working tools, but nevertheless useful in the classification of such tools and toolkits. The results of this analysis suggest that functional inferences of tools, as well as explorations of site activities (where stone tools serve as proxies for subsistence activities), should be conducted in conjunction with microscopic use wear analysis. Lastly, the ethnographic record has provided an integral line of functional reasoning and its application in the sampling process was vital to establishing the visibility and identification of this toolkit archaeologically.

The identification of this toolkit is a beginning to the illumination and documentation of the roles and activities of women in the deep past. The consistencies in the ethnographic review and the resulting lithic toolkit characterized by expediency and variability, specifically scraper variability, supports a degree of deep continuity in hide-working practices. Specific tool types were also reflected both archaeologically and ethnographically. This is best evidenced by the semi-lunar multifunctional specimen (KdVo-6:139), a tool form referenced throughout the ethnographic literature as part of the female toolkit with one primary function being hide-production (Boas 1888, 517-518, de Laguna and Horton 1947, 39). Additionally, many of the general tool types reported in the ethnographic literature, otherwise under- or unacknowledged within contemporary archaeology, were identified in this analysis such as side-scrapers, flake tools, pebble/cobble flakes or spalls, and cobble scrapers.

The teardrop Chindadn point (KdVo-6:96) is most referenced as a point in regional literature. However, several researchers have hypothesized alternative functions for this tool type. For instance, Dixon (1999, 171) hypothesized their potential use as knives, with the convex margin being the active margin. He describes this tool type as generally small and occasionally ground on

one lateral margin for hafting (Dixon 1999, 171). Goebel and Pontti (1991) hypothesized the teardrop-shaped bifaces functioned as perforators or knives. The Little John specimen differs morphologically from other regional variants in that it is unifacially retouched, exhibits steep edge angles, and is larger. Both macro- and microscopic evidence indicates this particular specimen was used on both the pointed and beveled margins for scraping hides. These findings warrant comparative analyses of other tear-drop bifaces in the region.

This study has demonstrated marked continuity of hide-working tool function through time suggestive of long-standing traditional practices within hide-production. Simultaneously, the identification of formal artifacts within the hide-working toolkit at the Little John site suggests that temporally and/or culturally specific tool-types are also present. This supports the proposition that perhaps projectile point and microblade technologies are not culturally diagnostic (Potter 2007, 38) at least independently, and that alternative activities, such as hide-working may reflect practices of tradition wherein cultural identifiers may be distinguishable. Hide-working tools, including the *ulu* and *chi tho*, are regarded as culturally diagnostic for the late prehistoric periods of the Arctic and Subarctic respectively. Further, they have been generally accepted as parts of the female toolkit as a result of direct ethnographic observation. Similar associations between women's tools as signatures for archaeological cultures are lesser recognized or otherwise absent in interpretations of the distant past. De Laguna and Horton (1948) and McKennan (1959) hypothesized antecedent tool types for both the *ulu* and *chi tho,* respectively. I suggest that that there are functional and morphological consistencies between Kdvo-6:139 and the *ulu* as well KdVo-6:96 and the *chi-tho* that support this hypothesis and warrant detailed analytical comparisons.

Using ethnographic inference, I have demonstrated the likelihood that the subset of

activities related to hide-production was normatively a female-dominated activity in ancient eastern Beringian lifeways. This analysis illuminates the range of tools used by women in the deep past to include modified pebbles and cobbles, formal tools, and flake tools, manufactured on a variety of raw materials. The visibility of women in the deep past has been in part limited by minimal attention towards expedient technologies as well as the functional assumptions relating stone tools with seemingly bifacial qualities and pointed outlines to activities associated with the procurement of game as opposed to the processing of its products.

Hide-working toolkit variability has also been said to imply specialization (Larsen and Rainey 1948, 148), which would suggest that the hide-producers during the Chindadn occupation at Little John were indeed specialized within this craft. This analysis has illuminated a hide-working activity area in the west lobe of the Little John site wherein, specialized hide-working activities were occurring, likely by women, 14,000 years ago.

7 Conclusion

Conkey and Spector (1997:415) suggested that the value of feminist archaeological research begins with recognition of the broad range of activities associated with female labour. This research has illuminated a diverse group of tools that attests to the broad range of activities and possible specialization associated with hide-production in the archaeological past. It has also enhanced our understandings of female labour and contributions at the Little John site approximately 14,000 years ago. With the identification of a hide-working toolkit, I was able to locate a hide-working locus at the site. Archaeological understandings of hide-working must conceptualize it is a technology-producing activity encompassing a complex subset of activities and requiring a diverse toolkit.

The results of this analysis indicate that non-hunting subsistence technology in eastern

Beringia is also characterized by technological variability. Additionally, the ethnographic record depicts hide-working activities and to some extent, technology, as culturally and temporally specific. The presence of formal diagnostic artifacts suggests that female toolkits should be further analyzed and considered within regional debates on the culture sequence and technological organization of the late Pleistocene/early Holocene transition within Eastern Beringia. The expedient hide-working toolkit identified and described in this research challenges our current assumptions of tool function from the macroscopic level and attests to the interpretive value in their detailed study. Further functional analyses of hide-working toolkits will help to determine if these toolkits are culturally diagnostic and their contribution to the variability characterizing this time period, as is proposed here.

Women were undoubtedly significant economic contributors to big-game hunting societies (Waguespack 2005, 674). The significance of hide, including its procurement, transport from kill sites to camp sites, investment of time and resources in its processing, and overall vitality, is underacknowledged in the region. It is from the illumination of women's roles within the Beringian subsistence economy, that we can begin to recognize the implications such work had on mobility and habitation patterns as well as the formation of archaeological assemblages. Future work should continue to emphasize hide-working but also expand into similarly detailed analyses of alternative perishable products and technologies. The application of the feminist approach in eastern Beringia has only been preceded by Heppner's analysis of osseous tools from the Broken Mammoth site (2017). I maintain that continued feminist efforts in the region will challenge and confront our embedded archaeological assumptions and it will holistically strengthen both the integrity of our shared investigation as well as the interpretative narrative of eastern Beringia and understandings of early technological organization.

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Appendices

Appendix 1: The Little John Site Radio Carbon Chronology

No.	Little John Stratigraphic Zone		Lab Number LJ Sample Number	Little John Dates RCY	Calibrated Years Before Present (2σ)		Direct Associations	Stratigraphic Associations	Little John Occupation Periods (OP)	Eikland Pond Vegetation	*Yihkah Männ'* Vegetation	Climate Events	Correlated Regional Archaeological Components	
	West Lobe	East Lobe	Lab # & Site Sample # (Fa=Faunal Sample)	Reported Radiocarbon (1 σ)	CAL BP1	CAL BP2	Direct Association, ≤ 1m	Within Same Stratigraphic Unit	Periods of Occupations Based on Clustered Dates	Vermiare & Cwynar 2010	MacIntosh 1997	WRt=White River Tephra Deposit	Interior Alaska Holmes 2011, 2014	SW Yukon Workman 1978, Hare 1995
0	O/A	O/A					Historic Artifacts	Historic artifacts: VIc Postwar continued use by local *Dtno6* VIb Military artifacts from 1940s VIa Contact trade through 1930s	OP VI - HISTORIC OP VIc Contemporary OP VIb Alaska Highway OP VIa Contact Traditional			Warming	Euro-American Tradition	Historic Contact Traditional
1	B1	B1	Beta 245515 KdVo6 S07-04	250±40	440	150	Small biface incurvate base	Notched & basally thinned small bifaces, small end scrapers, burins, large hearths with cobbles	OP Vc Latest Holocene 150 -1,240			Little Ice Age 600-150 ya WRt-2 East Lobe 1.2 kya		Late Prehistoric - NAt - Aishihik Phase 1.2 Kya-150 ya Copper points, Kavik & small notched points, round end scrapers, wedges
	White River Tephra - 2 East Lobe Deposit												Athapaskan Tradition 1.9 Kya - 150 ya	
2	Upper and Middle B2	Loess above Paleosol Complex	Beta 231795 KdVo6 S07-02	1,620±40	1,570	1,410	Hearth pit lunate biface	Notched & lancolate bifaces, lunate bifaces, microblades, conical Mb cores, large side & small end scrapers, burins, notches, large hearths with cobbles, hearth pits	OP Vb Late Holocene (Between Ash Falls) 1,240 - 1,900	Zone EK 5 8.3 Kya-present Spruce /Alder Rise sharp decline in poplar, sedges, grasses Closed Mixed Boreal Forest	Alder Zone 6.2 Kya-present			NAt - Taye Lake Phase 5.0-1.2 Kya Notched stemmed & lancolate points, microblades, large bifaces angular rounded & hafted end scrapers burins
3			Beta 182799 KdVo6 S03-11	1,740±40	1,740	1,550	BTF							
4			Beta 387618 KdVo6 N1190'1-8	1,780±30	1,820	1,620	Flakes							
5			Beta 245518 KdVo6 S07-11	1,950±40	1,990	1,820	Medial lancolate biface					WRt-1 North Lobe 1.9 Kya	Northern Archaic 6.0-1.9 Kya Side-notched points large side scrapers microblades, burin	
6			Beta 383732 KdVo6 S12-10	2,100±30	2,150	2,000	Hearth pit conical Mb core burin with notch		OP Va Middle Holocene 2,000 - 8,000					
7			Beta 355049 KdVo6 12-06	2,169±30	2,310	2,110	Large hearth with multiple cobbles							
8			UOC 3376 KdVo6 Fa10-16	3,107+28	3,380	3,240	Wood feature							
9			UOC 3253 KdVo6 S16-02	6,745±25	7,660	7,570	Loess above PC						Proto-Northern Archaic 9.5--6.5 Kya Lancolate bifaces large side scrapers sub-conical microblade cores	Little Arm Phase 7.2-5 Kya Lancolate bifaces, microblades, wedged, tabular, & conical Mb cores, burins, large side & end scrapers
10	Lower B2	Paleosol 1 (P1) loess above Paleosol Complex PC: Hearth Feature	Beta 387614 KdVo6 Fa08-045	7,200±30	8,040	7,960	Swan bone	Lancolate bifaces, keeled scrapers on blades, side & end scrapers, gravers	OP IV Early Holocene 8,000 - 10,100		Spruce Zone 8.3-6.2 Kya			
11			Beta 323239 KdVo6 Fe11-18	8,560±40	9,560	9,480	Split bison split pebbles			Zone EK 4 9.4-8.3 Kya Poplar spike thermal maximum	Spruce Rise 9.4 - 8.2 Kya			
12			UOC 3373 KdVo6 S11-W	8,581±34	9,560	9,500	PC wood feature					Milankovich Thermal Maximum 10,000 - 9,000		Northern Cordilleran 10-7.2 Kya Large straight & round based lancolate points large blades & flakes, transverse burins
13			Beta 355050 KdVo6 S12-09	8,860±40	10,170	9,780	Medial lancolate biface							
14			Beta 182798 KdVo6 Fa03-01	8,890±50	10,190	9,890	Split long bone fragments flake debitage			Zone EK 3 11.2-9.4 Kya Birch rise Betula (30-66%) sphagnum appears increase in poplar and willow Open Parkland hydric lowlands mesic uplands				
15			UOC 0642 KdVo6 S11-16	8,972±43	10,230	9,920	PC hearth feature							
16			UOC 3375 KdVo6 S11-13	9,092±41	10,300	10,190	PC: hearthfeature							
17	Lower B2	Paleosol Complex 1 (PC1-P2)	Beta 387616 KdVo6 Fa10-19	9,370±30	10,680	10,520	Bison long bone frag EMF, BTF	Foliate bipoints (2), lancolate biface, Mb core frag, Mbs, end & side scrapers, EMFs	OP III Late Pleistocene 11,100 - 10,500				American Paleoarctic Tradition/Denali Complex 11.5-9.5 Kya Campus microblade cores, foliate bipoints, transverse burins	
18			UOC 0643 KdVo6 Fa14-03/4	9,474±65	11,080	10,560	Wapiti centrumm 32 vetebra elements							
19			UOC 0644 KdVo6 Fa10-21	9,502±59	11,090	10,590	Caribou tibia debitage							
20			Beta 217279 KdVo6 S06-04	9,530±40	11,090	10,690	Caribou bone foliate bipoint							
21			Beta 218235 KdVo6 Fa04-150	9,550±50	11,120	10,690	Swan tibia foliate bipoint MB core frag							
22			Beta 217279 KdVo6 S06-04	9,580±60	11,170	10,700	Bison long bone fragment							
23			UOC 3249 KdVo6 Fa16-03	9,610±54	11,170	10,760	Bison long bone frag biface fragment							
24	Basal Loess	Paleosol Complex 2 & 3 (PC2-P3 & PC3-P4)	Beta 406635 KdVo6 S2014-01	9,780±30	11,240	11,190	EME, BTF, F	Large oblate biface Chindadn Type 3 biface modified bone tools (ulna awl, tibia beamer, chisels?) end and side scrapers EMFs	OP II Late Younger Dryas - Post Younger Dryas 12,000 - 11,200		Birch Rise 12.9 - 9.0 Kya Dwarf birch, decline in sage, rise in aquatic plants	Warming	Swan Point Ebt Phase 3a (CZ-3a) 12-11.4 Kya Chindadn Type 3 bifaces	
25			Beta 355051 KdVo6 S13-12	9,790±50	11,260	11,170	Above large oblate biface							
26			UOC 3374 KdVo6 S2011-23	9,815±47	11,310	11,180	Squirrel top of hearth Fe11-24							
27			Beta 323238 KdVo6 S2012-03	9,860±40	11,340	11,200	Charcoal, basal of hearth Fe11-24, CPA							
28			UOC 3256 KdVo6 Fa16-19.06	9,866±61	11,410	11,180	Wapiti humerus frag							
29			Beta 323237 KdVo6 S12-02	9,890±40	11,370	11,390	Charcoal hearth Fe11-24							
30			Beta 382328 KdVo6 Fa13-34	9,970±40	11,510	11,260	Below large oblate biface							
31			AA 108777 KdVo6 AA3201.02	9,983±60	11,650	11,250	Bone beamer hearth Fe11-24							
32			UOC 3251 KdVo6 Fa16-01.02	9,992±58	11,710	11,260	Bison long bone fragment							
33			AA 108779 KdVo6 Fa14-10.01	9,996±70	11,760	11,250	Refit bison long bone fragments spiral fracture							
34			Beta 241525 KdVo6 Fa07-30	10,000±60	11,760	11,250	Wapaiti phalanx			Zone EK2 17.7-11.2 Kya Herbs (>90%) sedges, grasses, flowering plants (rose, aster families) Open Dry Tundra notably high deposition rates of silt dominated loessal soil		Cooling Younger Dryas 12.9-11.7 Kya		
35			Beta 382329 KdVo6 Fa12-04	10,110±30	11,840	11,600	Bison cuboid Oblate biface frag WRt Peak obsidian							
36			UOC 3370 KdVo6 Fa10-16	10,148±73	12,060	11,400	Bone fragment							
37		Loess Below Paleosol Complex (P9f)	UOC 3252 KdVo6 Fa12-22	10,359±77	12,440	11,950	Bison long bone frags hammerstone	*East Lobe:* Chindadn Type 1 & 2 bifaces, large oblate biface, EMFs & split cobble choppers hammerstones, BTFs percussion fractured bison & wapiti *West Lobe Loess:* Chindadn Type 1 & 2 bifaces large bifaces retouched blades end & side scrapers]	OP Ib Late Allerod - Early Younger Dryas 13,080 - 12,000				Swan Point Ebt Phase 3b (CZ-3b) 12.8-12.2 Kya Chindadn Type 1 & 2 bifaces	Basal KaVn-2 12.7-11.6 Kya
38			UOC 0643 KdVo6 Fa06-133	10,831±48	12,790	12,680	Caribou inominate							
39			Beta 303043 Kdvo6 S11-01	10,840±50	12,800	12,680	Wood, EMF, refit split bison bones							
40			UCIAMS 88769 KdVo6-06-143	10,960±30	12,910	12,720	Wapiti illiium with cut marks							
41			UOC 3255 KdVo6 Fa03-14	11,106±63	13,090	12,800	Bison tooth Chindadn Type 1 & 2 bifaces							
42			Beta 387613 KdVo6 Fa07-17	11,140±40	13,080	12,970	Caribou astragalus EMF long bone frags							
43	Basal Loess?	Loess Below Paleosol Complex (P9f)	Beta 241523 KdVo6 Fa07-22	12,020±70	14,080	13,730	Bison centrum	Flake core, retouched split pebbles, EMFs, split cobble choppers, hammerstones, bison and wapiti	OP Ia Allerod Interstadial 14,730 - 13,730		Herb-Tundra Steppe 16 - 13 Kya Grasses, sage, willow, sedges	Younger Dryas Allered 14.7 - 12.9 Kya	Swan Point Ebt Phase 2 (CZ-4a) 13.5-13.1 Kya Small lanceolate bifaces	Britannia Creek KiVi-3 Component 1 c. 13.5 Kya
44			UOC 3257 KdVo6 Fa16-27.1/2	12,356±72	14,802	14,084	Refitting large mammal long bone fragments with impact fracture						Swan Point Ebt Phase 1 (CZ-4b) 14.2-13.8 Kya Dyuktai Microblade Technology	
45			Beta 387617 KdVo6 Fa10-137	12,480±40	14,730	14,210	Bison phalanx							
46			AA 108778 KdVo6 Fa06-131.01	12,433±90	15,018	14,156	Bison centrum							

Table Key:
Mb=Microblade
BTF=Biface Thinning Flake
EMF=Edge Modified Flake
CPA=Cobble, Pebble in Association
Ebt=East Beringian Tradition
NAt=Northern Archaic Tradition
PC=Paleosol Complex

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Appendix 2: Hide-working Use-wear Experiment

Experimental Tools

I began this experiment by manufacturing via hard hammer percussion three scrapers. The first, Obsidian Scraper 1, is an obsidian scraper with unimarginal retouch (Figure 1 and 2). The second, Basaltic Scraper 1, is a basalt scraper with unimarginal retouch (Figure 3 and 4). And the third, Basaltic Scraper 2, is a bimarginally retouched scraper (Figure 5 and 6). None of the tools were hafted.

Figure 2.1 Obsidian Scraper 1-dorsal surface

Figure 2.2 Obsidian Scraper 1-ventral surface

Figure 2.3 Basaltic Scraper 1-dorsal surface

Figure 2.4 Basaltic Scraper 1-dorsal surface

Figure 2.5 Basaltic Scraper 2-face 1

Figure 2.6 Basaltic Scraper 2-face 2

Documentation of Tool-use and Use-wear

Interval One (0-15 minutes) The first stage of use is a 15 minute interval (interval 1=0-15 minutes) of scraping a commercially tanned piece of hide/leather, per tool. Motion was decided intuitively based upon comfortability of individual tool morphology, however, includes either a push or a pull-pull motion.

Basaltic Scraper 1: applied push- and push-pull- motions, away from body

- *Observation w/out magnification:* within the first 15 minutes of scraping, the scraper became visually polished and rounded along the working edge. But very constrained to the immediate working edge.
- *Observation @ 50 x:* projections are dulling and edges appear to be rounding; no striations; doesn't appear to be polished
- *Observation @ 225 x:* striations are absent; polish does appear to be forming along the entire working edge (extensive in length along edge of both surfaces but not invasive); edge rounding is apparent

Figure 2.7 Basaltic Scraper 1 (50x)

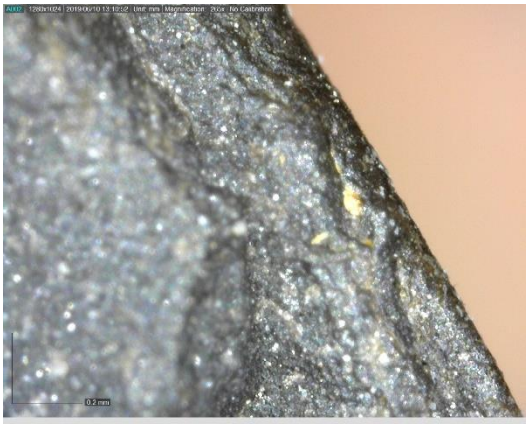

Figure 2.8 Basaltic Scraper 1 (225x)

Obsidian Scraper 1: applied push- and push-pull- motions, away from body

- *Observation w/out magnification:* the scraper became visibly worn as well but, less obviously than the basaltic scraper
- *Observation @ 50 x:* wear is becoming apparent, mainly rounding a long edge, less so on ventral surface than dorsal; ventral has sharp projections; striations and polish not obvious/apparent
- *Observation @ 225 x:* the edge rounding is still apparent or even more apparent; no striations, polish is difficult to see (if any) because of iridescence of raw material

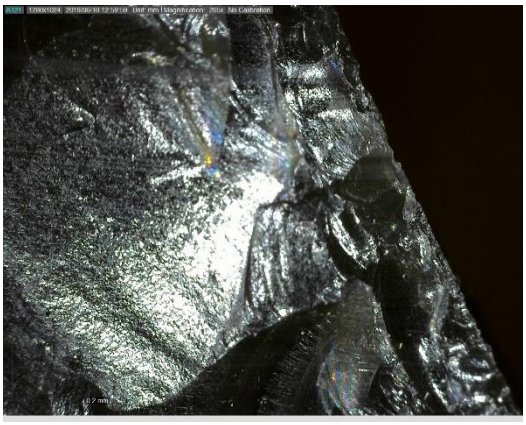

Figure 2.9 Obsidian Scraper 1 (50x)

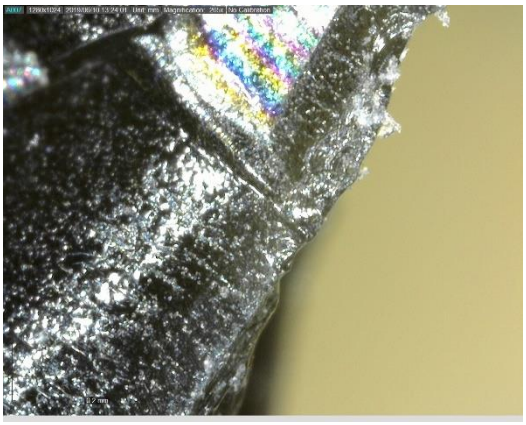

Figure 2.10 Obsidian Scraper 1 (225x)

Basaltic Scraper 2: applied push- and push-pull- motions, away from body

- *Observation w/out magnification:* the scraper became somewhat visibly worn but less so than the other pieces
- *Observation @ 50 x:* projections are still sharp; no obvious rounding or polishing; wear is nearly non-existent
- *Observation @ 225 x:* neither polish nor striations have developed, however, edge rounding is more apparent at this magnification

Figure 2.11 Basaltic Scraper 2 (50x)

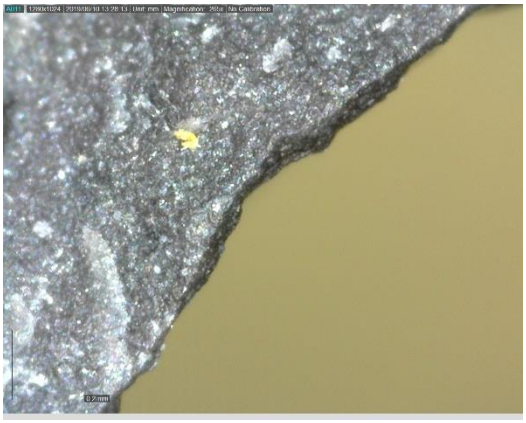

Figure 2.12 Basaltic Scraper 2 (225x)

Interval Two (15-30 minutes): This stage applied the same use motions and piece of leather for an additional 15 minutes to all three tools.

