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EARLY HOLOCENE SETTLEMENT OF THE UPPER SUSITNA RIVER BASIN, CENTRAL ALASKA

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Abstract. Human settlement of eastern Beringia appears to have been a gradual process starting in the Bølling-Allerød interstadial. Settlement of the upland Alaska Range did not occur until 1,300 years later, possibly linked to the emergence of a highly mobile settlement system during the Younger Dryas and early Holocene. However, evaluating the timing of upland settlement has been hampered by a primarily surficial upland archaeological record. This study tests landscape use models with new data from the buried early Holocene component 1 at Susitna River 3 in the upper Susitna River basin, central Alaska Range. The Susitna River 3 assemblage indicates that initial use of the upper Susitna River basin consisted of long-distance logistical forays from residential camps outside of the study area by highly mobile individuals provisioned with formal lithic toolkits. This data supports a shift to a highly mobile land-use system during the early Holocene. Initial settlement may be tied to the spread of boreal forest in the interior lowland and foothills regions, coupled with the emergence of upland caribou herd populations as an important resource.

Keywords: Settlement of eastern Beringia, prehistoric landscape use, Alaska Range, lithic technological organization
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ПОСЕЛЕНИЕ РАННЕГОЛОЦЕНОВОГО ВОЗРАСТА В ВЕРХНЕЙ ЧАСТИ БАССЕЙНА Р. САСИТНА, ЦЕНТРАЛЬНАЯ АЛЯСКА

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Аннотация. Поселение людей в восточной части Берингии было постепенным процессом, начавшимся в период интерстадиала беллинг-аллеред. Поселение в горном хребте Аляски произошло на 1300 лет позже и, возможно, связано с появлением систем высокомобильного обитания во время позднего дриаса и раннего голоцена. Тем не менее оценка хронологии заселения нагорья была затруднена тем, что большая часть археологических памятников нагорья представлены в поверхностном залегании. В этом исследовании изучаются модели ландшафтного использования с новыми данными от погребенного раннего голоценового культурного слоя (компонента) 1 на стоянке Река Саситна 3 в бассейне реки Саситна, центральном Аляскинском хребте. Ансамбль Река Саситна 3 указывает, что первоначальное использование верхнего бассейна реки Саситна состояло из дальних логистических вылазок из жилых лагерей за пределами района исследования высокомобильными группами людей, снабженных набором типологически выраженных каменных орудий. Эти данные поддерживают переход к высокомобильной системе землепользования в раннем голоцене. Первоначальное заселение может быть связано с распространением бореальных лесов во внутренних районах низменности и предгорий в сочетании с появлением популяций горного карибу в качестве важного пищевого ресурса.

Ключевые слова: заселение Восточной Беринги, доисторическое использование ландшафта, Аляскинский хребет, технологическая организация каменного производства.
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Introduction

The archaeological record of Alaska suggests that human settlement of the region was a gradual process, occurring over thousands of years beginning as climate ameliorated during the Bølling Allerød interstadial. The earliest widely accepted evidence for human settlement of Alaska is in the Tanana River basin at Swan Point (14,200 cal BP) and Little John (14,000 cal BP) (Figure 1) (Easton et al. 2011; Holmes 2001, 2011). Humans spread from the Tanana basin into the foothills of the Nenana and Teklanika river drainages during the Allerød interstadial, represented by Dry Creek component 1 (13,500 cal BP) (Graf et al. 2015; Powers and Hoffecker 1989) and Walker Road component 1 (13,100 cal BP) (Goebel et al. 1991). There are a total of 13 cultural components dating between 14,000–13,000 cal BP in central Alaska, suggesting that this region was continuously occupied after initial settlement (see reviews in Graf and Bigelow 2011; Potter et al. 2013). Northwest Alaska was initially settled during the late Allerød period, represented by the Tuluaq Hill site in the Noatak River Basin (13,100 cal BP) (Rasic 2011; Rasic and Gal 2000); by the Younger Dryas settlers had spread throughout the Brooks Range, represented by cultural components from seven sites dating between 12,900–11,200 cal BP (see reviews in Rasic 2011; Smith et al. 2013).