Basaltic Scraper 1:

- *Observation w/out magnification:* not much change; slightly more dull and rounded along working edge on both surfaces
- *Observation @ 50 x:* also no significant change; rounding is becoming more obvious, maybe more development of polish; no striations
- *Observation @ 225 x*: same as above

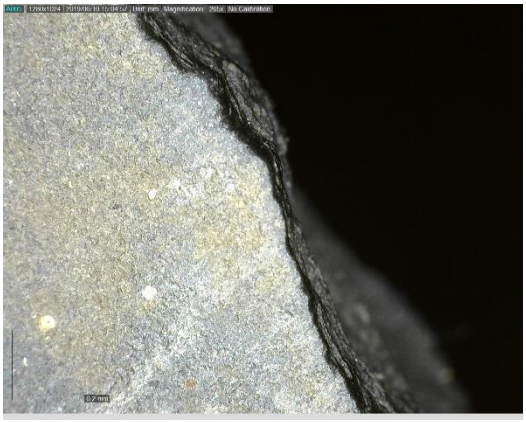

Figure 2.13 Basaltic Scraper 1 (50x)

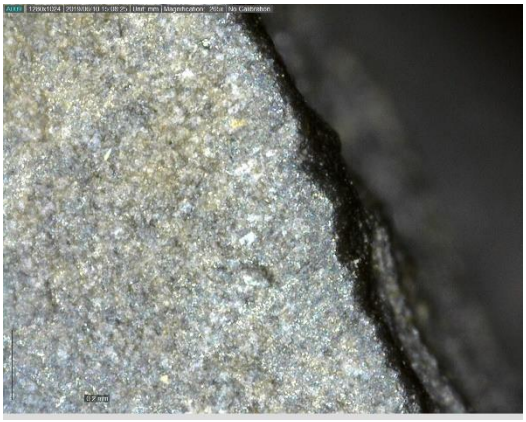

Figure 2.14 Basaltic Scraper 1 (225x)

Obsidian Scraper 1:

- *Observation w/out magnification:* slightly more edge rounding although many sharp protrusions along extent of working edge still
- *Observation @ 50 x:* appears similar as to observations made w/out magnification

- *Observation @ 225 x*: more rounding present on certain parts of tool edge (i.e. the more convex part) but many projections still present; cannot visibly see polish or striations

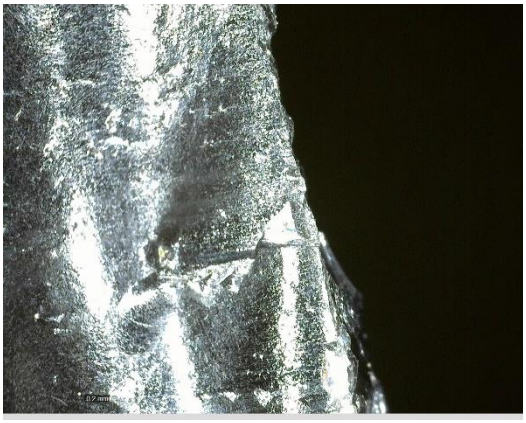

Figure 2.15 Obsidian Scraper 1 (50x)

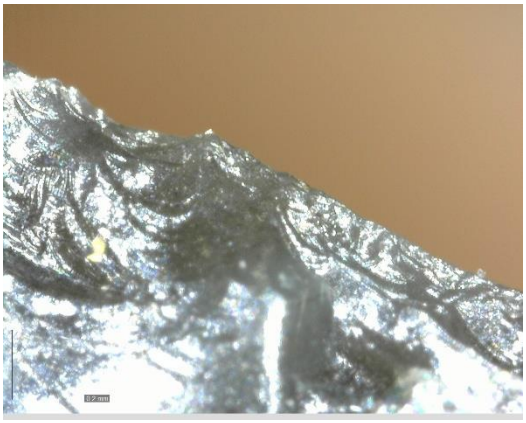

Figure 2.16 Obsidian Scraper 1 (225x)

Basaltic Scraper 2:

- *Observation w/out magnification:* appears barely used (probably because it is bifacial and the working edge is much larger than the end scrapers (more use-life?); It is effectively removing hair
- *Observation @ 50 x:* Slightly more edge rounding visible but no other attributes of wear i.e. striations or polish (?)
- *Observation @ 225 x*: observations are similar as @ 50 x

Figure 2.17 Basaltic Scraper 2 (50x)

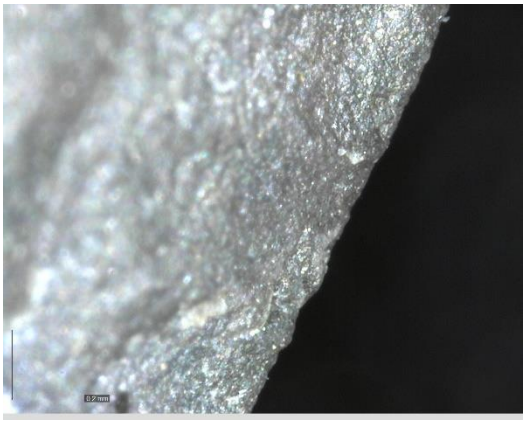

Figure 2.18 Basaltic Scraper 2 (225x)

Interval Three (30-45 minutes): This stage applied the same use motions and piece of leather for an additional 15 minutes to all three tools.

Basaltic Scraper 1:

- *Observation w/out magnification:* tool was becoming noticeably less effective
- *Observation @ 50 x:* polish appears to be developing; edges above the working edge are more worn
- *Observation @ 225 x:* areas beyond working edge are becoming worn

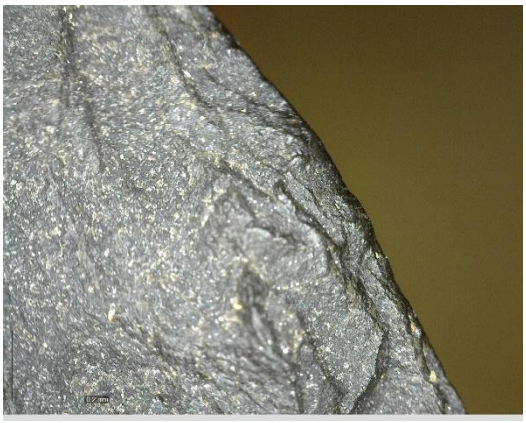

Figure 2.19 Basaltic Scraper 1 (50x)

Figure 2.20 Basaltic Scraper 1 (225x)

Obsidian Scraper 1:

- *Observation w/out magnification:* tool was still fairly effective, I thought the obsidian would wear faster but the sharp protrusions are still present along edge (not excessively) enough to aid in scraping and removing hair
- *Observation @ 50 x:* edge rounding is still the most obvious evidence of wear
- *Observation @ 225 x*: polish becoming apparent and more edge rounding

Figure 2.21 Obsidian Scraper 1 (50x)

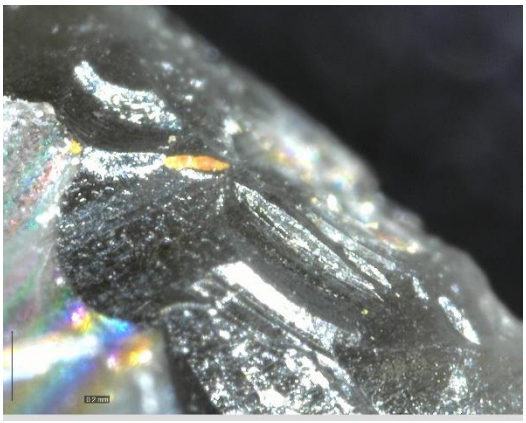

Figure 2.22 Obsidian Scraper 1 (225x)

Basaltic Scraper 2:

- *Observation w/out magnification:* tool was still fairly effective—most effective of all tools to remove hair; wear is still developing slowly compared to other tools, still think it's because both surfaces are used interchangeably
- *Observation @ 50 x:* edge rounding is developing slowly

- *Observation @ 225 x*: edge rounding is more obvious at this magnification (this is a good interval to compare the polish develop of B1 compared to the lack of polish developing on B2)

Figure 2.23 Basaltic Scraper 2 (50x)

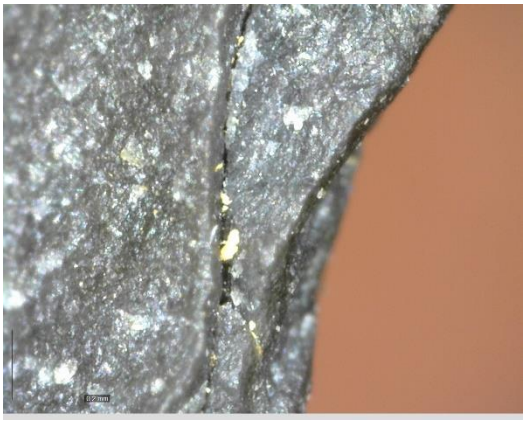

Figure 2.24 Basaltic Scraper 2 (225x)

Interval Four (45-60 minutes): This stage applied the same use motions and piece of leather for an additional 15 minutes to all three tools.

Basaltic Scraper 1:

- *Observation w/out magnification:* some rounding and possible polish developing further up from the working edge
- *Observation @ 50 x:* Polish appears to be developing; edge rounding is significant, working edge appearing straight with little to no undulations or projections
- *Observation @ 225 x*: polish potentially developing along projections on surface

Figure 2.25 Basaltic Scraper 1 (50x)

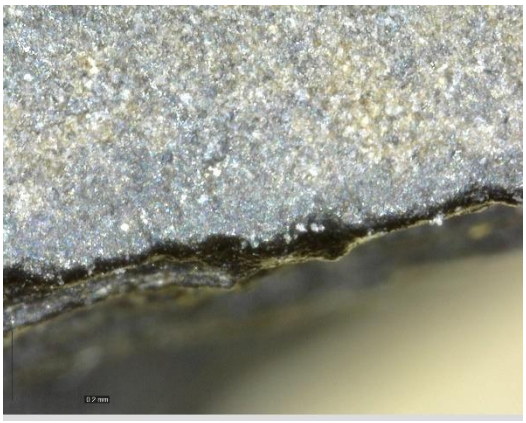

Figure 2.26 Basaltic Scraper 1 (225x)

Obsidian Scraper 1:

- *Observation w/out magnification:* the working edge looks dull and blunt; projections more rounded but some sharp points left
- *Observation @ 50 x:* edge rounding is still the most obvious, however, microchipping is occurring along ventral surface of working edge
- *Observation @ 225 x:* same as @ 50 x

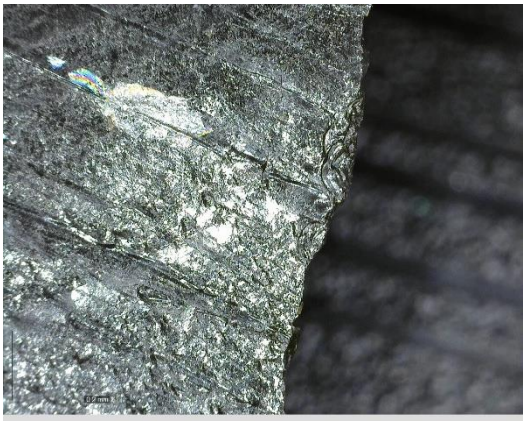

Figure 2.27 Obsidian Scraper 1 (50x)

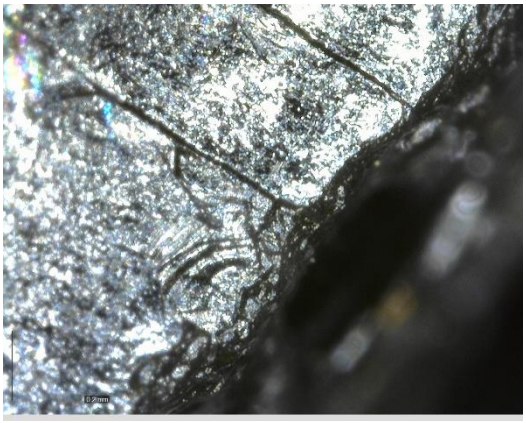

Figure 2.28 Obsidian Scraper 1 (225x)

Basaltic Scraper 2:

- *Observation w/out magnification:* still has sharp edges and protrusions, wear developing slowly
- *Observation @ 50 x:* rounding is present but protrusions still numerous and fairly sharp; no to little polish development
- *Observation @ 225 x*: Edge rounding is more apparent, however, still few other observable traces of wear

Figure 2.29 Basaltic Scraper 2 (50x)

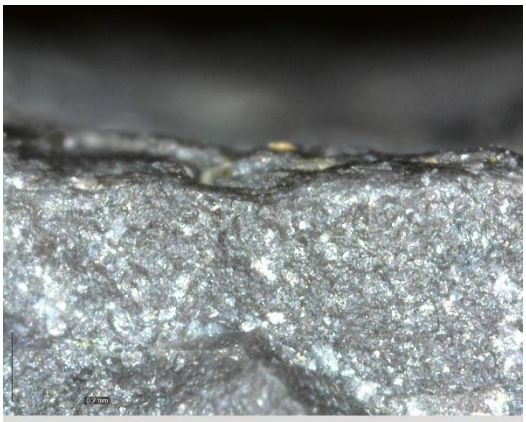

Figure 2.30 Basaltic Scraper 2 (225x)

Interval Five (60-75 minutes): This stage applied the same use motions and piece of leather for an additional 15 minutes to all three tools.

Basaltic Scraper 1:

- *Observation w/out magnification:* observations are same as interval four, ventral surface wear seems to be increasing
- *Observation @ 50 x:* edge rounding is appearing extreme or extensive, polish is accumulating noticeably
- *Observation @ 225 x:* still no evidence of striations

Figure 2.31 Basaltic Scraper 1 (50x)

Figure 2.32 Basaltic Scraper 1 (225x)

Obsidian Scraper 1:

- *Observation w/out magnification:* observations are same as interval four, visible changes in wear are plateauing
- *Observation @ 50 x:* edge rounding is also appearing extreme or extensive, not sure about polish
- *Observation @ 225 x*: microchipping is evident in some areas of ventral surface and working edge

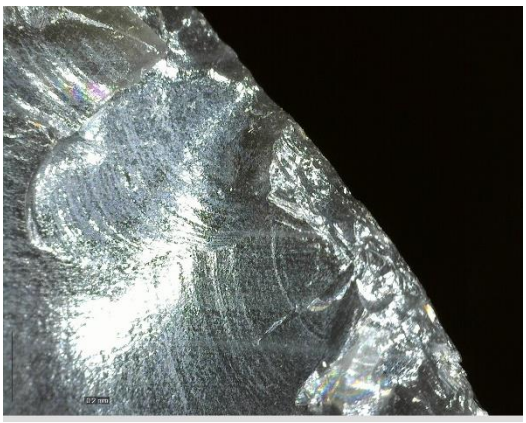

Figure 2.33 Obsidian Scraper 1 (50x)

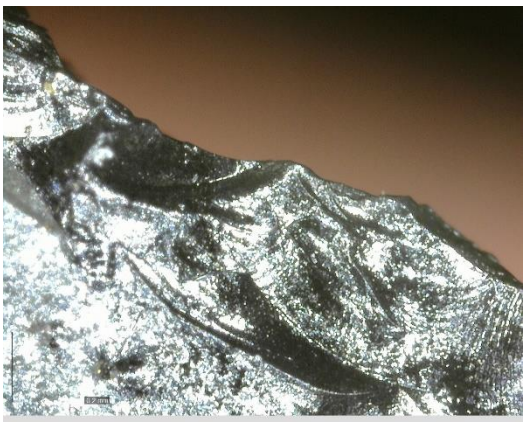

Figure 2.34 Obsidian Scraper 1 (225x)

Basaltic Scraper 2:

- *Observation w/out magnification:* possibly more edge rounding

- *Observation @ 50 x:* wear is accumulating slowly; some increased development of polish and edge rounding
- *Observation @ 225 x*: observations noted at 50 x are slightly more apparent

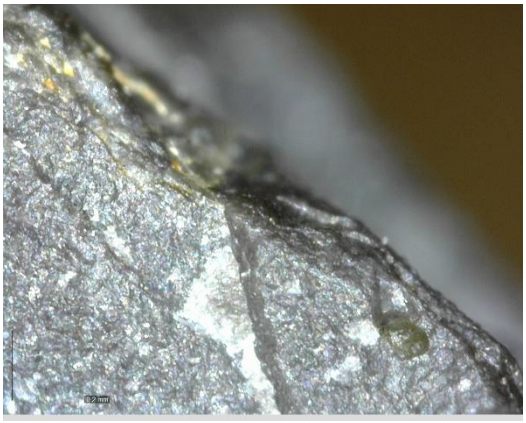

Figure 2.35 Basaltic Scraper 2 (50x)

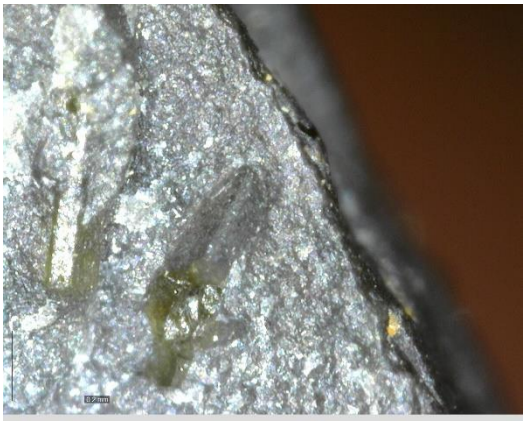

Figure 2.36 Basaltic Scraper 2 (225x)

Interval Six (75-90 minutes): This stage applied the same use motions and piece of leather for an additional 15 minutes to all three tools.