Settlement of the central Alaska Range occurred by the Allerød/Younger Dryas transition, represented by cultural components at Teklanika West (12,900 cal BP) in the upper Teklanika River valley, Eroadaway (12,750 cal BP) in the upper Nenana River valley, and

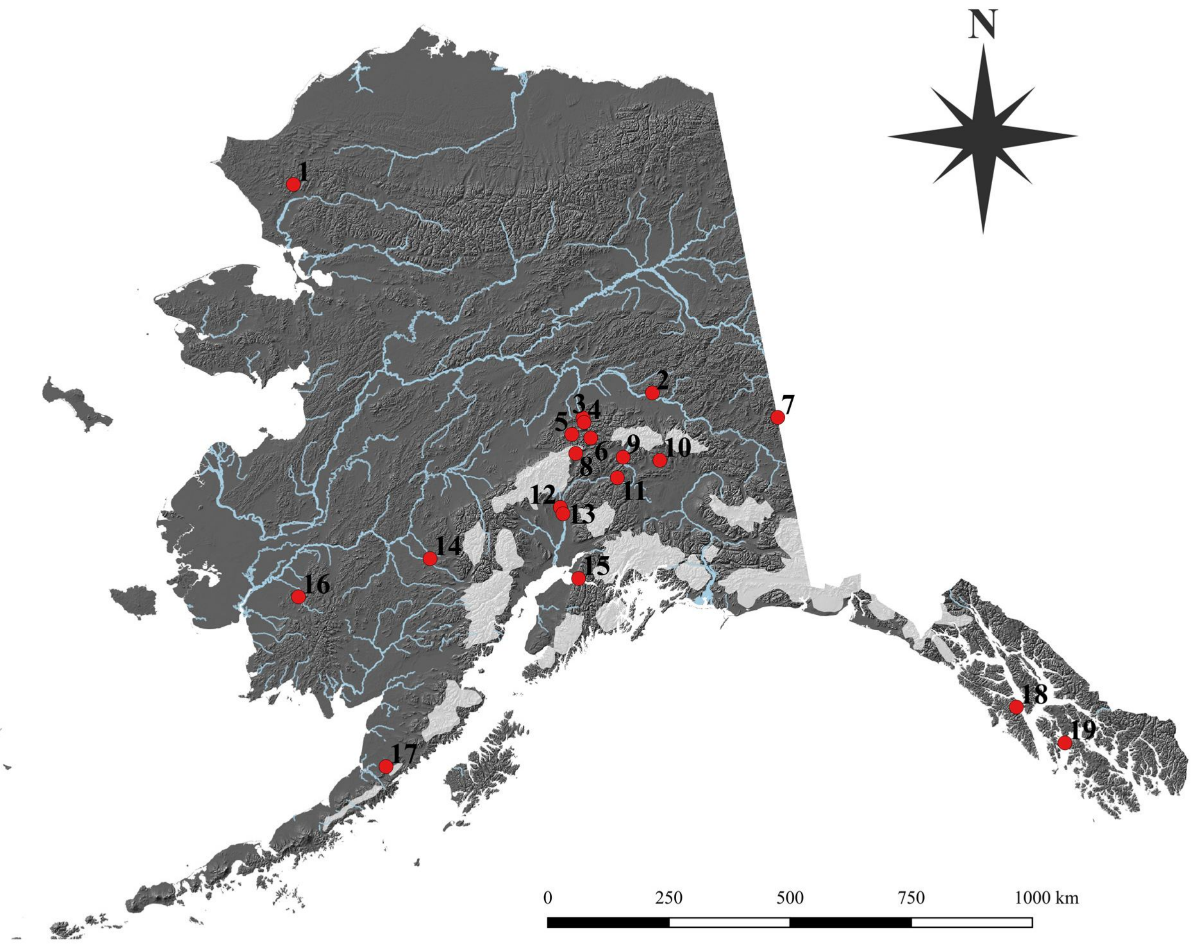

Figure 1. Overview map of Alaska showing the location of sites mentioned in text: *1, Tuluaq Hill; 2, Swan Point; 3, Walker Road; 4, Dry Creek; 5, Teklanika West; 6, Eroadaway; 7, Little John; 8, Bull River II; 9, Susitna River 3; 10, Phipps, Sparks Point, Whitmore Ridge; 11, Jay Creek Ridge; 12, Trapper Creek Overlook; 13, Susitna River Overlook; 14, Lime Hills Cave; 15, Beluga Point; 16, Spein Mountain; 17, Ugashik Narrows; 18, Hidden Falls; 19, On Your Knees Cave. Glacial extent 13 cal BP from Dyke et al. (2003)*

Рис. 1. Обзорная карта Аляски с памятниками, упоминаемыми в тексте: *1 – Тилуак Хилл; 2 – Сван Поинт; 3 – Уолкер Роуд; 4 – Драй Крик; 5 – Текланика; 6 – Эроадуэй; 7 – Литтл Джон; 8 – Булл Ривер II; 9 – Саситна Ривер; 10 – Фиппс, Спаркс Пойнт, Уитмор Ридж; 11 – Джэй Крик Ридж; 12 – Траппер Крик Оверлук; 13 – Сустина Ривер Оверлук; 14 – Лайм Хиллс Кэйв; 15 – Белуга Пойнт; 16 – Спейн Маунтэйн; 17 – Угашик Нэрроуз; 18 – Хидден Фалс; 19 – Он Ё Ниис Кейв. Границы ледника из Dyke et al. (2003)*

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Bull River II (12,460 cal BP) in the Broad Pass region of the Susitna basin (Coffman 2011; Coffman and Potter 2011; Holmes et al. 2010; Wygal 2009, 2010). Humans continued to spread throughout the central Alaska Range in the Younger Dryas and early Holocene, represented by cultural components from seven sites dating between 12,460–7800 cal BP (see review in Graf and Bigelow 2011), including important upland sites Phipps, Sparks Point, and Whitmore Ridge in the Tangle Lakes region (West et al. 1996a, 1996b, 1996c).

The first evidence for human occupation of southwest Alaska comes from Lime Hills Cave (12,350 cal BP) and Spein Mountain (11,600 cal BP) (Ackerman 2001, 2011), indicating initial settlement of this region during the Younger Dryas. Southcentral Alaska was settled by the early Holocene, represented by cultural components at Susitna River Overlook and Trapper Creek Overlook (both occupied by 9100 cal BP) (Wygal and Goebel 2012), and possibly at Jay Creek Ridge, where the earliest component is associated with radiocarbon dates ranging between 11,200 and 7800 cal BP (Dixon 1993; Dixon et al. 1985; Reuther 2000). Settlement of the southern coast of Alaska also occurred by the early Holocene, represented by On Your Knees Cave (10,300 cal BP) on Prince of Wales Island, Hidden Falls (10,200 cal BP) on Baranof Island, and Ugashik Narrows (10,100 cal BP) on the Alaska Peninsula (Davis 1996; Henn 1978; Kemp et al. 2007). Lithic raw material provenance and patterns in lithic technology suggest that the initial settlers of the southern coast moved there from the interior of Alaska (Reger and Wygal 2016; Wygal and Goebel 2012; Yesner 2001).