Basaltic Scraper 1:

- *Observation w/out magnification:* tool was largely ineffective
- *Observation @ 50 x:* no striations, polish has developed extensively on angled working edge and on ventral surface; projections are rounded and edge is rounded
- *Observation @ 225 x*: no additional observations

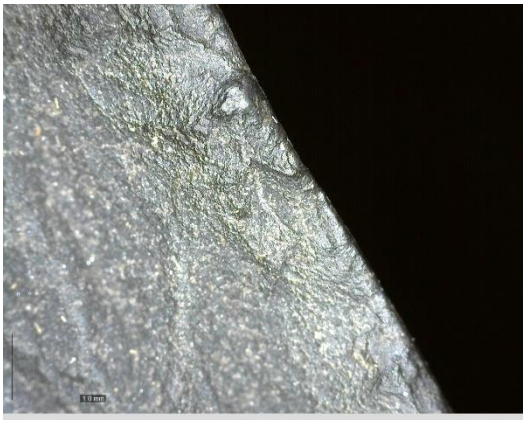

Figure 2.37 Basaltic Scraper 1 (50x)

Figure 2.38 Basaltic Scraper 1 (225x)

Obsidian Scraper 1:

- *Observation w/out magnification:* tool also largely ineffective even though some projections along working edge still visible
- *Observation @ 50 x:* polish development is difficult to measure but, it is still visible including on ventral surface; no striations; edge is well rounded
- *Observation @ 225 x*: projections appear rounded and polished

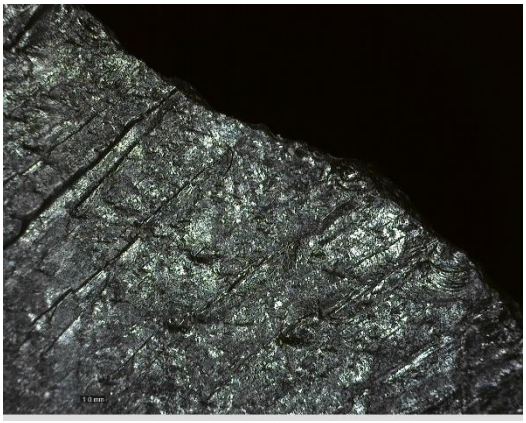

Figure 2.39 Obsidian Scraper 1 (50x)

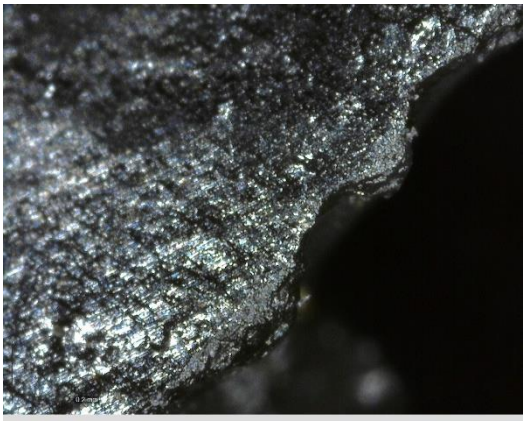

Figure 2.40 Obsidian Scraper 1 (225x)

Basaltic Scraper 2:

- *Observation w/out magnification:* tool was still useful
- *Observation @ 50 x:* not as much wear as other two tools; edge is rounding however, and polish is developed (although not well-developed)
- *Observation @ 225 x*: no additional observations

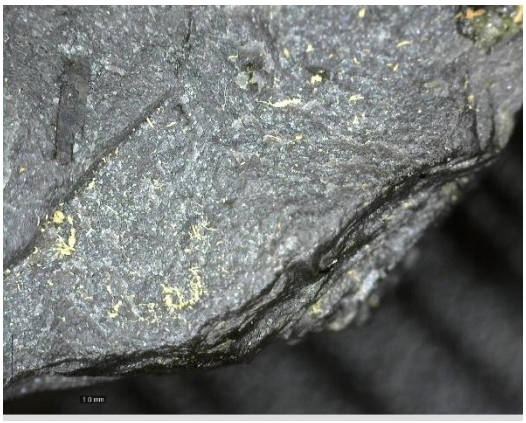

Figure 2.41 Basaltic Scraper 2 (50x)

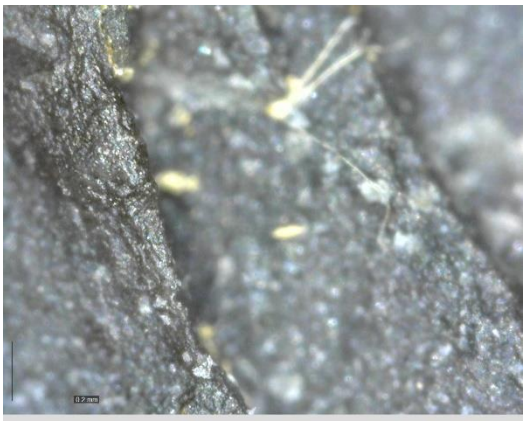

Figure 2.42 Basaltic Scraper 2 (225x)

Results

General Observations: the leading characteristic is extensive edge rounding, followed by rounding of projections; polish was quick to appear on edges and slowly developed along the contact surface

but, extent of development varied between tools; scarring is bifacial for the obsidian scraper and unifacial for the basaltic scraper. However, the dorsal surface bears more scarring; striations on the obsidian scraper are either absent or indistinguishable from raw material properties.

Table 2.1 Results of Experimental Program and the Identification of Use Motion

	Striations- Orientation	**Scarring- Location**
Basaltic Scraper 1	Perpendicular to working edge	Unifacial (dorsal surface)
Obsidian Scraper 1	Absent	Bifacial (more frequent on dorsal surface)
Basaltic Scraper 2	Absent	Bifacial

Table 2.2 Results of Experimental Program and the Identification of Worked Material

	Polish- Luster	**Polish- Texture**	**Polish- Extent**	**Striations- Nature**	**Edge Damage**	**Contact Area**
Basaltic Scraper 1	Dull	Greasy	Edge and surface	Shallow and diffuse	Extensive edge rounding	Broad
Obsidian Scraper 1	Relatively Dull	Greasy	Edge and surface	n/a	Extensive edge rounding	Broad
Basaltic Scraper 2	Dull	Greasy	Edge	n/a	Moderate edge rounding	Broad

Appendix 3: Use-Wear Characteristics for Inferring the Method of Use-Expanded

Method of Use	Use-Wear Attribute	
	Striations	**Scarring**
Cutting	-Located near working edge with a parallel distribution	-Located on both surfaces of working edge
Sawing/Slicing	-Unifacial and slanted or diagonal working edge	-Located more heavily on one surface
Scraping/Planing	-If present, perpendicular to working edge and opposite scarred surface **Planing; more abrasive wear on contact surface*	-Exclusively unifacial, typically occurs over a wide area **Projections are worn first and extensively*
Whittling	-If present, perpendicular to working edge and opposite scarred surface	-Unifacial scarring; little to no edge crushing
Graving	-May appear as longitudinal, transverse or both but, is exclusive to a working tip as opposed to an edge	-Scarring is highly variable
Boring	-N/A	-Characteristic roughening of tip -Scarring emanates from tip, unifacially or bifacially
Chopping	-Diagonal to working edge	-Heavy scarring, with well-defined terminations (hinged or stepped) -If asymmetrical, damage accumulates faster on one side of working edge
Adzing	-Unifacial and perpendicular working edge	-Unifacial scarring
Wedging	-Perpendicular to cutting edge	-Similar to chopping -Pitting/chipping opposite the cutting edge
Projectile	-If present, parallel to long axis **Sometimes short axis, if hafted transversely* -Either close or distant to working edge	-Well-defined terminations
Abrading	-N/A	**Wear is primarily abrasive and located on the surface, not working edge*
Pounding	-N/A	-Pitting and cracking on a surface, not working edge

(after Odell and Odell-Vereecken 1980)

Appendix 4: Use-Wear Characteristics for Inferring the Worked Material

Worked Material	Soft Plant	Wood	Bone/Antler	Stone	Shell	Meat/Fresh Hide	Dry Hide
Polish Lustre	Very Bright	Very Bright	Bright	Moderately Bright		Relatively Dull	Dull
Polish Texture	Very smooth polish when well developed	Very Smooth polish	Micro pitted polish	Very Smooth	Smooth polish	Rough bumpy polish	Greasy polish
Polish Nature		Curved with troughs and crests		Very flat	Domed		Includes pits 50x larger than bone polish
Extent of Polish			Confined to working edge			Over entire surface	
Striations	Filled-in and comet tail striations	Distinct broad and shallow striations	Many deep and narrow striations	Similar striation patterning to shell	Unique striations in geometric pattern	Few narrow but deep striations	Diffuse shallow striations
Edge Damage	Minimal edge damage	Moderate edge damage	Extensive edge damage	Extensive edge damage	Extensive edge damage	Minimal edge damage	Extensive rounding of edge
Contact Area	Broad	Narrow	Narrow	Narrow	Narrow	Broad	Broad
Fracture Type	Bending	Cone-initiated	Cone-initiated	Cone-initiated	Cone-initiated	Bending	Bending

(after Miller 2013; Keeley 1980; Yerkes 1983)

Appendix 5: Variables Used to Infer Function

Variable		Description
Metrics	Maximum length	Measured .1 mm
	Maximum width	Measured .1 mm
	Maximum Thickness	Measured .1 mm
		Measured .1 mm
	Weight	Measured .1 gm
Working Edge(s)	Number	Number of working edges
	Location	Left/right lateral, proximal, distal
	Edge morphology	Pointed, straight, concave, convex
	Edge length	Measured .00 mm
	Edge angle	Acute (<30), Steep (>30)
	Retouch	Absent, present-unimarginal, present-bimarginal
	Retouch type	Feathered, stepped, smoothed
	Retouch Pattern	Clustered, continuous
Raw Material	Material type	Variable
	Cortex	Absent, some, present
	Patina	Present, absent

Appendix 6: Data—Tool Identification

Artifact #	Artifact Class		Tool
	Pre-Microscopic Analysis	Post-Microscopic Analysis	
93.00	Flake Tool	Flake Tool	X
95.00	Bifacial Tool	Bifacial Tool	X
96.00	Bifacial Tool	Bifacial Tool	X
97.00	Bifacial Tool	Bifacial Tool	X
123.00	Bifacial Tool	Bifacial Tool	X
125.00	Bifacial Tool	Bifacial Tool	X
127.00	Flake Tool	Flake Tool	X
129.00	Bifacial Tool	Bifacial Tool	X
139.00	Bifacial Tool	Bifacial Tool	X
146.00	Pebble/Cobble	Pebble/Cobble	X
147.00	Flake Tool	Flake Tool	X
149.00	Flake Tool	Flake Tool	X
264.00	Flake	Flake	
265.01	Flake	Flake	
265.02	Flake	Flake	
265.03	Flake	Flake	
279.00	Pebble/Cobble	Pebble/Cobble	
287.00	Pebble/Cobble	Pebble/Cobble	
300.00	Flake	Flake Tool	X
348.00	Flake	Flake Tool	X
349.01	Flake	Flake	
349.02	Flake	Flake	
349.03	Flake	Flake	
349.04	Flake	Flake	
349.06	Flake	Flake	
351.00	Flake	Flake	
353.00	Flake	Flake	
357.00	Core	Core	
361.00	Flake	Flake	
366.00	Flake	Flake	
383.01	Flake	Flake	
385.01	Flake	Flake	
385.02	Pebble/Cobble	Pebble/Cobble	
386.00	Pebble/Cobble	Pebble/Cobble	
388.00	Flake	Flake Tool	X
389.00	Flake	Flake	
413.00	Flake Tool	Flake	
466.00	Core	Core	
467.00	Pebble/Cobble	Pebble/Cobble	
542.00	Bifacial Tool	Bifacial Tool	X
594.00	Pebble/Cobble	Pebble/Cobble	
595.00	Flake	Flake	
640.00	Flake Tool	Flake	
651.00	Flake	Flake	
653.00	Flake	Flake Tool	X
655.00	Flake Tool	Flake	
658.01	Flake	Flake	
664.00	Flake	Flake	
665.00	Flake	Flake	
716.00	Bifacial Tool	Bifacial Tool	X
736.00	Flake Tool	Flake	
737.01	Flake	Flake	
737.02	Flake	Flake	
746.00	Flake Tool	Flake Tool	X
750.00	Flake Tool	Flake Tool	X
751.00	Flake Tool	Flake Tool	X
808.01	Flake	Flake	
1054.00	Flake	Flake	
1124.00	Flake Tool	Flake Tool	X
1125.00	Flake Tool	Flake Tool	X
1126.00	Flake	Flake	

1128.00	Flake	Flake	
1182.00	Pebble/Cobble	Pebble/Cobble	
1183.00	Pebble/Cobble	Pebble/Cobble	
1184.00	Pebble/Cobble	Pebble/Cobble	
1300.00	Pebble/Cobble	Pebble/Cobble	
1357.00	Flake Tool	Flake Tool	X
1358.00	Pebble/Cobble	Pebble/Cobble	
1359.00	Pebble/Cobble	Pebble/Cobble	
1452.00	Core	Core	
1472.00	Pebble/Cobble	Pebble/Cobble	
1477.00	Flake	Flake	
1478.00	Flake	Flake	
1483.00	Flake Tool	Flake Tool	X
1486.00	Pebble/Cobble	Pebble/Cobble	X
1580.00	Flake	Flake	
1588.00	Flake	Flake	
1607.00	Flake Tool	Flake	
1732.00	Flake Tool	Flake	
1810.00	Core	Core	
1812.00	Flake Tool	Flake	
1813.00	Flake	Flake	
1814.01	Flake	Flake	
1814.02	Flake	Flake	
1816.00	Flake Tool	Flake	
1835.00	Pebble/Cobble	Pebble/Cobble	
1963.00	Flake Tool	Flake	
1979.00	Pebble/Cobble	Pebble/Cobble	X
1983.00	Pebble/Cobble	Pebble/Cobble	X
2035.00	Pebble/Cobble	Pebble/Cobble	
2036.00	Flake	Flake	
2037.00	Pebble/Cobble	Pebble/Cobble	
2042.00	Core	Core	
2043.00	Flake	Flake	
2044.00	Pebble/Cobble	Pebble/Cobble	
2060.00	Pebble/Cobble	Pebble/Cobble	
2062.00	Flake Tool	Flake	
2063.00	Flake	Flake Tool	X
2115.00	Pebble/Cobble	Pebble/Cobble	
2156.00	Bifacial Tool	Bifacial Tool	X
2159.00	Bifacial Tool	Bifacial Tool	X
2192.00	Flake Tool	Flake Tool	X
2241.00	Flake Tool	Flake Tool	X
2297.00	Pebble/Cobble	Pebble/Cobble	X
2482.01	Flake	Flake	
2483.00	Flake	Flake	
2542.00	Pebble/Cobble	Pebble/Cobble	
2544.00	Core	Core	
2574.04	Flake	Flake	
2577.00	Flake	Flake	
2586.00	Flake	Flake	
2593.00	Flake	Flake	
2615.00	Flake Tool	Flake	
2645.00	Flake	Flake	
2646.00	Flake	Flake	
2678.00	Flake	Flake	
2679.00	Pebble/Cobble	Pebble/Cobble	
2681.00	Pebble/Cobble	Pebble/Cobble	
2682.00	Flake	Flake	
2683.01	Flake	Flake	
2686.00	Pebble/Cobble	Pebble/Cobble	
2703.00	Flake Tool	Flake Tool	X
2704.00	Flake	Flake Tool	X
2710.00	Flake Tool	Flake Tool	X
2714.00	Flake Tool	Flake Tool	X
2766.00	Pebble/Cobble	Pebble/Cobble	
2768.00	Pebble/Cobble	Pebble/Cobble	

2769.00	Flake	Flake	
2784.00	Bifacial Tool	Bifacial Tool	X
2788.00	Flake	Flake	
2789.00	Flake Tool	Flake Tool	X
2791.00	Flake Tool	Flake Tool	X
2806.00	Flake	Flake	
2813.00	Flake	Flake Tool	X
2821.00	Flake	Flake	
2838.00	Flake Tool	Flake	
2841.00	Flake Tool	Flake Tool	X
2861.00	Flake	Flake	
2920.00	Flake Tool	Flake Tool	X
2921.00	Bifacial Tool	Bifacial Tool	X
2973.01	Flake	Flake	
2974.01	Flake	Flake	
2974.02	Flake	Flake	
2974.03	Flake	Flake	
2974.04	Flake	Flake	
2974.05	Flake	Flake	
2974.06	Flake	Flake	
2974.07	Flake	Flake	
2974.08	Flake	Flake	
2978.00	Flake Tool	Flake Tool	X
3035.00	Flake	Flake	
3070.00	Pebble/Cobble	Pebble/Cobble	
3072.00	Flake	Flake	
3074.00	Pebble/Cobble	Pebble/Cobble	X
3107.00	Flake	Flake	
3108.00	Pebble/Cobble	Pebble/Cobble	
3134.00	Pebble/Cobble	Pebble/Cobble	
3136.00	Flake	Flake	
3139.00	Flake	Flake	
3140.00	Flake	Flake	
3143.00	Flake	Flake	
3146.00	Flake	Flake	
3148.00	Flake	Flake	
3165.01	Pebble/Cobble	Pebble/Cobble	
3282.00	Flake	Flake	
3283.00	Flake	Flake	
3288.01	Flake	Flake	
3313.00	Flake	Flake	
3443.00	Flake	Flake	
3474.00	Flake Tool	Flake Tool	X
3476.00	Flake Tool	Flake	
3503.00	Pebble/Cobble	Pebble/Cobble	
3508.00	Flake	Flake	
3512.00	Pebble/Cobble	Pebble/Cobble	
3514.00	Pebble/Cobble	Pebble/Cobble	
3518.00	Flake Tool	Flake	
3520.00	Flake	Flake	
3522.00	Pebble/Cobble	Pebble/Cobble	
3532.00	Pebble/Cobble	Pebble/Cobble	
3535.00	Pebble/Cobble	Pebble/Cobble	
3546.00	Pebble/Cobble	Pebble/Cobble	
3575.00	Flake	Flake	
3577.01	Flake	Flake	
3600.00	Pebble/Cobble	Pebble/Cobble	
3601.00	Pebble/Cobble	Pebble/Cobble	
3607.00	Pebble/Cobble	Pebble/Cobble	
3617.00	Pebble/Cobble	Pebble/Cobble	
3618.00	Pebble/Cobble	Pebble/Cobble	X
3619.00	Pebble/Cobble	Pebble/Cobble	
3722.00	Flake	Flake Tool	X
3795.00	Flake	Flake	
3797.00	Flake	Flake	
3800.00	Flake	Flake	

3832.00	Bifacial Tool	Bifacial Tool	X
3862.01	Flake Tool	Flake Tool	X
4080.00	Flake Tool	Flake Tool	X
4100.00	Flake Tool	Flake Tool	X
4104.01	Flake	Flake	
4106.00	Flake	Flake	
4110.01	Flake Tool	Flake Tool	X
4110.02	Flake Tool	Flake Tool	X
4125.00	Flake	Flake	
4127.00	Flake	Flake	
4128.00	Flake Tool	Flake Tool	X
4148.00	Flake	Flake Tool	X
4235.00	Pebble/Cobble	Pebble/Cobble	
4341.00	Flake	Flake	
4375.00	Flake	Flake	
4379.00	Pebble/Cobble	Pebble/Cobble	X
4380.00	Flake Tool	Flake	
4381.00	Flake	Flake	
4384.00	Flake Tool	Flake	
4391.00	Flake	Flake	
4449.00	Flake Tool	Flake	
4451.00	Flake	Flake	
4455.00	Flake	Flake	
4456.00	Flake	Flake	
4458.00	Flake	Flake	
4470.00	Pebble/Cobble	Pebble/Cobble	X

Appendix 7: Data—Active Part Identification

Artifact	Active Part			Type(s) of Wear Present
	#	Location	Description	
95.00	1	lateral 1	-	scarring, crushing, polish
	2	proximal lateral 2	-	scarring, crushing, polish
	3	point	-	scarring, edge rounding, polish
	3	distal lateral 2	-	scarring, crushing, polish
	4	distal	-	scarring, edge rounding, polish
96.00	1	distal	-	scarring, edge rounding, striations, polish
	2	left lateral	point to medial section	scarring, edge rounding, striations, polish
	3	right lateral	point to medial section	scarring, edge rounding, polish
97.00	1	lateral 1	lateral margin to breakage point	scarring, polish, edge rounding
	2	proximal	break	scarring, polish, edge rounding
	3	lateral 2	lateral margin to breakage point	scarring, polish, edge rounding
123.00	1	lateral 1	longer margin	scarring, polish, edge rounding
	2	lateral 2	shorter margin	scarring, polish, edge rounding
	3	distal	-	scarring, polish, edge rounding
	4	medial	broken margin	scarring, polish, edge rounding
125.00	1	lateral 1	longer margin	scarring, polish, edge rounding
	2	lateral 2	shorter margin	scarring, polish, edge rounding
	3	medial	-	scarring
	4	distal	-	scarring
127.00	1	right lateral	-	scarring, polish, rounding/removal of flake scars
	2	left lateral	-	scarring, polish
	3	distal	-	scarring, polish, rounding/removal of flake scars
129.00	1	lateral 1	longer margin	scarring, polish, edge rounding
	2	lateral 2	shorter margin	scarring, polish, crushing
	3	distal	-	scarring, polish, crushing
139.00	1	straight margin	-	scarring, polish, edge rounding, removal of flake scars
	2	convex margin	-	scarring, polish, edge rounding, removal of flake scars
146.00	1	lateral 1	left/longer margin	scarring, polish, edge rounding/and of projections
	2	lateral 2	right/shorter margin	scarring, polish, edge rounding/and of projections
	3	distal	-	scarring, polish, edge rounding/and of projections
147.00	1	left lateral	-	scarring, polish
	2	proximal	-	scarring, polish, multi-directional striations
149.00	1	left lateral	-	scarring, polish
	2	distal	-	scarring, polish, crushing
300.00	1	right lateral	proximal part (1/2 cortex, 1/2 not)	scarring, polish
	2	left lateral	extent of margin	scarring, polish
	3	distal	-	scarring, polish, crushing

348.00	1	left lateral	-	scarring, polish
	2	right lateral	-	scarring, polish
	3	distal	-	scarring polish
388.00	1	left lateral	small point	scarring, polish, edge rounding
542.00	1	right proximal	point oriented right	scarring, polish, edge rounding
	2	left lateral	-	scarring, polish, edge rounding
	3	distal	-	scarring, polish, edge rounding
653.00	1	left lateral	-	scarring, polish
	2	right lateral	-	scarring, polish
	3	distal	-	scarring, polish
716.00	1	lateral 1	longer margin	scarring, polish, edge rounding
	2	lateral 2	shorter margin	scarring, polish, edge rounding
	3	distal	-	scarring
746.00	1	right lateral (1)	ventral edge	scarring, edge rounding, possible striations
	2	right lateral (2)	dorsal edge	scarring, edge rounding
	3	left lateral	-	scarring, edge rounding, polish
750.00	1	left lateral	-	scarring, polish, edge rounding
	2	right lateral	-	scarring, polish, edge rounding
	3	distal	-	scarring, polish
751.00	1	right lateral	-	scarring, polish
	2	left lateral	-	scarring, polish
1124.00	1	left lateral	-	scarring
	2	right lateral	-	scarring, polish
	3	distal	-	scarring, polish
1125.00	1	left lateral	-	scarring, polish, striations
	2	right lateral	-	scarring, polish, striations
	3	distal	-	scarring, polish, striations
1357.00	1	left lateral	-	scarring, polish
	2	right lateral	-	scarring polish
1483.00	1	right lateral	-	scarring, polish, striations
	2	distal	-	scarring, polish
1486.00	1	lateral 1	longer margin	scarring, polish, rounding
	2	lateral 2	shorter margin	scarring, polish, rounding
	3	distal	flaked end	scarring, polish, rounding
	4	proximal	unflaked end	polish
1979.00	1	lateral 1	-	scarring, possible polish, possible edge rounding
1983.00	1	right lateral	-	scarring, rounding of scars, poorly developed polish
	2	left distal	-	scarring, rounding of scars, poorly developed polish
2063.00	1	surface 1	split surface	polish, edge rounding
2156.00	1	lateral 1	right; oriented with crystalline surface up	scarring, polish
	2	lateral 2	left	scarring, polish

	3	point	-	scarring, polish, edge rounding
2159.00	1	lateral 1	longer margin	scarring, polish, edge rounding
	2	lateral 2	shorter margin	scarring, polish, edge rounding
	3	distal	-	scarring
2192.00	*Unobservable*		-	
2241.00	1	distal	-	scarring, edge rounding, polish
2297.00	1	right lateral	-	scarring, edge rounding
2703.00	1	right lateral	-	scarring, polish
	2	left lateral	-	scarring, polish
2704.00	1	left lateral	-	scarring, striations, edge rounding
	2	right lateral	-	scarring, polish, edge rounding
2710.00	1	right lateral	refit proximal segement	scarring
2714.00	1	left lateral	oriented, point part up	scarring, edge rounding, striations
	2	right lateral	-	scarring, edge rounding, striations
2784.00	1	left lateral	oriented, point part up	scarring, edge rounding
	2	right lateral	-	scarring, edge rounding
2789.00	1	left lateral	-	scarring, edge rounding, polish
	2	right lateral	-	scarring, edge rounding, polish
	3	graver	on left lateral	scarring, edge rounding, polish
2791.00	1	distal	refit distal segment	scarring, edge rounding, polish
2841.00	1	left lateral	refit medial segment	scarring, edge rounding, polish
2920.00	1	lateral 1	-	scarring, polish, edge rounding
2921.00	1	left lateral	-	scarring, edge rounding, polish
	2	right lateral	-	scarring, edge rounding, polish
	3	proximal	-	snap fracture
	4	distal	-	scarring, edge rounding, polish
2978.00	1	left lateral	-	scarring
	2	right lateral	-	scarring, striations
	3	distal	-	scarring
3074.00	1	left lateral	-	scarring, edge rounding
	2	distal	-	scarring, edge rounding
3474.00	1	left lateral	-	scarring, crushing, polish
	2	right lateral	-	scarring, crushing, polish
3618.00	1	lateral 1	longer margin	scarring
3619.00	1	lateral 1	-	scarring, possible polish, possible edge rounding
3722.00	1	right lateral	-	scarring, edge rounding, polish
3832.00	1	lateral 1	longer margin	scarring, edge rounding, polish
	2	lateral 2	shorter margin	scarring, edge rounding polish
3862.01	1	left lateral	cortex distal	scarring, polish
	2	right lateral	-	scarring, polish
	3	distal	-	scarring polish
4080.00	1	left lateral	longer margin	scarring, polish

	2	right lateral	shorter margin	scarring, polish
4100.00	1	left lateral	-	scarring, polish
	2	right lateral	-	scarring, polish
4110.01	1	left lateral	-	scarring, edge rounding, polish
	2	right lateral	-	scarring, polish
4110.02	1	left lateral	-	scarring, polish, edge rounding
	2	right lateral	-	scarring, polish
	3	distal/point	-	scarring
4128.00	1	left lateral	-	scarring, polish
	2	right lateral	-	scarring, polish
4148.00	1	right lateral	-	scarring, crushing, polish
4379.00	1	lateral 1	-	scarring, edge rounding, polish
4470.00	1	left lateral	-	scarring, edge rounding, polish

Appendix 8: Data—Use Motion Identification

Artifact	AP	Location	Striations	Use Method	Scarring	Use Method
95.00	1	lateral 1	diffuse parallel striations along edge, bifacial	sawing/slicing	flaking on both surfaces but more on one surface, edge rounding also present, including on projections,	sawing/slicing
	2	proximal lateral 2	many parallel striations on both faces near edge	sawing/slicing	bifacial flaking, irregular placement and shape	sawing/slicing
	3	point	multidirectional, but mainly along axis of the point	graving	scarring is variable, edge rounding is present along arrises and projections	graving
	4	distal lateral 2	very few, variably oriented striations	?	bifacial flaking, irregular shape and size	?
	5	distal	very few, variably oriented striations	?	bifacial scarring but, edge damage is characterized by edge rounding and smoothing	
96.00	1	distal	few, shallow striations perpendicular to the working edge	scraping	ventral: edge rounding, little-no scarring on surface; dorsal: edge rounding of projections, removal/rounding of flake scars; scarring is unifacial	scraping
	2	left lateral	few, shallow striations parallel/diagonal to the working edge (ventral)	sawing/slicing	extreme edge rounding, scarring is unifacial (dorsal)	scraping
	3	right lateral	few striations, deep, diagonal to the working edge (ventral)	sawing/slicing	extreme edge rounding, scarring is unifacial (dorsal)	scraping
97.00	1	lateral 1	absent	n/a	edge rounding/removal of flake scars on one surface/edge and retainment of scars on opposing surface/edge	slicing/sawing or scraping
	2	proximal	absent	n/a	large hinge fracture	projectile
	3	lateral 2	unifacial and diagonal	cutting	some edge rounding; flake scars largely intact	cutting
123.00	1	lateral 1	short diffuse striations perpendicular the working edge on one face	?	bifacial scarring, edge rounding	?
	2	lateral 2	n/a	n/a	bifacial scarring, edge rounding	?
	3	distal	few, variably oriented striations	hafting ?	bifacial scarring, edge rounding	hafting
	4	medial	n/a	n/a	large snap fracture	projectile
125.00	1	lateral 1	possible diagonal striations on one face	?	step fractures on both surfaces of edge	projectile
	2	lateral 2	possible perpendicular striations	scraping/planing (?)	step fractures on both surfaces of edge, edge rounding is prevalent and rounding of flake scars	scraping/planing (?)
	3	medial	n/a	n/a	large hinge fracture	projectile
	4	distal	few short deep multidirectional striations, mainly perpendicular	?	large snap fracture, few microscars and edge rounding, particularly on corners	?
127.00	1	right lateral	n/a	n/a	bifacial scarring but more edge damage on ventral surface	sawing/slicing
	2	left lateral	n/a	n/a	scarred on both faces; retouch on dorsal and use damage on ventral	sawing/slicing
	3	distal	on ventral surface perpendicular to edge; deep/short; opposite retouched surface	scraping/planing	scarred on both faces; retouch on dorsal and use damage on ventral	sawing/slicing

129.00	1	lateral 1	areas with parallel and diagonal striations	sawing/slicing	bifacial scarring-highly variable size and terminations including; feather, snap, hinge, step fractures; edge rounding also extensive; lots of edge damage altogether	sawing/slicing
	2	lateral 2	possibly diagonal striations on one face	unknown (possibly sawing/slicing)	bifacial scarring-variable also but, dominated by feather terminations; little to no edge rounding but lots of breakage/crushing/sharp working edge; scarring/edge damage is equal on both faces	cutting
	3	distal	absent	n/a	bifacial scarring, variable terminations; much less damage than lateral edges	unknown
139.00	1	straight margin	striations immediate working edge, parallel and perp. (non-retouched surface)	scraping/planing	unifacial scarring, extensive step fractures on one surface with feather termination, few microscars on opposing face; extensive edge rounding	scraping/planing
	2	convex margin	striations immediate working edge, both parallel (few) and perp. (many) (non-retouched surface)	scraping/planing	unifacial scarring, extensive step fractures on one surface with feather termination, some microscars on opposing face but few; extensive edge rounding	scraping/planing
146.00	1	lateral 1	n/a	n/a	unifacial scarring on ventral surface; extensive edge rounding	scraping/planing
	2	lateral 2	n/a	n/a	unifacial scarring on ventral surface; extensive edge rounding	scraping/planing
	3	distal	very few shallow striations perpendicular working edge	scraping/planing	unifacial scarring on ventral surface; extensive edge rounding	scraping/planing
147.00	1	left lateral	diagonal and parallel the working edge on both surfaces	cutting	bifacial scarring, somewhat irregular but largely small and feathered	cutting
	2	distal	few multidirectional striations	graving	scarring is multidirectional and irregular but shallow feathered terminations prevalent	graving
149.00	1	left lateral	parallel striations on ventral and dorsal	cutting	scarring is bifacial, irregular scarring feather and step, on working edge	cutting
	2	proximal	absent	n/a	scarring is unifacial, edge rounding present	hafting
300.00	1	right lateral	absent	n/a	scarring is bifacial, regular small feather terminated scars	cutting
	2	left lateral	possible parallel striations	n/a	scarring is bifacial, regular small feather terminated scars	cutting
	3	distal	absent	n/a	very few bifacial scars	backing wear
348.00	1	left lateral	striations perpendicular the working edge on ventral and dorsal surface	scraping/planing	unifacial scarring, both retouch and use, edge rounding also present-moderate	scraping/planing
	2	right lateral	absent	n/a	unifacial scarring, retouch and use; scarring is on both faces but, retouch alternates faces and remains unifacial	scraping/planing
	3	distal	absent	n/a	unifacial scarring, retouch and use; scarring is on both faces but, retouch alternates faces and remains unifacial	scraping/planing
388.00	1	left lateral	many shallow striations perpendicular the working edge	scraping/planing	unifacial scarring on contact surface/opposite the striations	scraping/planing

542.00	1	right proximal	parallel striations on one surface	sawing/slicing	retouch scarring on both faces, use wear scars on surface opposite striations, extreme edge rounding	sawing/slicing
	2	left lateral	absent	n/a	retouch scarring on both faces, more heavily worked on one side	sawing/slicing
	3	distal	absent	n/a	bifacial scarring and extensive edge rounding	cutting
653.00	1	left lateral	deep, slightly diagonal to working edge, more heavily located on dorsal surface	sawing/slicing	bifacial scarring, regular small and feathered, more heavily located on dorsal surface	sawing/slicing
	2	right lateral	absent	n/a	bifacial, also regular but less frequent than opposing lateral margin	sawing/slicing
	3	distal	few striations perpendicular to the working edge	scraping/planing	largely unifacial, some variability	scraping/planing
716.00	1	lateral 1	potential striations that are few and multidirectional	?	bifacial scarring well defined	projectile
	2	lateral 2	potential striations that are few and multidirectional	?	bifacial scarring well defined	projectile
	3	distal	absent	n/a	large hinge fracture, appears to be located below haft wear, broke within haft	projectile/hafting
746.00	1	right lateral (1)	shallow, perpendicular	n/a	largely unifacial scarring on dorsal, with few irregular scars on ventral; edge rounding on working edge	scraping/planing
	2	right lateral (2)	absent	n/a	bifacial scaring but heavier on ventral surface	backing wear
	3	left lateral	shallow, perpendicular and diagonal	n/a	largely unifacial scarring on dorsal, with few irregular scars on ventral; edge rounding on working edge	scraping/planing
750.00	1	left lateral	unobservable (possibly perp. and para.)	n/a	unifacially worked on ventral but bifacial fractures on dorsal from use-consistent w/experimental obsidian scraper	scraping/planing
	2	right lateral	unobservable (possibly perp. And para.)	n/a	unifacially worked on ventral but bifacial fractures on dorsal from use-consistent w/experimental obsidian scraper	scraping/planing
751.00	1	right lateral	absent	n/a	minimal bifacial scarring	cutting
	2	left lateral	absent	n/a	minimal bifacial scarring	cutting
1124.00	1	left lateral	few, shallow striations diagonal to the working edge (dorsal)	sawing/slicing	bifacial-snap fractures, feather-terminated on scars	cutting
	2	right lateral	few, shallow striations diagonal to the working edge (dorsal)	sawing/slicing	dorsal/unifacial-snap fractures, feather-terminated on scars	sawing/slicing
	3	distal	absent	n/a	dorsal: snap factures, feather-termination scars with polish developed within; some scarring on ventral surface (unifacial scarring)	sawing/slicing
1125.00	1	left lateral	many, shallow long striations parallel working edge, heavier on ventral	cutting	feathered termination on both faces	cutting
	2	right lateral	few shallow, long striations parallel to working edge on ventral surface	cutting	feathered termination on both faces	cutting
	3	distal	few shallow, long	cutting	feathered termination on both	cutting

			striations parallel to working edge on ventral surface		faces	
1357.00	1	left lateral	deep perpendicular and diagonal on ventral surface (unifacial)	scraping/planing	feather-terminated scars, primarily on dorsal surface (unifacial scarring, opposing striations)	scraping/planing
	2	right lateral	deep, parallel striations, bifacial	cutting	bifacial-feather-terminated scars (bifacial scarring)	cutting
1483.00	1	right lateral	parallel striations	cutting	bifacial scarring, appears heavier on dorsal but, likely retouch, and scarring is equally distributed	cutting
	2	distal	absent	n/a	bifacial scarring, but more frequent on dorsal surface	cutting
1486.00	1	lateral 1	long, shallow, diffuse, mainly perpendicular to working edge	scraping/planing	step and feather terminated macrofractures, largely unifacial	scraping/planing
	2	lateral 2	absent	n/a	step and feather terminated macrofractures, largely unifacial	scraping/planing
	3	distal	very few long, shallow, diffuse, perpendicular to working edge	scraping/planing	step and feather terminated macrofractures, largely unifacial	scraping/planing
	4	proximal	very few long, shallow, diffuse, parallel to edge	n/a	n/a	n/a
1979.00	1	lateral 1	absent	n/a	unifacial on dorsal surface	scraping/planing
1983.00	1	right lateral	absent	n/a	bifacial scarring but, more extensive on ventral surface	cutting
	2	left distal	absent	n/a	bifacial scarring but, more extensive on ventral surface	cutting
2063.00	1	surface 1	absent	n/a	edge rounding	scraping
2156.00	1	lateral 1	absent	n/a	bifacial scarring	unknown
	2	lateral 2	absent	n/a	bifacial scarring	unknown
	3	point	multidirectional striations	graving or projectile wear	bifacial scarring	projectile
2159.00	1	lateral 1	absent	n/a	bifacial scarring, mostly feather and step terminated scars	unknown
	2	lateral 2	absent	n/a	bifacial scarring, mostly feather and step terminated scars	unknown
	3	distal	absent	n/a	absent (some feather and step fractures but appear to originate from lateral margins or else transportation wear--probably NOT use-wear)	unknown
2192.00	*Unobservable*					
2241.00	1	distal	absent	n/a	unifacial scarring	scraping/planing
2297.00	1	right lateral	absent	n/a	unifacial scarring	scraping/planing
2703.00	1	right lateral	absent	n/a	bifacial scarring but, more frequent on dorsal surface; edge rounding of protrusions and flake scars	scraping/planing
	2	left lateral	absent	n/a	bifacial scarring but, more frequent on dorsal surface; edge rounding of protrusions and flake scars	scraping/planing
2704.00	1	left lateral	parallel working edge, more frequent on dorsal surface	cutting	unifacial scarring	sawing/slicing
	2	right lateral	absent	n/a	unifacial scarring	sawing/slicing

2710.00	1	right lateral	possible parallel striations on dorsal surface	sawing/slicing	unifacial scarring on ventral surface	sawing/slicing
2714.00	1	left lateral	diagonal striations on ventral surface	sawing/slicing	bifacial scarring but more damage on dorsal surface, ventral surface has irregular sized feather scars; edge rounding also present	sawing/slicing
	2	right lateral	diagonal striations on ventral surface	sawing/slicing	bifacial scarring but more damage on dorsal surface, ventral surface has irregular sized feather scars; edge rounding also present	sawing/slicing
2784.00	1	left lateral	some diagonal but mostly parallel bifacial striations	sawing/slicing	bifacial retouch, more intensive on ventral surface; edge rounding also present	sawing/slicing
	2	right lateral	possible diagonal striations	n/a	bifacial retouch, more intensive on ventral surface; edge rounding also present	sawing/slicing
2789.00	1	1 lateral	absent	n/a	unifacial retouch on dorsal surface	scraping/planing
	2	2 lateral	few perpendicular striations on ventral surface	scraping/planing	unifacial retouch on dorsal surface	scraping/planing
	3	graver	absent	n/a	bifacial/multidirectional, but mainly on dorsal surface	graving
2791.00	1	distal	many shallow striations, perp. the working edge, concentrated on very distal portion	scraping/planing	unifacial scarring on dorsal surface, extensive edge rounding	scraping/planing
2841.00	1	left lateral	many shallow striations, perp. the working edge	scraping/planing	unifacial scarring on dorsal surface, extensive edge rounding	scraping/planing
2920.00	1	lateral 1	absent	n/a	few bifacial scars immediately on working edge	chopping
2921.00	1	left lateral	absent	n/a	bifacial scarring, well defined hinge/step fractures	projectile
	2	right lateral	absent	n/a	bifacial scarring, well defined hinge/step fractures	projectile
	3	proximal	absent	n/a	large hinge fracture	projectile
	4	distal	absent	n/a	bifacial scarring, well defined hinge/step fractures	projectile
2978.00	1	left lateral	absent	n/a	slight scaring on distal most point of lateral margin	hafting
	2	right lateral	diagonal and restricted to working edge on both faces	cutting	bifacial microscarring	cutting
	3	distal	absent	n/a	bifacial microscarring	cutting
3074.00	1	left lateral	absent	n/a	scarring is unifacial, edge rounding present	scraping/planing
	2	distal	few perpendicular striations on ventral surface	scraping/planing	scarring is bifacial but heavier on dorsal surface	scraping/planing
3474.00	1	left lateral	n/a	n/a	largely unifacial, edge rounding	scraping/planing
	2	right lateral	n/a	n/a	largely unifacial, more on ventral surface than left lateral exhibits, edge rounding present	scraping/ planing
3618.00	1	lateral 1	absent	n/a	bifacial scarring, feather terminated, more extensive on ventral surface	cutting
3722.00	1	right lateral	n/a	n/a	bifacial but more on dorsal surface, slight edge rounding present, microflaking minimal	sawing/slicing
3832.00	1	lateral 1	few potential striations in diagonal direction consistent with projectile wear	projectile	bifacial scarring; inconsistent breakage-few feather scars, few snaps, edge rounding mixed with sharp edge	projectile

	2	lateral 2	few potential striations in diagonal direction consistent with projectile wear	projectile	bifacially worked; like lateral 1 few and variable microscars, feather and snap and sharp and rounded portions of the edge	projectile
3862.01	1	left lateral	absent	n/a	bifacial but more on dorsal surface, edge rounding and rounding of scars	sawing/slicing
	2	right lateral	parallel/diagonal to working edge, observed on ventral surface	sawing/slicing	bifacial but more on dorsal surface, edge rounding and rounding of scars	sawing/slicing
	3	distal	absent	n/a	bifacial but more on dorsal surface, edge rounding more pronounced than other working edges, rounding of projections	sawing/slicing
4080.00	1	left lateral	few diffuse diagonal striations on both faces	sawing/slicing	bifacial but more pronounced on dorsal	sawing/slicing
	2	right lateral	few diffuse parallel striations on both faces	cutting	bifacial but more pronounced on ventral	sawing/slicing
4100.00	1	left lateral	few striations parallel and close to working edge, primarily on dorsal surface	cutting	bifacial scarring, use damage on both faces, retouch on dorsal	cutting
	2	right lateral	absent	n/a	bifacial scarring, some edge rounding	cutting
4110.01	1	left lateral	very few striations parallel working edge	cutting	irregular bifacial scarring	cutting
	2	right lateral	diagonal striations primarily on ventral surface	sawing/slicing	irregular bifacial scarring	cutting
4110.02	1	left lateral	absent	n/a	unifacial scarring on dorsal surface, slight rounding	sawing/slicing
	2	right lateral	absent	n/a	bifacial scarring, highly irregular size and termination types	sawing/slicing
	3	distal/point	absent	n/a	multidirectional scarring on all angles of point	graving
4128.00	1	left lateral	some parallel and some diagonal, more prominent on ventral	cutting	very few scars, bifacial	cutting
	2	right lateral	few possible parallel striations on ventral surface	cutting	bifacial, similar to opposing edge but more scarring	cutting
4148.00	1	right lateral	few shallow striations, parallel working edge	cutting	bifacial and irregular scarring	cutting
4379.00	1	lateral 1	absent	n/a	steep scars, bifacial, but more extensive on steeper face	unknown
4470.00	1	left lateral	absent	n/a	unifacial scarring on ventral surface; three large fractures/scars	unknown

Appendix 9: Data—Worked Material Identification

Artifact	AP	Greasy Polish	Dull Polish	Comments:	Edge Rounding	Projection Rounding	Removal of Flake Scars	Scarring	Comments:	Hide-working
95.00	1	N	N	discontinuous bright polish	N	N	N	bifacial	bifacial retouch; edge is crushed	Other
	2	N	N	discontinuous bright developed polish on working edge	N	N	N	bifacial	bifacial retouch; edge is crushed	Other
	3	N	N	discontinuous bright developed polish on working edge	Y-moderate	Y-moderate	Y-moderate	bifacial		Other
	4	N	N	discontinuous bright polish	N	N	N	bifacial	bifacial retouch; edge is crushed	Other
	5	N	N	bright spots	Y-minimal	Y-minimal	N	bifacial	bifacial retouch on base, edge rounding is haft wear	Other
96.00	1	Y	Y	greasy polish on both faces	Y-extensive	Y-extensive	Y-extensive	unifacial	extensive edge rounding including scars and projections	Y-dry hide
	2	Y	Y	greasy polish on both faces	Y-extensive	Y-extensive	Y-extensive	unifacial	extensive edge rounding including scars and projections	Y-dry hide
	3	Y	Y	greasy polish on both faces	Y-extensive	Y-extensive	Y-extensive	unifacial	extensive edge rounding including scars and projections	Y-dry hide
97.00	1	Y	N	greasy polish, mostly on broken point, polish relatively dull	Y-moderate	Y-moderate	N	bifacial	plenty of edge rounding, likely repurposed to cut hide or possibly meat	Y-Meat/ Fresh Hide
	2	Y	Y	hafting polish	Y	Y	Y	bifacial	haft wear	Other
	3	N	N	moderately bright polish along both faces of edge	Y-moderate	Y-minimal	N	bifacial		Y-Meat/ Fresh Hide
123.00	1	N	N	moderately bright, patchy	Y-moderate	Y-minimal	N	bifacial	characterized by discontinuous or patchy bright polish and edge rounding	Other
	2	N	N	moderately bright, patchy	Y-moderate	Y-minimal	N	bifacial	characterized by discontinuous or patchy bright polish and edge rounding	Other
	3	N	N	moderately bright polish, with hafting bright spots	Y-moderate	Y-moderate	N	bifacial	haft wear	Haft wear
	4	n/a	n/a	n/a	N	N	N	large snap fracture	projectile wear	Other