Researchers are still working to understand how the settlement of eastern Beringia unfolded, and the environmental and cultural context for this process (Dixon 2011; Dumond 2011; Graf and Bigelow 2011; Potter et al. 2017; Wygal and Goebel 2012; Wygal 2017; Yesner 1998, 2001). This study is part of the Alaska Range Uplands Project, focused on understanding the process of settlement as it pertains to the uplands of the central Alaska Range and southcentral Alaska, in particular the record of initial human settlement of the upper Susitna River basin on the southern flank of the central Alaska Range (Figure 2). Several studies provide evidence for a shift to a highly mobile subsistence-settlement system and corresponding range expansion in central Alaska accompanying climate shifts in the Younger Dryas and early Holocene (Graf and Bigelow 2011; Mason et al. 2001; Potter et al. 2013). Cooler, dryer conditions in the Younger Dryas may have supported increased grass and forb biomes across interior Alaska, providing a landscape more favorable for mobile herd animals. During this time the archaeological record supports an increased focus on mobile herd populations of bison (*Bison* sp.), wapiti (*Cervus canadensis*), and caribou (*Rangifer tarandus*) for human subsistence, and increased range mobility including use of upland landscapes (Graf and Bigelow 2011). The early Holocene brought warmer temperatures to the region, yet there is evidence for periodic climactic instability including drought and cooler temperatures, and the early Holocene archaeological record supports a continued focus on mobile herd animals for subsistence (Mason et al. 2001). The highly mobile Younger Dryas/early Holocene hunting strategy included provisioning individuals with formalized toolkits (e.g., microblades) primarily made on non-local lithic raw material (Graf and Bigelow 2011; Graf and Goebel 2009; Mason et al. 2001). Increased range mobility into the uplands in the Younger Dryas/early Holocene is supported by occupations at Eroadaway, Bull River II, and the Tangle Lakes region (Graf and Bigelow 2011).

Fully evaluating upland landscape use in the Younger Dryas and early Holocene has been hampered by a primarily surface or near-surface archaeological record that is often difficult to radiocarbon date (Thorson 1990). The Alaska Range Uplands Project focused on archaeological survey and testing in the Alaska Range to identify areas with buried, datable cultural deposits to test models of landscape use with new archaeological data (Blong 2016). This paper presents the lithic assemblage from the early Holocene component 1 at Susitna River 3 in the upper Susitna basin. This assemblage was recovered from a buried context and is used investigate early Holocene lithic technological organization in the upper Susitna basin and to test settlement models for the Alaska Range and southcentral Alaska. The goal of this paper is to use the Susitna River 3 component 1 lithic assemblage to test the model that the initial settlement of the upper Susitna basin was by highly mobile individuals