125.00	1	N	N	minimal polish development, primarily on distal portion	Y-minimal	Y-minimal	N	bifacial	scarring dominated by step terminations	Other
	2	N	N	minimal polish development, primarily on breaks	Y-minimal	Y-minimal	N	bifacial	scarring dominated by step terminations	Other
	3	N	N	moderately bright polish	N	N	N	absent	one large hinge fracture	Other
	4	Y	Y	consistent with hafting	Y-minimal	N	N	absent	one large hinge fracture	Other
127.00	1	N	N	bright polish, patchy but on both faces and working edge	Y-minimal	N	Y-minimal	bifacial	primarily retouch on dorsal surface, but irregular microchipping on ventral	Other
	2	N	N	bright polish, patchy but on both faces and working edge; more developed than opposing lateral	N	N	N	bifacial	irregular fracture types, sizes, and location	Other
	3	N	N	bright polish well developed on both faces and working edge	N	N	N	bifacial	retouch on ventral surface but extensive irregular scarring on both faces (see left lateral description)	Other
129.00	1	N	N	some bright polish mostly on arrises and within scars	Y-moderate	Y-moderate	N	bifacial	step, feather, and snap terminations, a lot of edge damage	Other
	2	N	N	some bright polish mostly on arrises and within scars	Y-minimal	N	N	bifacial	step, feather, and snap terminations, edge damage; more feather and less other than opposing working edge	Other
	3	N	N	polish absent	Y-minimal	N	N	bifacial	mostly feathered terminations	Other
139.00	1	Y	Y	dull greasy polish observed on edge and ventral surface; potentially overlapping brighter polish	Y-extensive	Y-extensive	Y-extensive	unifacial	unifacial scarring is stepped and steep on dorsal surface, some rounding of steps and polish on them	Y-dry hide
	2	Y	Y	dull greasy polish on edge, projections, and face; potentially other polishes	Y-extensive	Y-extensive	Y-moderate	unifacial/bifacial	bifacially worked toward point end, unifacial toward rounded edge; use wear appear unifacial along majority of tool	Y-dry hide
146.00	1	Y	Y	looks like dull greasy polish but might be material	Y-extensive	Y-extensive	n/a	unifacial	unifacial scarring on ventral surface; extensive edge rounding	Y-dry hide
	2	Y	Y	looks like dull greasy polish but might be material	Y-extensive	Y-extensive	n/a	unifacial	unifacial scarring on ventral surface; extensive edge rounding	Y-dry hide
	3	Y	Y	looks like dull greasy polish but might be material	Y-extensive	Y-extensive	n/a	unifacial	unifacial scarring on ventral surface; extensive edge rounding	Y-dry hide

147.00	1	N	N	bright polish concentrated on working edge, but present on ventral surface also	N	N	N	bifacial	bifacial scarring but, more prominent on ventral surface, termination dominated by feather	Other
	2	N	N	bright polish on all or most angles on point	Y-moderate	Y-minimal	Y-minimal	multidirectional	multidirectional scarring and edge rounding and polish development	Other
149.00	1	N	N	both bright and relatively dull polish	N	N	Y-minimal	bifacial	irregular bifacial scarring	Other
	2	N	N	bright polish	N	N	N	unifacial	unifacial scarring, some crushing present	Other
300.00	1	N	N	bright-very bright, primarily on ventral surface	N	N	N	bifacial	irregular size and termination	Other
	2	N	N	bright-very bright, primarily along edge	N	N	N	bifacial	irregular size and termination but, notable snap fractures	Other
	3	N	N	poor-no polish development	N	N	N	bifacial	few	Other
348.00	1	N	N	poor-no polish development	Y-moderate	N	N	unifacial	retouch and use, edge rounding also present-moderate	Other
	2	N	N	poor-no polish development	N	N	N	unifacial	retouch and use; scarring is bifacial but, retouch alternates faces and remains unifacial	Other
	3	N	N	poor-to no polish	N	N	N	unifacial	retouch and use; scarring is bifacial but, retouch alternates faces and remains unifacial	Other
388.00	1	Y	Y	dull greasy polish present	Y-moderate	Y-moderate	Y-moderate	unifacial	minimal edge damage/rounding-probably reflecting minimal use	Y-dry hide
542.00	1	N	N	polish not observed	Y-moderate	Y-moderate	N	bifacial	edge damage looks like hide wear but there is no observable polish	Other
	2	N	N	bright polish on face 1 and face 2, concentrated on working edge	Y-moderate	Y-extensive	Y-moderate	bifacial	one face heavily step fractured, other face feather-scars dominate	Other
	3	N	N	this edge appears greasier than lateral edges	Y-moderate	Y-extensive	Y-moderate	bifacial	bifacial edge damage is visible, few step fractures	Other
653.00	1	N	N	patchy discontinuous bright polish--more bright polish than right lateral	Y-moderate	Y-moderate	Y-moderate	bifacial		Other
	2	N	N	patchy discontinuous bright polish	Y-moderate	Y-moderate	Y-moderate	bifacial		Other
	3	N	N	bright polish	Y-minimal	Y-minimal	Y-minimal	unifacial	some bifacial scarring but minimal	Other

716.00	1	Y	N	some areas look like greasy dull polish which is likely the raw material; wet greasy polish on parts of edge	Y-minimal	N	N	bifacial	bifacially worked, step fractures on one face, small microfractures on both faces on working edge	Other
	2	N	N	some areas look like greasy dull polish which is likely the raw material; wet greasy polish on parts of edge possibly	Y-minimal	N	N	bifacial	bifacially worked, step fractures on one face, small microfractures on both faces on working edge	Other
	3	N	N		N	N	N	n/a	one large hinge fracture	Other
746.00	1	N	N	minimal polish development, moderately dull and pitted/rough	Y-moderate	Y-moderate	Y-minimal	unifacial	some bifacial scarring but minimal	Yes-fresh hide
	2	N	N	minimal polish development, moderately dull and pitted/rough	Y-moderate	Y-moderate	Y-minimal	bifacial	bifacial scarring appears ground for backing	?
	3	N	N	relatively dull pitted polish, on ventral surface	Y-extensive	Y-extensive	Y-moderate	unifacial	some bifacial scarring but minimal	Yes-fresh hide
750.00	1	Y	Y	pitted dull polish	Y-extensive	Y-extensive	y-moderate	unifacial	unifacially worked on ventral, bifacial fractures on dorsal consistent w/experimental obsidian scraper	Y-fresh hide
	2	N	Y	pitted dull polish	Y-moderate	Y-moderate	Y-minimal	bifacial	not invasive chipping; bifacial fractures on from w/experimental obsidian scraper	Y-fresh hide
751.00	1	N	N		N	N	N	bifacial	very minimal	Other
	2	N	N		N	N	N	bifacial	very minimal	Other
1124.00	1	N	N	poorly developed polish restricted to spots of working edge, bright	Y-minimal	Y-minimal	N	bifacial	dorsal and ventral: snap fractures and feather-terminations	Other
	2	N	N	poorly developed polish restricted to spots of working edge, bright	Y-minimal	Y-minimal	N	unifacial	dorsal: snap factures, feather-terminated scars with polish developed within	Other
	3	N	N	poorly developed polish restricted to spots of working edge, bright	Y-moderate	Y-minimal	N	unifacial	dorsal: snap factures, feather-terminated scars with polish developed within; some scarring on ventral surface	Other
1125.00	1	N	N	poorly developed polish restricted to spots of working edge, bright	Y-minimal	N	N	bifacial	feather terminated scars dominate both faces	Other
	2	N	N	no polish observed	Y-minimal	N	N	bifacial	feather terminated scars dominate both faces	Other
	3	N	N	no polish observed	Y-minimal	N	N	bifacial	feather terminated scars dominate both faces	Other

1357.00	1	N	N	poorly developed bright polish on parts of working edge	Y-minimal	N	N	unifacial	feather-terminated scars, primarily on dorsal surface	Other
	2	N	N	poorly developed bright polish on parts of working edge	Y-minimal	N	N	bifacial	feather-terminated scars	Other
1483.00	1	N	N	discontinuous bright polish along working edge	N	N	N	bifacial	bifacial scarring, appears heavier on dorsal but, likely retouch, and scarring is equally distributed	Other
	2	N	N	bright very smooth polish on dorsal surface; bright smooth polish on some parts of edge on ventral surface	N	N	N	bifacial	bifacial scarring, but more frequent on dorsal surface	Other
1486.00	1	Y	Y	dull greasy polish including surface and edge	Y-extensive	Y-extensive	Y-minimal	unifacial	step and feather terminated macrofractures, largely unifacial	Yes-dry hide
	2	Y	Y	dull greasy polish including surface and edge	Y-extensive	Y-extensive	Y-minimal	unifacial	step and feather terminated macrofractures, largely unifacial	Yes-dry hide
	3	Y	Y	dull greasy polish including surface and edge	Y-extensive	Y-extensive	Y-minimal	unifacial	step and feather terminated macrofractures, largely unifacial	Yes-dry hide
	4	Y	Y	dull greasy polish including surface and edge	Y-extensive	N	N	absent	n/a	Yes-dry hide
1979.00	1	N	N	polish not observed	n/a	n/a	n/a	unifacial	rounding is not observable: all edges appear rounded and material is very dense	Other
1983.00	1	N	N	moderately bright, on edge and surface	Y-moderate	Y-moderate	N	bifacial	bifacial retouch; mostly feathered terminations	Other
	2	N	N	moderately bright, on edge and surface	Y-moderate	Y-moderate	N	bifacial	bifacial retouch; feathered and step terminations	Other
2063.00	1	Y	Y	dull greasy polish on face and edge but not on opposing face	Y-extensive	Y-extensive	n/a	absent		Yes-dry hide
2156.00	1	N	N	no polish observed	Y-minimal	N	N	bifacial	bifacial retouch w/feathered terminations	Other
	2	N	N	no polish observed	Y-minimal	N	N	bifacial	bifacial retouch w/feathered terminations	Other
	3	N	N	moderately bright, shiny polish	Y-moderate	Y-moderate	N	bifacial	bifacial retouch w/feathered terminations	Other
2159.00	1	N	N	discontinuous bright polish	Y-moderate	Y-moderate	Y-moderate	bifacial	bifacial scarring, mostly feather and step terminated scars	Other
	2	N	N	spots of bright wet looking polish	Y-moderate	Y-moderate	Y-moderate	bifacial	bifacial scarring, mostly feather and step terminated scars	Other
	3	N	N	also some spots of bright wet looking polish-may be raw material	Y-minimal	Y-minimal	N	absent	absent (some feather and step fractures but appear to originate from lateral margins or else	Other

									transportation wear--probably NOT use-wear)	
2192.00	*Unobservable*									
2241.00	1	N	N	moderately bright, poorly developed polish	Y-minimal	N	N	unifacial	feathered terminations on ventral surface	Other
2297.00	1	N	N	poorly developed bright polish confined to working edge	Y-moderate	Y-moderate	N	unifacial	few feather terminations on dorsal surface	Other
2703.00	1	N	N	bright polish along edge and projections	Y-minimal	Y-minimal	N	unifacial		Other
	2	N	N	bright polish along edge and projections; less developed than right lateral	Y-minimal	Y-minimal	N	unifacial		Other
2704.00	1	N	N	poorly developed polish	Y-moderate	Y-moderate	N	unifacial	dorsal surface	Other
	2	N	N	poorly developed polish	Y-moderate	Y-moderate	N	unifacial	dorsal surface	Other
2710.00	1	N	N	discontinuous bright developed polish on working edge	Y-moderate	Y-moderate	N	unifacial	dorsal surface, very small,	Other
2714.00	1	N	N	bright, smooth but pitted polish	N	N	N	bifacial	scarring on ventral surface from use, but unifacially retouched	Other
	2	N	N	bright, smooth polish	N	N	N	bifacial	scarring on ventral surface from use, but unifacially retouched	Other
2784.00	1	N	N	polish not observed	Y-extensive	Y-moderate	N	bifacial		Other
	2	N	N	polish not observed	Y-extensive	Y-moderate	N	bifacial		Other
2789.00	1	Y	Y	poorly developed dull greasy polish, mostly on ventral surface and in flake scars	Y-moderate	Y-moderate	Y-moderate	unifacial	largely unifacial but some bifacial flakes removed	Yes-dry hide
	2	Y	Y	poorly developed dull greasy polish, mostly on small portions of ventral	Y-extensive	Y-extensive	Y-moderate	unifacial	largely unifacial but some bifacial flakes removed	Yes-dry hide
	3	Y	Y	poorly developed polish	Y-extensive	Y-extensive	Y-minimal	bifacial/multidirectional	bifacial/multidirectional, but mainly on dorsal surface	Yes-dry hide
2791.00	1	N	N	moderately bright or bright polish; discontinuous, most prevalent in larger flake scars	Y-moderate	Y-moderate	N	unifacial	dorsal surface scarring	Other
2841.00	1	N	N	moderately bright or bright polish; discontinuous, most prevalent in larger flake scars	Y-moderate	Y-moderate	N	unifacial	dorsal surface scarring	Other
2920.00	1	N	N	possible discontinuous bright polish on small parts of working edge, no other edges show same potential polish	Y-moderate	Y-minimal	n/a	bifacial	few bifacial scars immediately on working edge	Other

2921.00	1	N	N	polish not observed	Y-moderate	Y-minimal	N	bifacial		Other
	2	N	N	polish not observed	Y-moderate	Y-minimal	N	bifacial		Other
	3	N	N	polish not observed	N	N	N	one flake scar		Other
	4	N	N	some shiny polish likely haft wear	Y-minimal	Y-minimal	N	bifacial		Other
2978.00	1	N	N	moderately bright present on ventral surface	N	N	Y-minimal	unifacial	scarring present on ventral surface	Other
	2	N	N	moderately bright present on ventral surface	Y-minimal	N	N	unifacial	scarring present on ventral surface	Other
	3	N	N	moderately to very bright polish present on ventral surface	N	N	Y-minimal	bifacial		Other
3074.00	1	N	N	polish not observed	Y-minimal	Y-minimal	N	unifacial		Other
	2	N	N	polish not observed	Y-minimal	Y-minimal	N	bifacial	scarring is bifacial but heavier on dorsal surface	Other
3474.00	1	N	N	moderately bright-bright; more extensive on ventral	Y-minimal	N	Y-minimal	bifacial	extensive edge damage; scarring is heavier on dorsal	Other
	2	N	N	moderately bright-bright; more extensive on ventral	Y-minimal	N	N	bifacial	extensive edge damage; scarring is heavier on dorsal	Other
3618.00	1	N	N	polish not observed	Y-minimal	Y-minimal	N	bifacial	bifacial scarring, feather terminated, more extensive on ventral surface	Other
3722.00	1	N	N	bright patchy shiny polish on both faces	Y-minimal	N	N	bifacial	bifacial but more on dorsal surface, microflaking is minimal, suggesting soft material	Other
3832.00	1	N	N	polish not observed; some possible greasy projections	Y-moderate	Y-moderate	Y-minimal	bifacial	bifacial; inconsistent breakage--few micro feather chips, few snaps, edge rounding mixed with sharp edge	Other
	2	N	N	polish not observed; some possible greasy projections	Y-moderate	Y-moderate	Y-minimal	bifacial	bifacial; like AP 1 few and variable microscars, feather and snap, sharp and rounded portions of edge	Other
3862.01	1	N	N	bright to moderately bright	Y-minimal	N	N	bifacial	edge damage is characterized by scarring and crushing	Other
	2	N	N	bright to moderately bright	N	N	N	bifacial	edge damage is characterized by scarring and crushing	Other
	3	N	N	bright to moderately bright (wet appearance)	Y-minimal	N	N	bifacial	more rounding on this margin then laterals	Other
4080.00	1	N	N	moderately bright (almost dull)	Y-moderate	Y-moderate	Y-moderate	bifacial	edge damage is most noted by rounding	Other
	2	N	N	bright polish, appears better developed on this margin	Y-moderate	Y-moderate	Y-moderate	unifacial	scarring is bifacial but, more frequent on the ventral	Other

									surface	
4100.00	1	N	N	less developed on left margin but same otherwise	Y-minimal	Y-minimal	N	bifacial	edge damage is minimal and scarring is bifacial	Other
	2	N	N	bright polish on both surfaces and edge	N	Y-minimal	N	bifacial	edge damage is minimal and scarring is bifacial	Other
4110.01	1	N	N	bright to moderately bright polish, well-developed and extensive on both surfaces but, more on ventral	Y-minimal	N	Y-minimal	bifacial	edge damage is less than other margin, scarring is inconsistent bifacial	Other
	2	N	N	moderately bright and poorly developed on both surfaces, discontinuous	Y-moderate	Y-minimal	Y-minimal	bifacial	edge damage on both faces, crushing more prevalent than rounding characteristics	Other
4110.02	1	N	N	moderately developed, very patchy	Y-minimal	N	N	bifacial	edge damage is minimal, scarring is bifacial but, more frequent on dorsal surface	Other
	2	N	N	moderately developed, very patchy	Y-minimal	N	N	bifacial	edge damage is minimal, scarring is bifacial but, more frequent on dorsal surface	Other
	3	N	N	bright to moderately bright	Y-minimal	N	Y-minimal	multidirectional	edge damage present on every angle/edge of point	Other
4128.00	1	N	N	moderately bright polish on both surfaces, heavier on dorsal surface	Y-minimal	N	N	unifacial	edge damage much more frequent on dorsal surface	Other
	2	N	N	moderately bright polish on both surfaces, heavier on ventral surface	Y-minimal	N	N	bifacial	edge damage on both surfaces, however, scarring and rounding are minimal	Other
4148.00	1	N	N	Bright polish on both surface	Y-minimal	Y-minimal	Y-minimal	unifacial	edge damage heavier on ventral;	Other
4379.00	1	N	N	polished all over artifact	Y	Y	Y	unifacial		Other
4470.00	1	N	N	no polish observed	Y-minimal	N	N	unifacial		Other

Appendix 10: Data—Artifact and Use-Wear Images

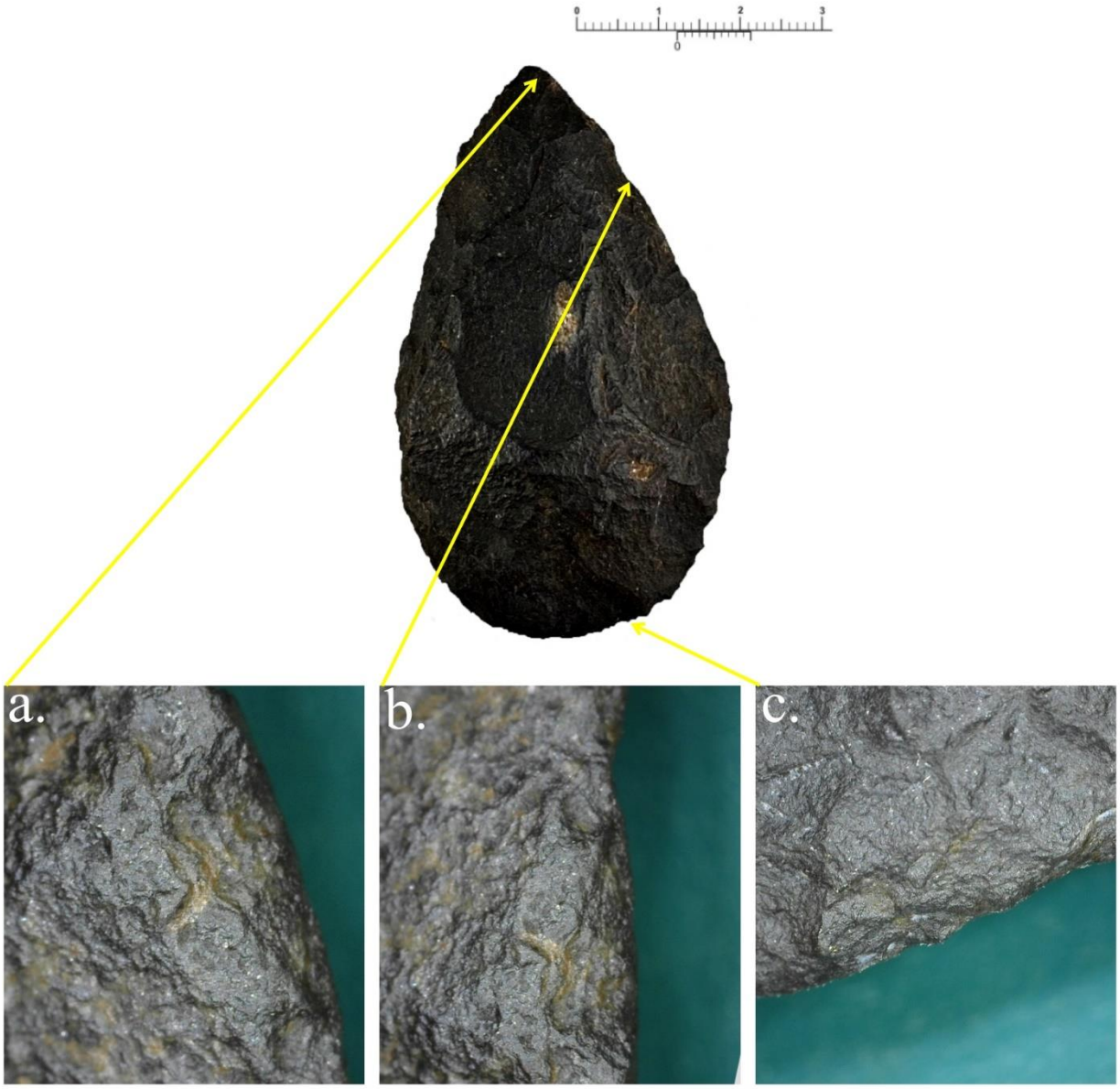

Figure 10.1. KdVo6-96: a. AP3-extensive edge rounding and rounding of projections, dull greasy polish (220x); b. AP3-extensive edge rounding, dull greasy polish (50x); c. AP1-extensive edge rounding, rounding of projections and rounding/removal of flake scars (50x)

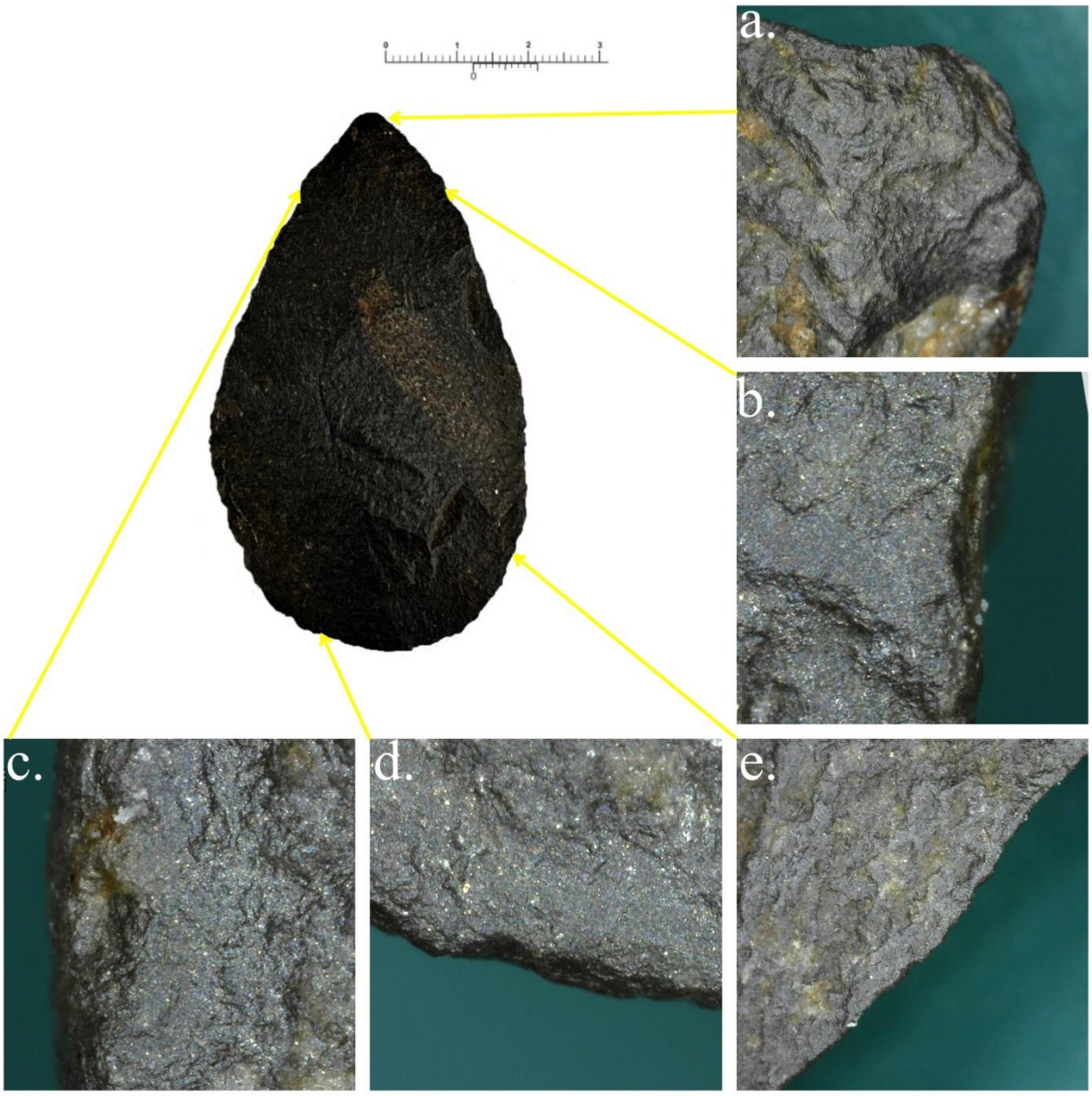

Figure 10.2. KdVo6-96: a. AP2-extensive edge rounding and rounding of projections, dull greasy polish (55x); b. AP2-extensive edge rounding and rounding of projections, perpendicular/diagonal striations (220x); c. AP3-extensive edge rounding, dull greasy polish (225x); d. AP1-extensive edge rounding, removal of flake scars, and rounding of projections, dull greasy polish (220x); e. AP1-extensive edge rounding and rounding of projections (50x)

Figure 10.3. KdVo6-139: a. AP2-extensive edge rounding, rounding of projection; striations perpendicular the working edge (225x); b. AP1-extensive edge rounding, rounding of projections, and removal of flake scars, dull greasy polish on edges and projections/ridges (50x)

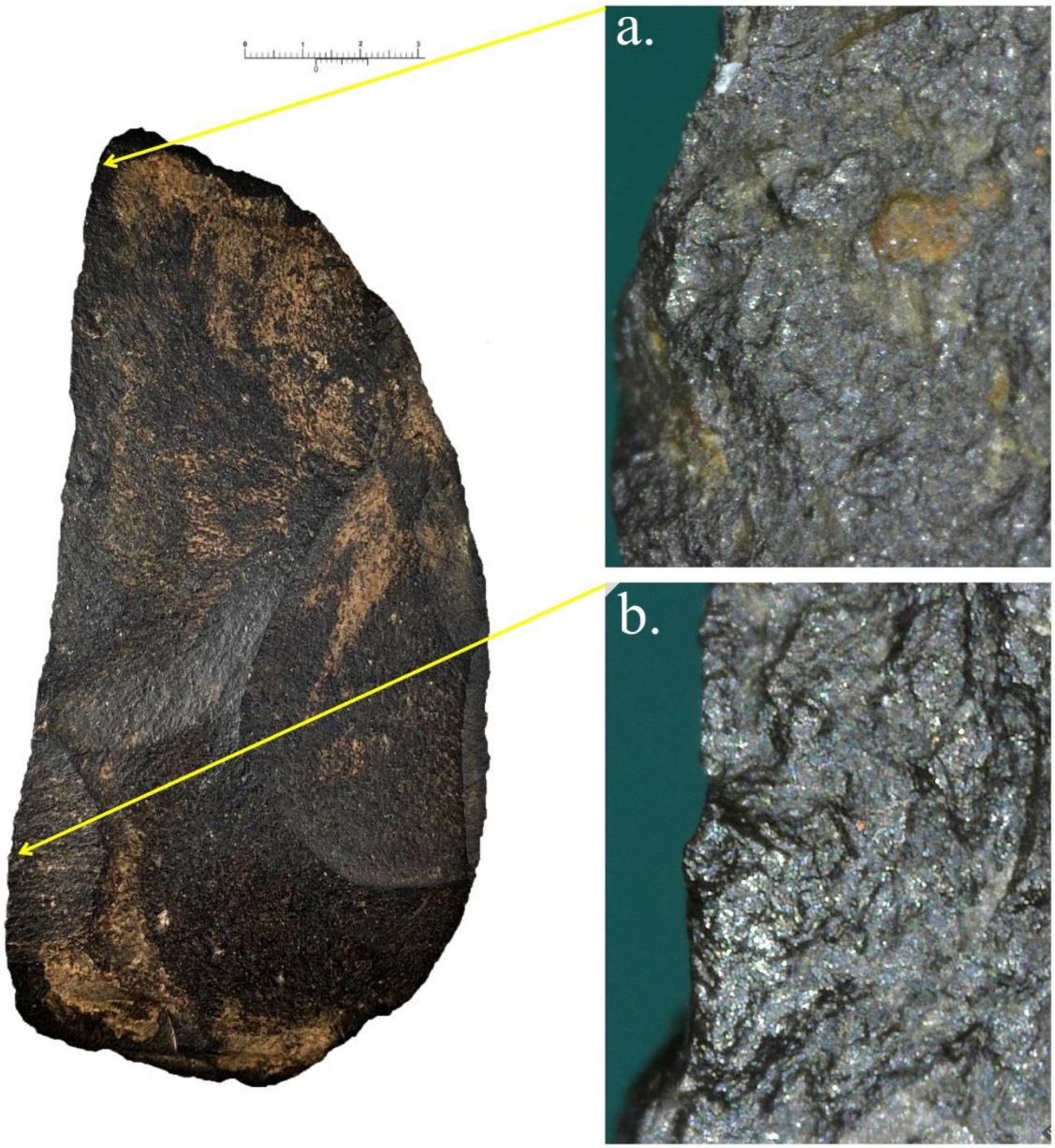

Figure 10.4. KdVo6-139: a. AP1-extensive edge rounding, striations perpendicular the working (225x); b. AP1-extensive edge rounding, rounding of projections, overlapping bright polish (225x)

Figure 10.5. KdVo6-146: dorsal surface

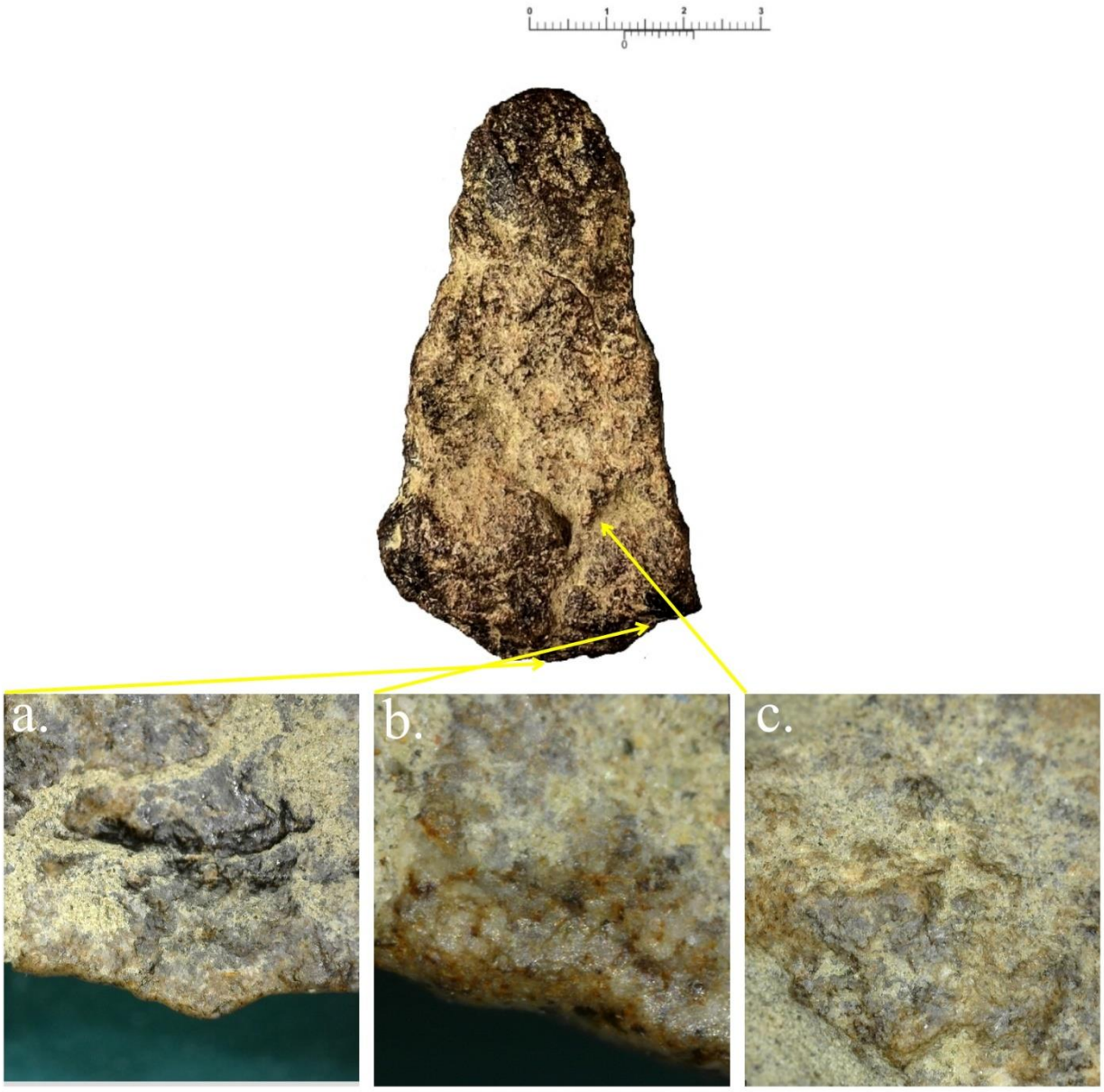

Figure 10.6. KdVo6-146: a. AP3-extensive edge rounding, rounding of projection; dull greasy polish (50x); b. AP3-extensive edge rounding, striations perpendicular the working edge (215x); c. facial striations perpendicular the working edge, dull greasy polish (50x)

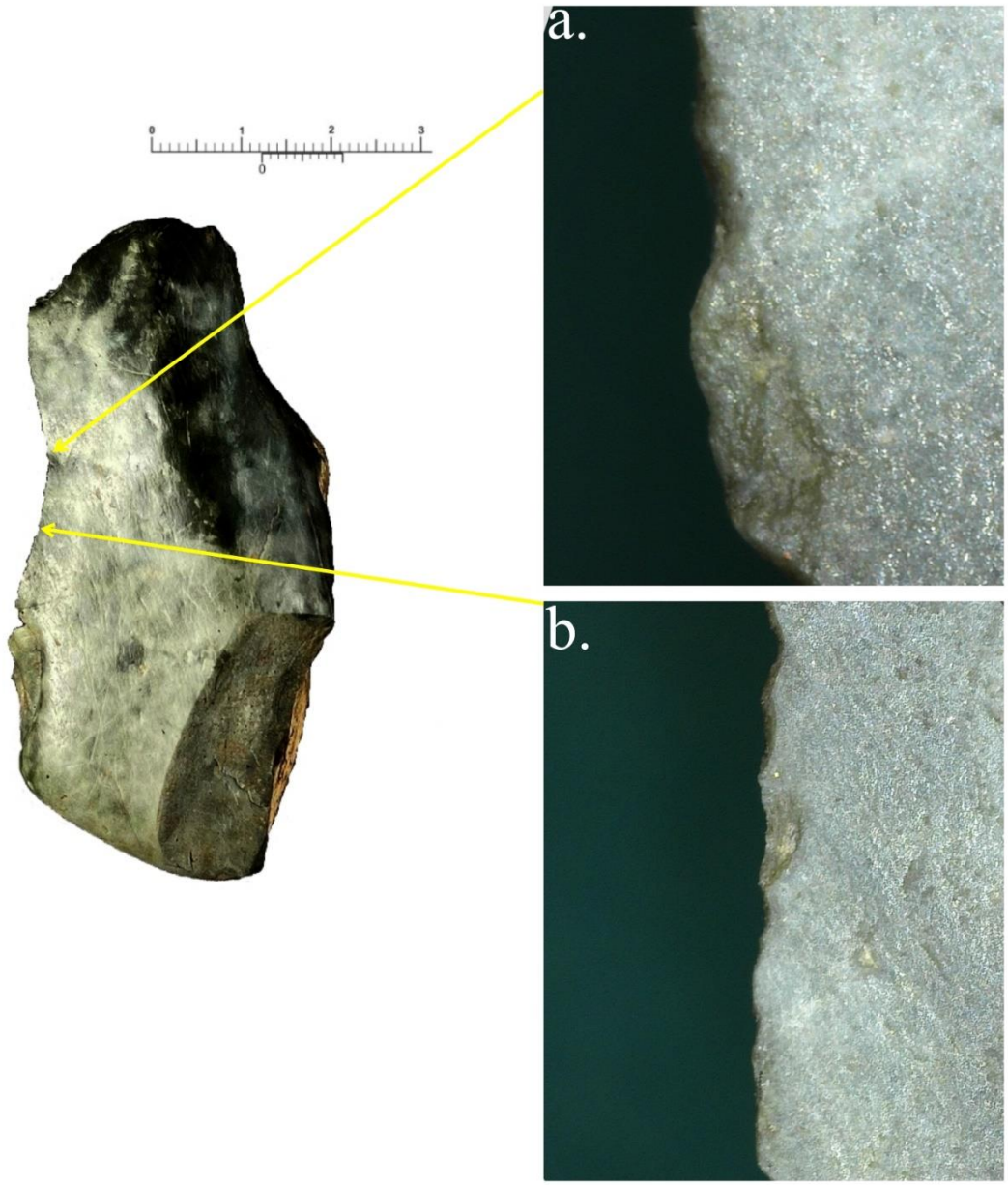

Figure 10.7. KdVo6-388: a. AP1-extensive edge rounding and rounding of projections, dull greasy polish on working edge (225x); b. AP1-extensive edge rounding and rounding of projections, striations perpendicular and diagonal the working edge (50x)

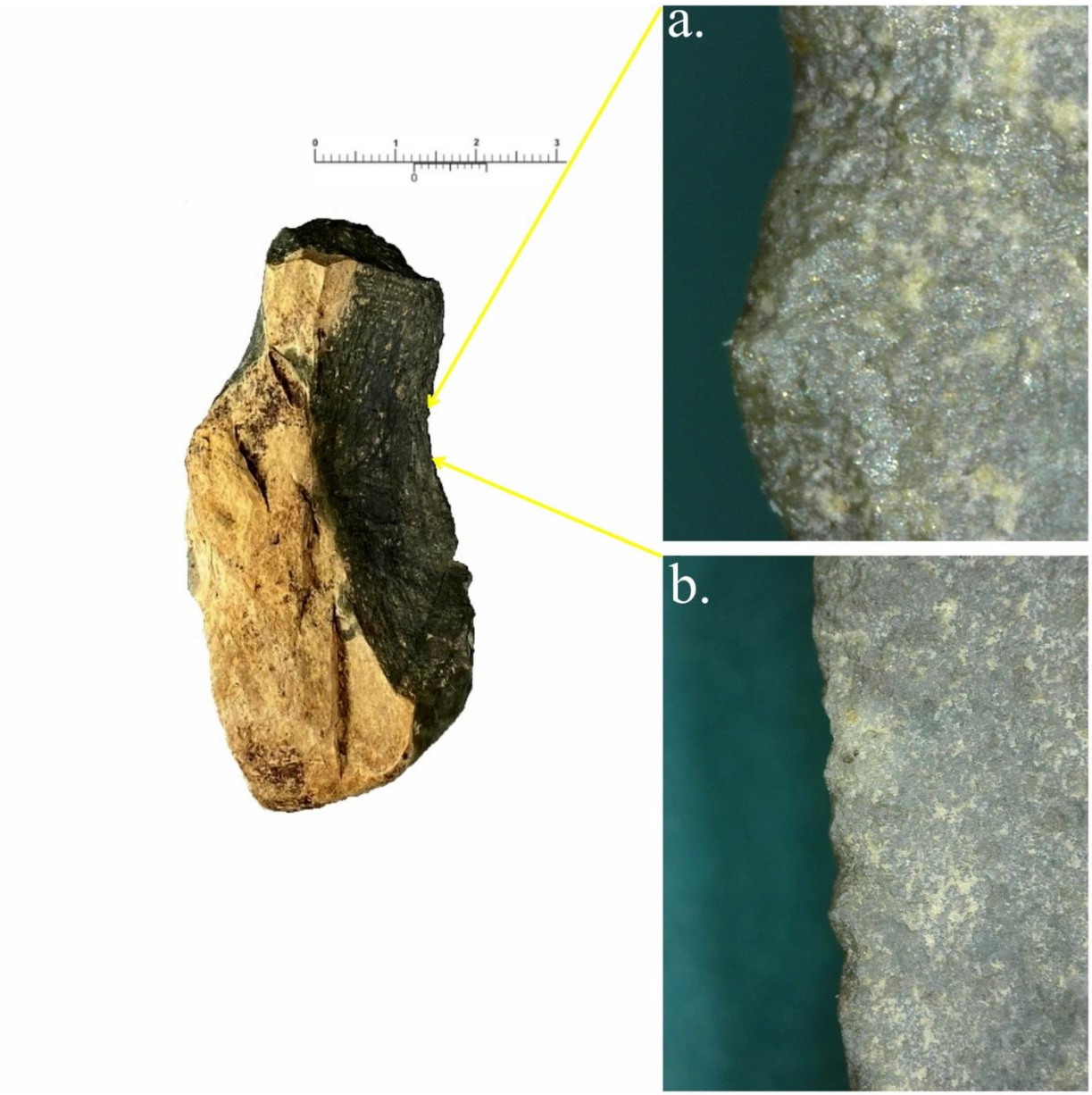

Figure 10.8. KdVo6-388: a. AP1-extensive edge rounding and rounding of projections, dull greasy polish in flake scars (225x); b. AP1- extensive edge rounding and rounding of projections, dull greasy polish in flake scars (50x)