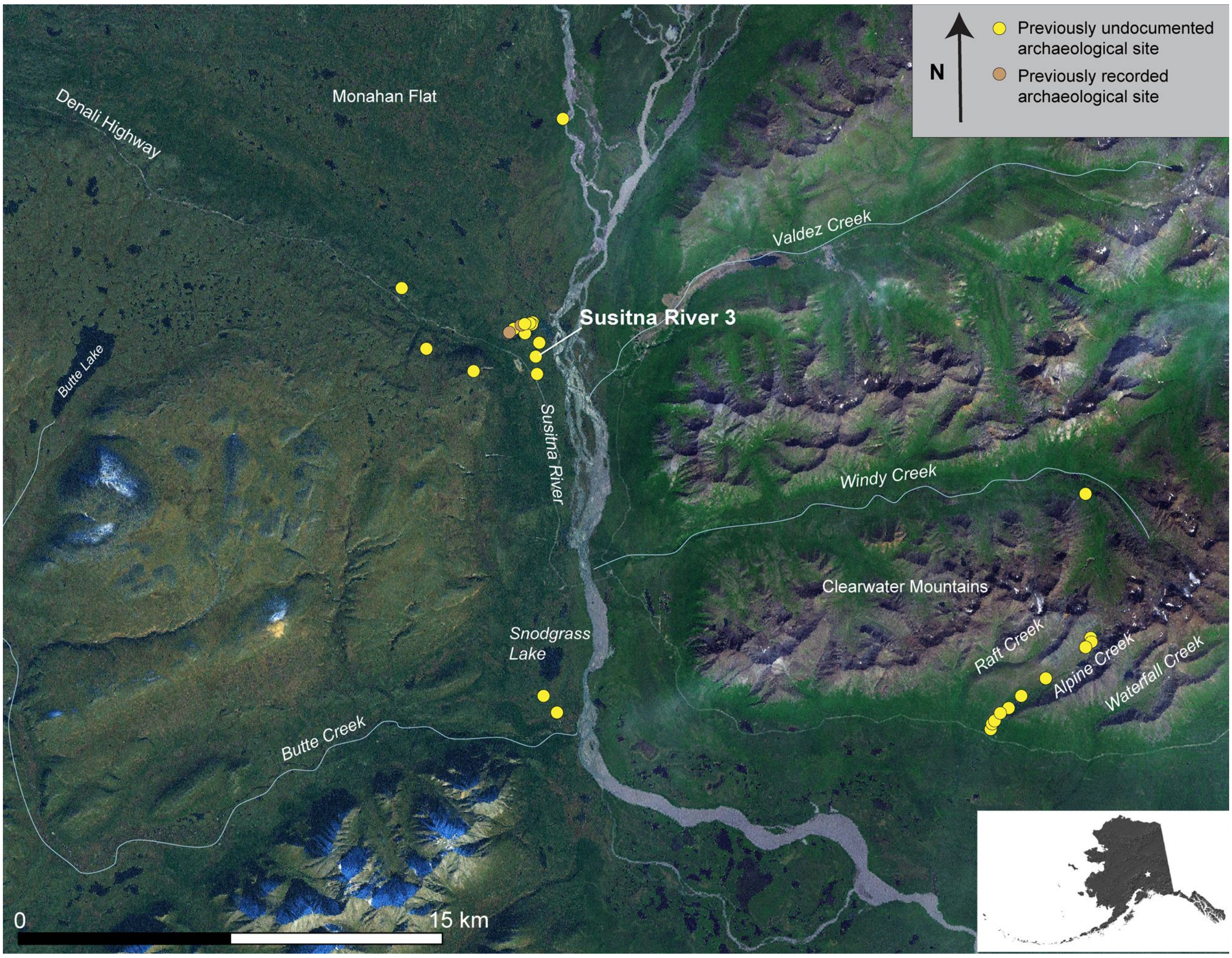

Figure 2. Upper Susitna River study area showing the 28 previously undocumented and two previously recorded archaeological sites investigated during the Alaska Range Uplands Project
Рис. 2. Исследуемая территория Верхней Саситны с 28, прежде недокументированными, и двумя, прежде зафиксированными, археологическими памятниками, исследовавшимися в рамках Проекта Нагорья Аляски

provisioned with formal lithic toolkits. This study presents the conclusion that this model is supported, and that initial early Holocene use of the upper Susitna River basin consisted of long-distance logistical forays from residential camps outside of the study area. Initial movement of hunter-gatherers into the study area may be tied to the spread of boreal forest biomes in the interior lowland and foothills regions, coupled with the emergence of upland caribou herd populations as an important resource.

Upper Susitna River Basin Study Area

The Susitna River is a glacial-fed stream originating in the southern Alaska Range and braiding across the broad, glacially-carved upper Susitna basin. The upper Susitna basin study area is geographically diverse, including peaks as high as 1900 masl in the Clearwater and northeastern Talkeetna mountains, kettle and kame topography on the broad, glacially carved Monahan Flat, and channeled glacial outwash and braided floodplains in the Susitna River valley bottom (Kachadoorian et al. 1954; Wahrhaftig 1960, 1965). Unconsolidated Quaternary surficial deposits dominate elevations below 1000 masl consisting primarily of glacial drift, often reworked and deposited as alluvium along rivers and streams (Smith 1981; Smith et al. 1988; Wahrhaftig 1960, 1965). The upper Susitna basin was completely covered by glacial ice during the Last Glacial Maximum, but was likely deglaciated by 14,000 ka (Dortch et al. 2010).

Vegetation in the study area is primarily *Betula* (birch) shrub tundra, with *Picea* sp. (spruce) and *Popu-*

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lus (cottonwood/aspen) trees in the valley bottom, and alpine tundra in upper elevations; modern treeline is approximately 850 masl (Rohr 2001). Paleovegetation research in the upper Susitna basin indicates that modern vegetation patterns were established by 6400 cal BP, and possibly as early as 7600 cal BP (Blong 2016; Rohr 2001). The paleovegetation record for the upper Susitna study area do not extend past 7600 cal BP; however, recent paleoecological research in the middle Susitna River basin indicates that vegetation from 14,000 to 12,000 cal BP consisted of birch shrub tundra, followed by an expansion of *Populus* sp. between 12,000 to 9,000 cal BP to an elevation of 870 masl, then by expansion of *Picea* sp. and subsequent establishment of modern vegetation patterns by 6000 cal BP (University of Alaska Fairbanks, United States Geological Service, URS Corporation 2016).