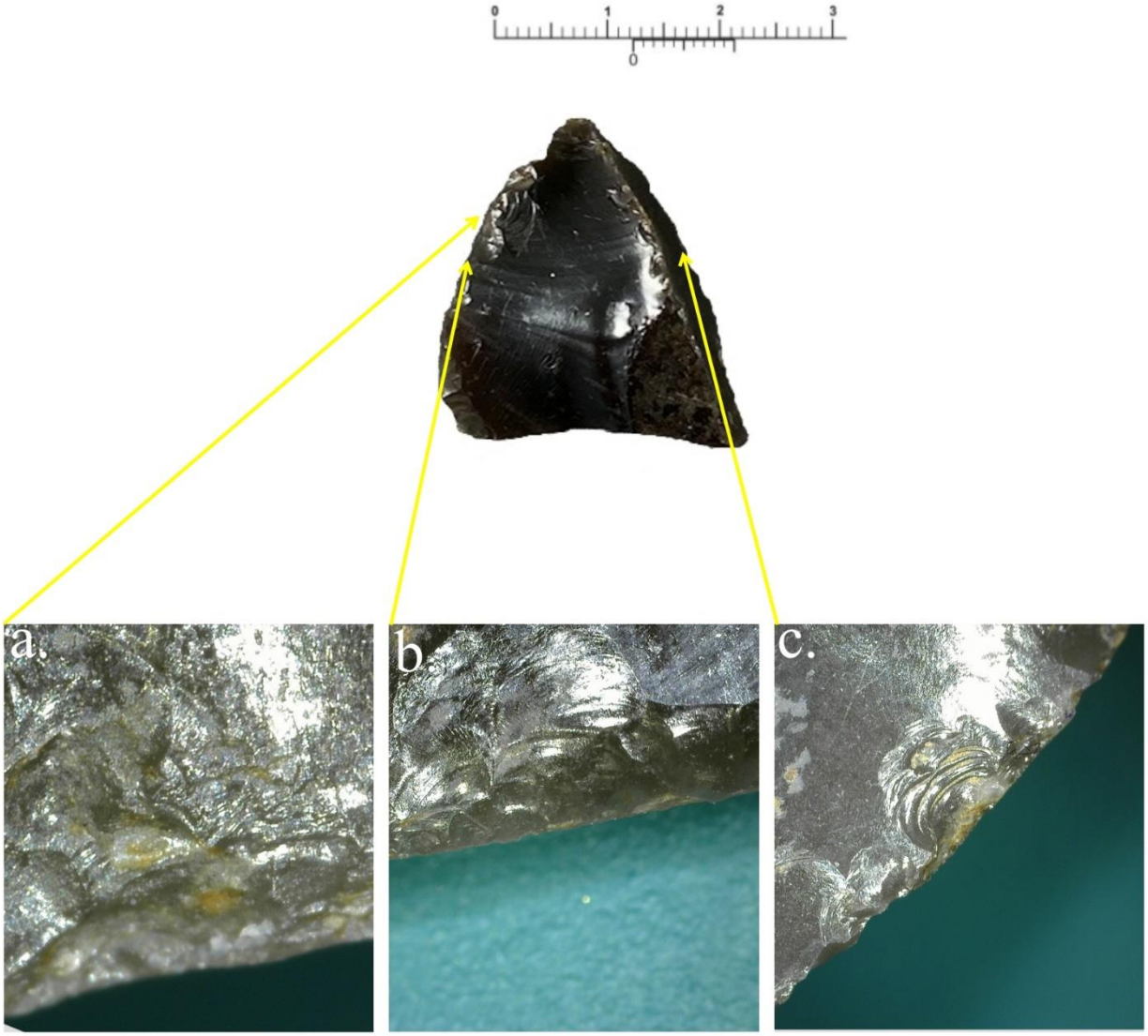

Figure 10.9. KdVo6-746: a. AP3-moderate edge rounding, rounding of projections and removal of flake scars (205x); b. AP3- moderate edge rounding, rounding of projections and removal of flake scars (50x); c. AP1-moderate edge rounding, rounding of projections, and removal of flake scars (50x)

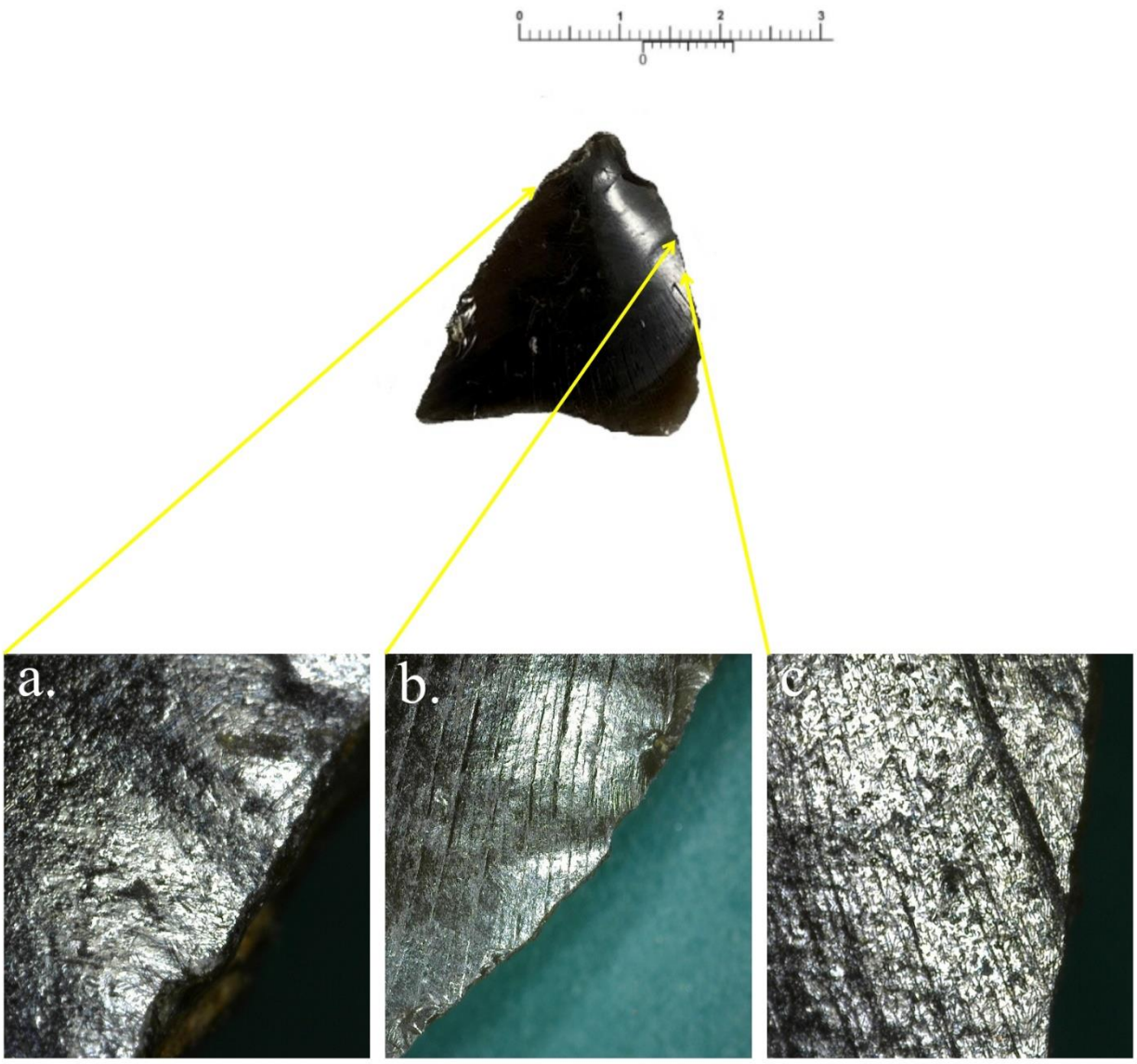

Figure 10.12. KdVo6-746: a. AP1-moderate edge rounding, dull polish with pitted/rough appearance, striations perpendicular the working edge (205x); b. AP3- moderate edge rounding and rounding of projections, discontinuous scarring on contact surface (50x); c. AP3- moderate edge rounding, dull polish with pitted/rough appearance, striations perpendicular and diagonal the working edge

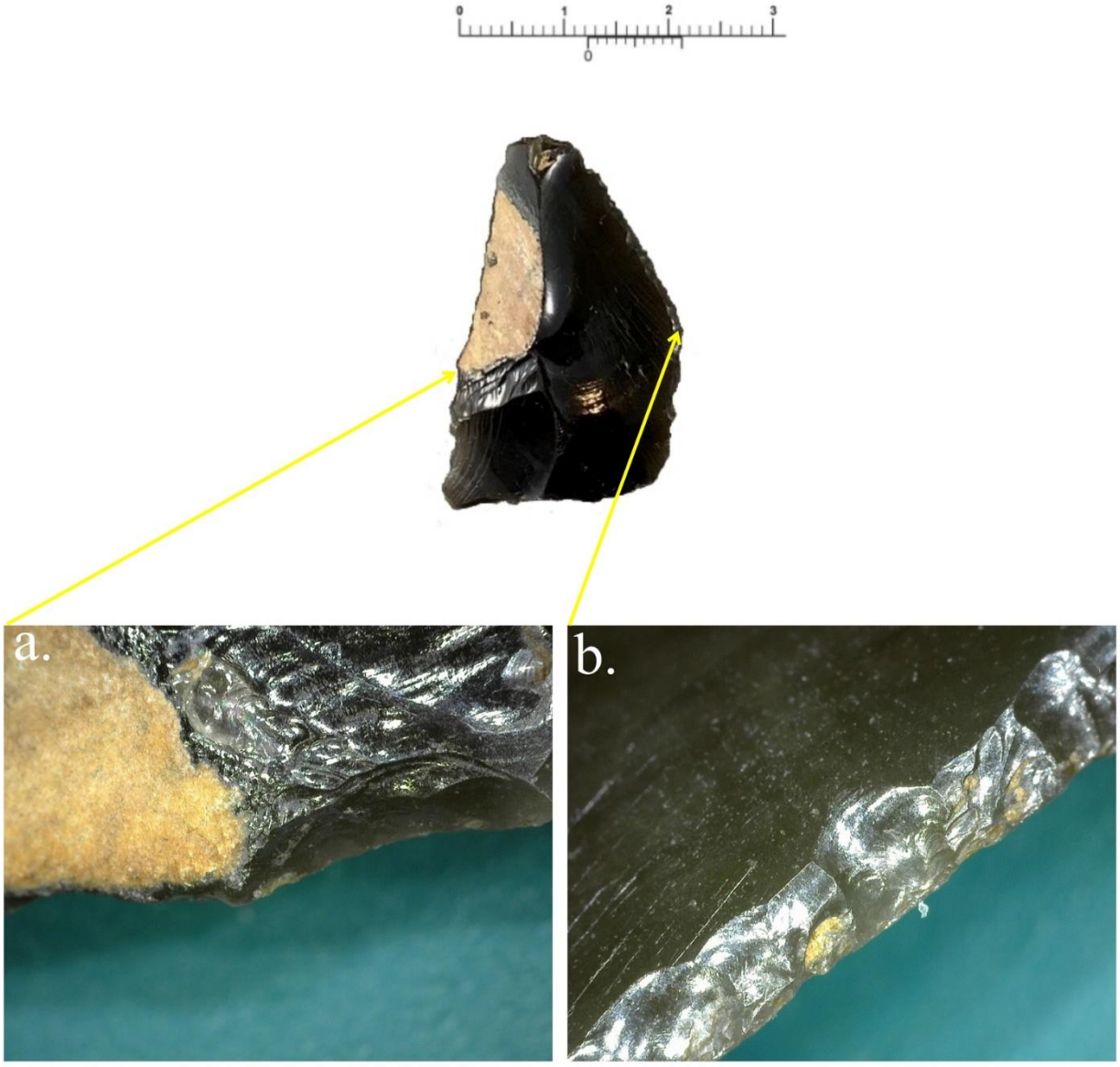

Figure 10.13. KdVo6-750: a. AP1-extensive edge rounding and rounding of projections, moderate removal of flake scars (50x); b. AP2- moderate edge rounding and rounding of projections, minimal removal of flake scars (50x)

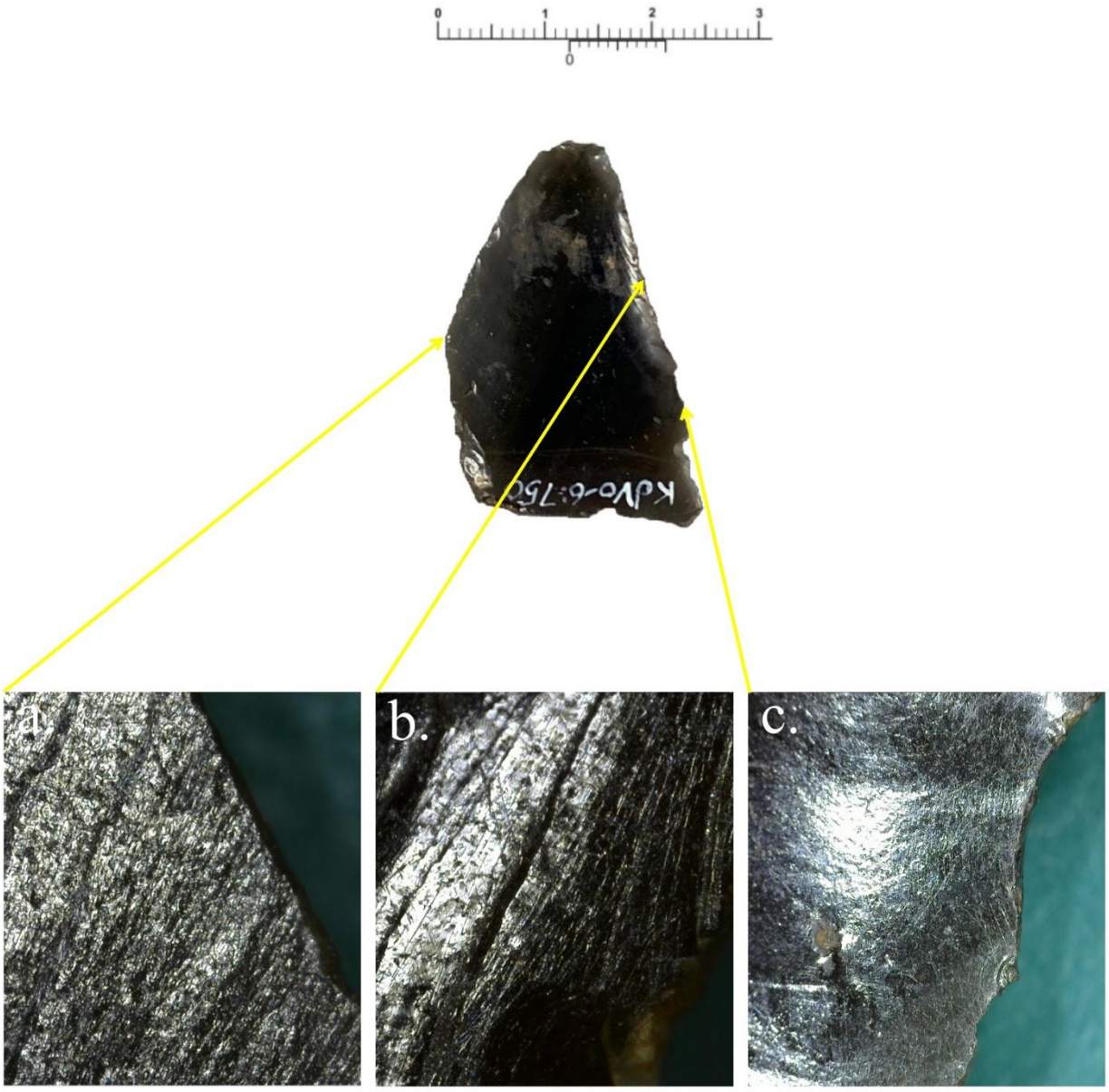

Figure 10.14. KdVo6-750: a. AP2-moderate edge rounding, moderately dull polish with pitted appearance (240x); b. AP1-moderately dull polish with pitted appearance (225x); c. AP1- extensive edge rounding and rounding of projections, discontinuous scarring on contact surface (50x)

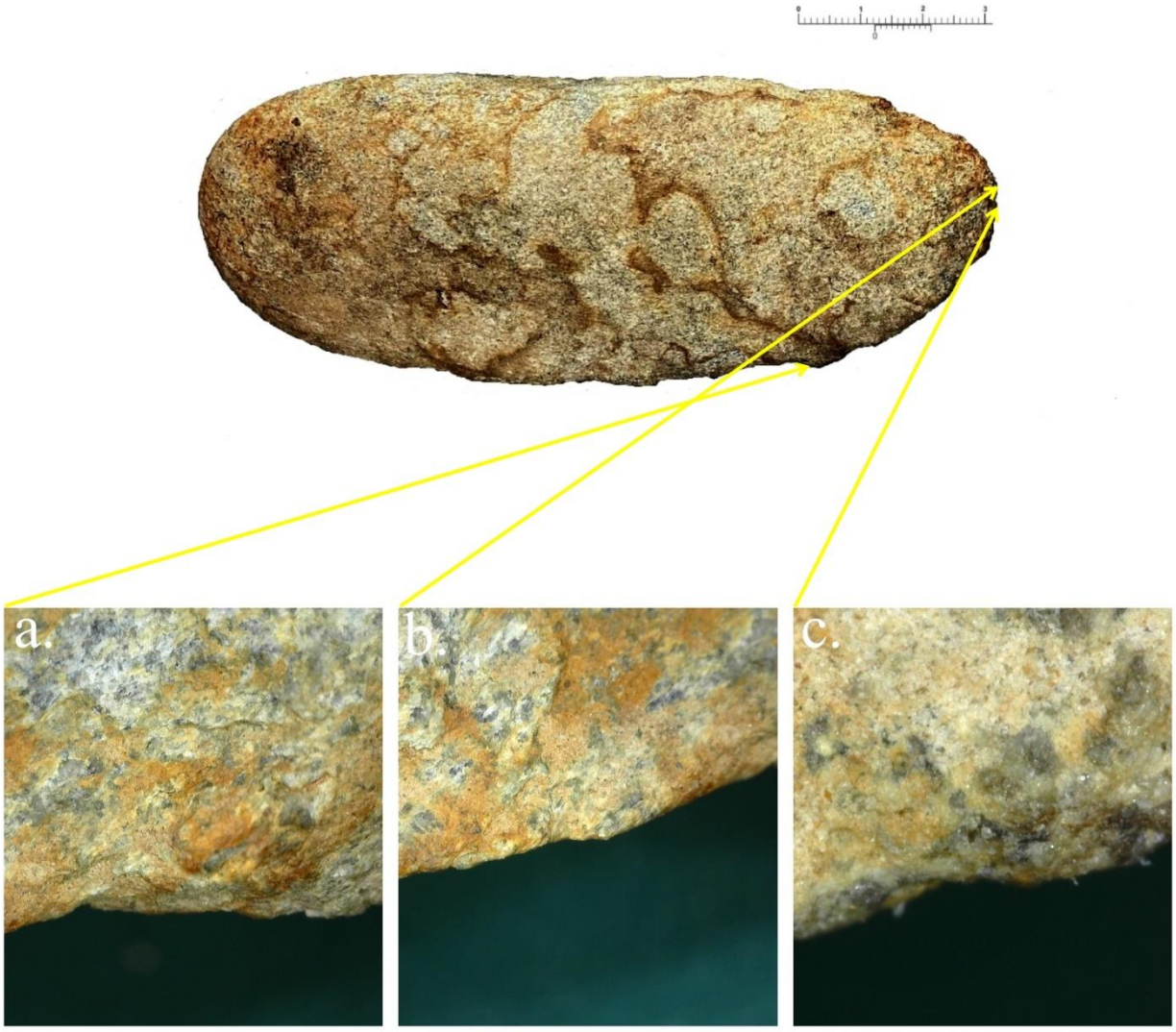

Figure 10.14. KdVo6-1486: a. AP1-extensive edge rounding and rounding of projections (50x); b. AP3-extensive edge rounding and rounding of projections, striations parallel the working edge (50x); c. AP3-extensive edge rounding and rounding of projections (215x)

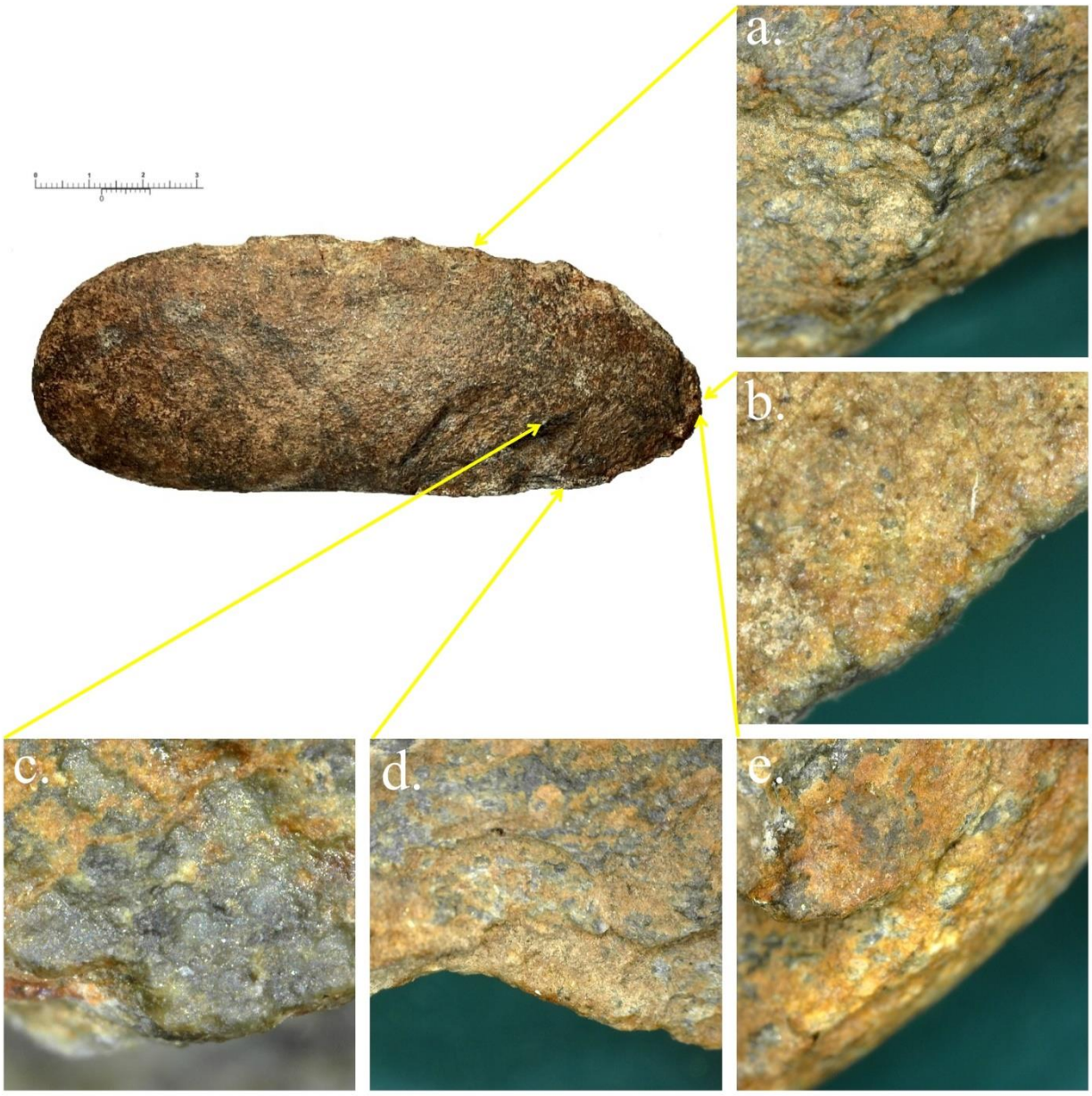

Figure 10.15. KdVo6-1486: a. AP1-extensive edge rounding and rounding of projections, dull greasy polish (50x); b. AP3-extensive edge rounding and rounding of projections (230x); c. surface-extensive edge rounding and rounding of projections, dull greasy polish (215x); d. AP2-extensive edge rounding and rounding of projections (50x); e. AP3-extensive edge rounding, dull greasy polish (50x)

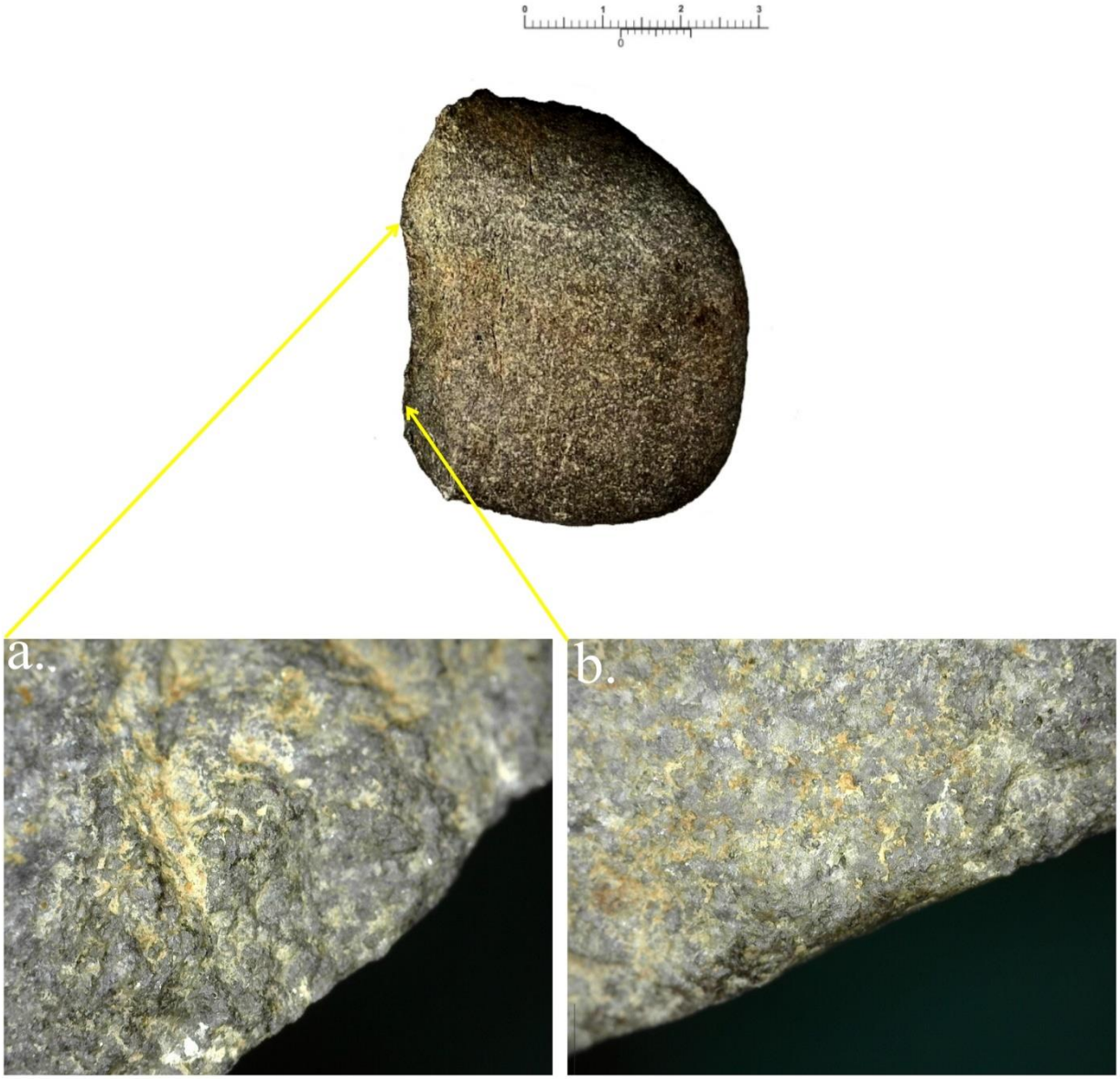

Figure 10.16. KdVo6-2063: a. AP1-extensive edge rounding, dull greasy polish (50x); b. AP1-extensive edge rounding, dull greasy polish (50x)

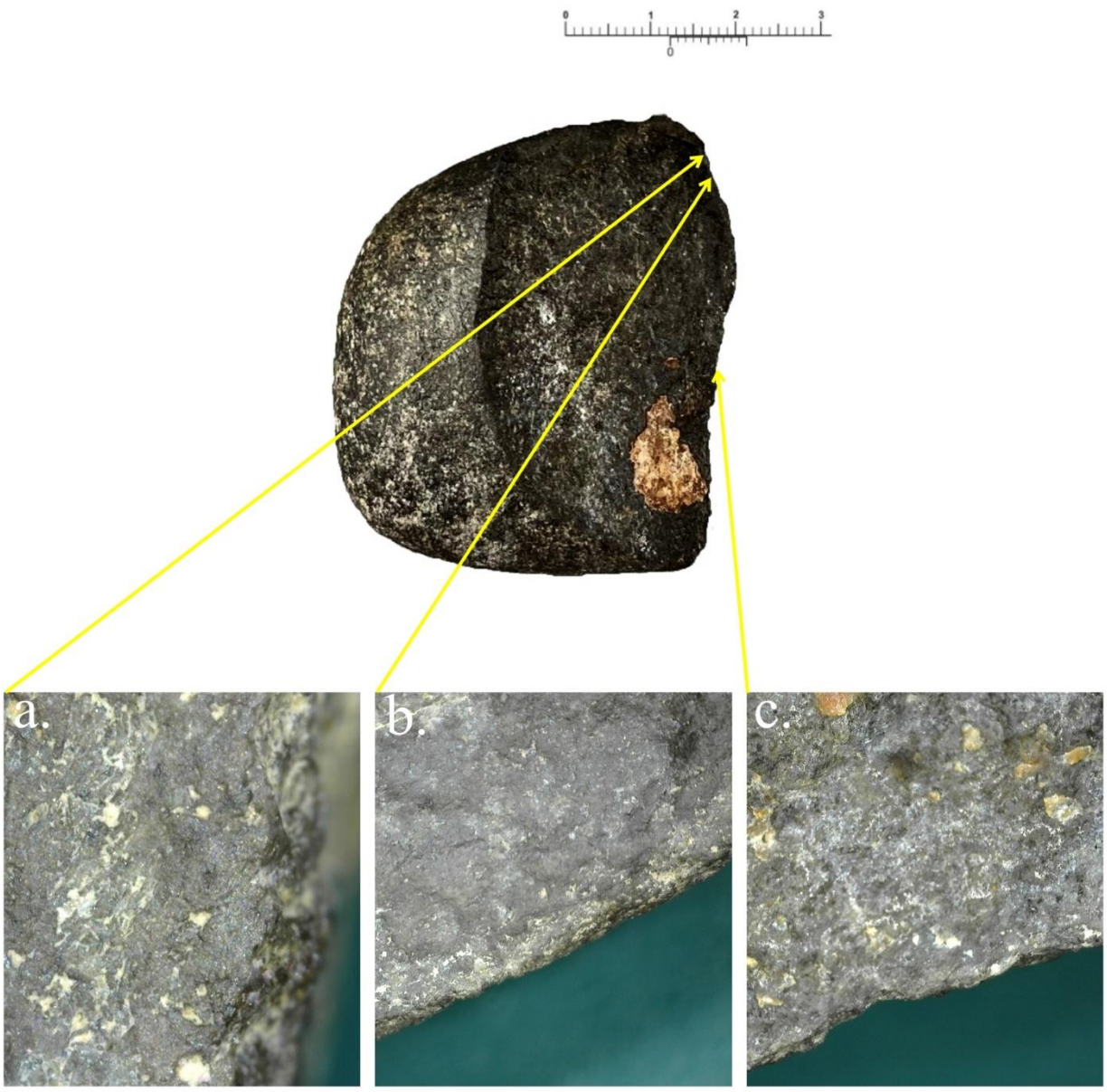

Figure 10.17. KdVo6-2063: a. AP1-extensive edge rounding, dull greasy polish, multidirectional striations (225x); b. AP1-extensive edge rounding, dull greasy polish (50x); c. AP1-extensive edge rounding, rounding of projections, dull greasy polish

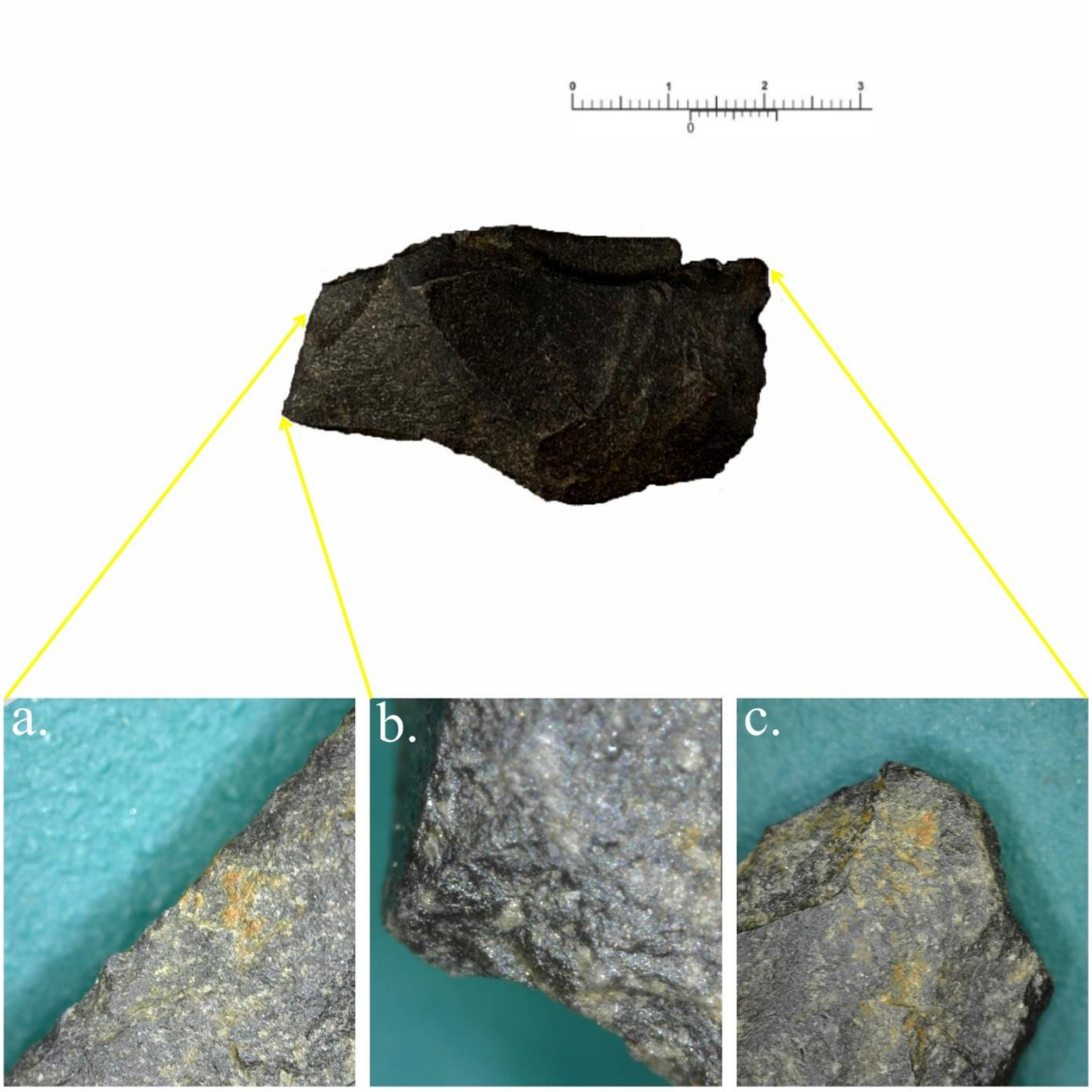

Figure 10.18. KdVo6-2789: a. AP2-extensive edge rounding and rounding of projections (50x); b. AP2- extensive edge rounding, dull greasy polish (240x) c. AP3- extensive edge rounding and rounding of projections, moderate removal of flake scars, dull greasy polish (50x)

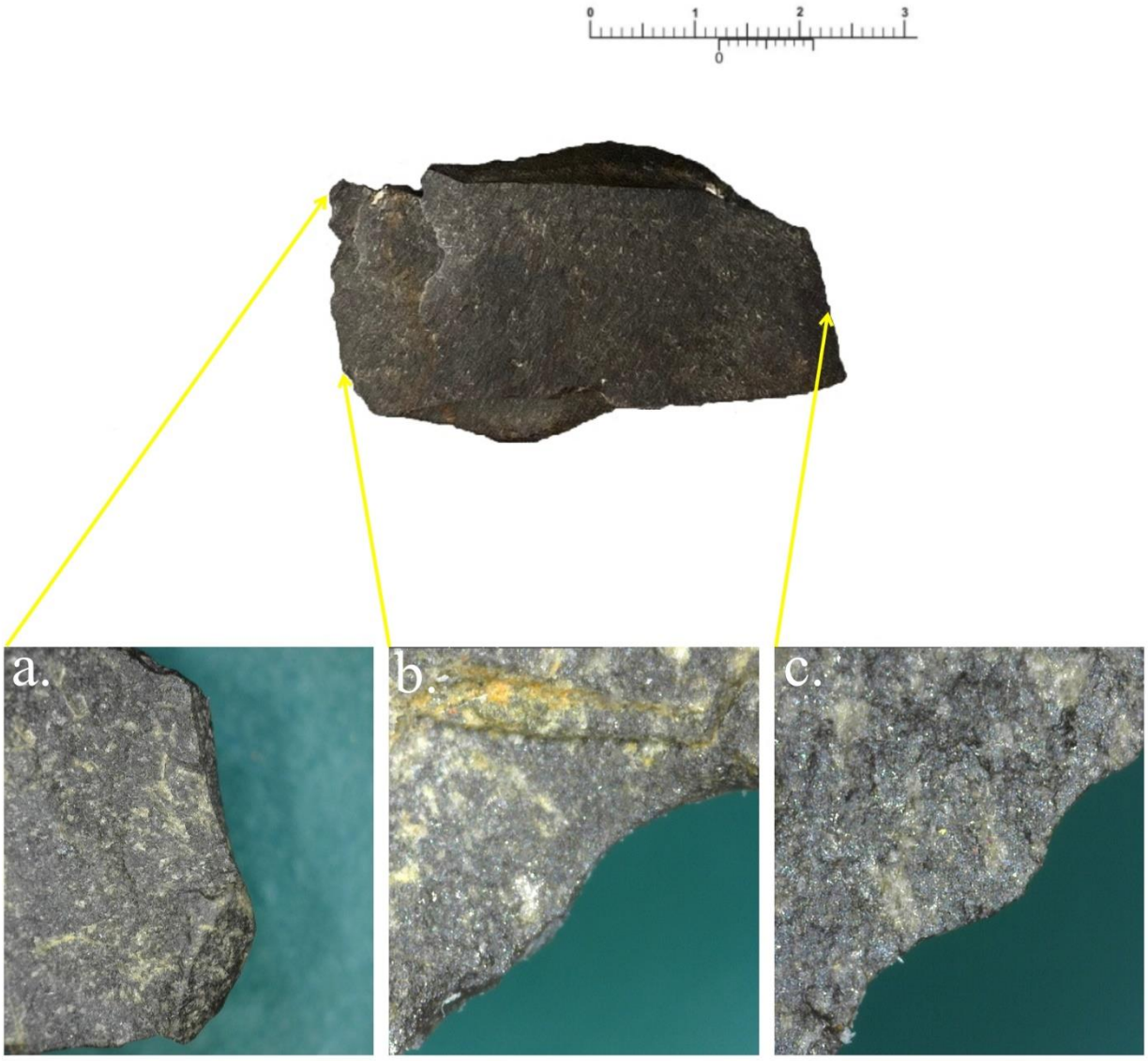

Figure 10.19. KdVo6-2789: a. AP3-extensive edge rounding and rounding of projections, dull greasy polish (50x); b. AP1-extensive edge rounding and rounding of projections, dull greasy polish (215x) c. AP2-extensive edge rounding and rounding of projections, dull greasy polish, perpendicular striations (225x)

Appendix 11: Data—Macroscopic Lithic Analysis

Artifact			Metrics				Raw Material			Active Parts						
										Edge-				Retouch		
#	Class	Type	Length (mm)	Width (mm)	Thickness (mm)	Weight (gm)	Material Type	Cortex	pXRF Source	#	Morphology	Length	Angle	Retouch	Type	Pattern
96.00	Flake Tool	Uniface with bimarginal retouch	67.10	39.90	13.10	31.40	basaltic	absent	Andesite Group A	1	convex	73.9	44	unimarignal retouch on dorsal surface	combination; primarily stepped, few feathered	continuous
										2	straight	48.5	50	unimarignal retouch on dorsal surface	combination; primarily stepped, few feathered	continuous
										3	straight	46.1	44	combination; bimarignal proximal portion; unimarginal medial portion	combination; primarily stepped, few feathered	continuous
139.00	Flake Tool	Uniface with bimarginal retouch	153.60	77.10	15.60	222.00	basaltic	absent	Andesite Group A	1	straight	148.7	47	unimarignal retouch on dorsal surface	combination; primarily stepped, few feathered	continuous
										2	convex	258.9	37	bimarginal	combination; primarily stepped, few feathered	continous feathered, discontinuous stepped
146.00	Pebble / Cobbl	Retouched Pebble Flake	71.30	40.60	10.70	30.30	unknown	present	n/a	1	straight	64.1	94	absent	feathered	continuous
										2	staight	61.3	64	bimarginal	feathered	continuous

	e Tool									3	convex	51.3	47	bimarginal	feathered	combination; continuous unimarginal retouch on ventral surface; discontinous bimarginal retouch on medial portion of AP
388.00	Pebble / Cobble Tool	Retouched Pebble Flake	70.00	33.70	16.70	46.50	greenstone	present	n/a	1	concave	35.8	38	unimarginal on ventral surface	feathered	continuous
746.00	Flake Tool	Retouched Flake (platform remnant)	29.80	28.30	7.00	4.70	obsidian	absent	wiki peak	1 2 3	straight straight convex	33.5 33.5 33.5	67 97 43	combination; primarily unimarginal on dorsal, small bimarginal area unimarginal unimarginal	feathered feathered feathered	combination; continuous unimarginal retouch; discontinuous bimarginal retouch continuous continuous
750.00	Flake Tool	Retouched Flake (platform remnant)	34.30	21.20	5.70	3.80	obsidian	absent	wiki peak	1 2	straight convex	34.3 35.8	36 36	bimarginal unimarinal; alternating surfaces	feathered feathered	continuous continuous
1486.00	Pebble / Cobble Tool	Bimarginally Retouched Cobble	122.20	47.70	18.00	150.80	unknown	present	n/a	1 2 3 4	straight straight convex convex	78.3 36.9 59.2 122.6	70 81 70 n/a	bimarginal unimarginal bimarginal n/a	feathered combination; feathered and stepped combination; feathered and stepped n/a	discontinuous continuous combination; continuous on ventral, discontinuous on dorsal n/a

2063.00	Pebble / Cobble Tool	Modified Split Cobble	49.20	41.80	19.20	56.10	unknown	present	n/a	1	flat	47.22	76	n/a	n/a	n/a
2789.00	Flake Tool	Retouched Combination Tool (flake fragment)	28.4	46	7.8	10.7	basaltic	absent	n/a	1	convex	19.8	32	unimarginal	feathered	continuous
										2	straight	13.9	33	unimarginal	feathered	continuous
										3	convex	11	40	unimarginal	feathered	continuous

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