Fauna in the study area today include black bear (*Ursus americanus*), brown bear (*Ursus arctos*), caribou (*Rangifer tarandus*), Dall sheep (*Ovis dalli*), moose (*Alces alces*), several species of ptarmigan (*Lagopus* sp.), snowshoe hare (*Lepus americanus*), seasonally available waterfowl, and many species of freshwater fish in lakes, rivers, and streams. The upper Susitna basin is an ideal laboratory for addressing upland lithic technological organization and land use because it exhibits a wide range of topographic, floral, and faunal variability, potentially reflecting the full range of upland adaptation.

Lithic Landscape

This study assessed the lithic landscape in the upper Susitna basin by documenting and sampling knappable lithic raw materials present in drainages throughout the study area (see summary in Blong 2016). The upper Susitna lithic landscape consists of relatively abundant amounts of knappable lithic raw material including metavolcanic, metabasalt, basalt, metasedimentary, quartzite, chert, metachert, chalcedony, argillite, and tuffaceous argillite rock types. The most common types of lithic raw material found in the study area are chalcedony, argillite, and basalt; these materials are available in large package sizes, but are often coarser-grained and/or weakly metamorphosed, affecting knapping quality.

Knappable lithic raw material from the study area is primarily microcrystalline to macrocrystalline texture, and is of moderate overall quality. Lithic raw materials are typically found in cobble- to boulder-sized nodules suitable for knapping. The majority of lithic raw material appears to be from the Amphitheatre Group formation that comprises a significant portion of the southern Clearwater Mountains and northeastern Talkeetna Mountains in the study area (Smith 1981). The Amphitheatre Group formation lies along the Talkeetna Fault, and the knappable lithic raw materials in this formation typically show signs of having undergone weak metamorphism. Several additional knappable raw materials collected in the study area appear to have been affected by weak metamorphism, likely also a result of proximity to the Talkeetna Fault (Mooney 2010; Smith 1981). As a result, much of the knappable-quality raw material in the study area is of variable quality from one nodule to the next and from one location to the other. Despite several geologic reference sources identifying various cherts as occurring in geologic formations in the study area, our survey found little evidence for abundant chert lithic raw material resources, and the minor amounts of chert we collected were typically poorer quality as a result of weak metamorphism.

Susitna River 3

From the period of 2010–2012 the Alaska Range Uplands Project documented 28 previously unrecorded archaeological sites in the Susitna study area. We conducted test excavations at 14 of these sites, and recovered cultural material from primary subsurface contexts at 12 of these. In addition, we conducted test excavations at two previously recorded sites. We observed three tephra horizons at most testing locations, and we found evidence for a possible fourth tephra at some locations. The three most ubiquitous tephras were correlated to the Devil, Watana, and Oshetna tephras described in the middle Susitna basin (Dixon and Smith 1990), based on color, weathering characteristics, texture, relative stratigraphic positioning, and glass geochemistry, while the fourth tephra has not been securely correlated to any previously studied tephra (Blong 2016).

Susitna River 3 is located at 860 masl on a prominent bedrock knoll overlooking Monahan Flat to the north and the Susitna River to the east. Vegetation at the site is shrub tundra; shrub birch is abundant, and willow (*Salix spp.*), blueberry, dwarf Labrador tea, and graminoids (Poaceae) are common. The site has a broad surface lithic scatter with concentrations of calcined and burned faunal remains covering an area of ~200 m x 80 m, primarily exposed in an off-highway vehicle (OHV) trail. Lithic tools collected from the surface include notched and lanceolate projectile point forms, microblades, and scrapers.

We excavated four 1-m^2 and four 50-cm^2 test units across the site (Figure 3), and identified three cultural components. The lithostratigraphy at the site is typical for most settings in the study area, consisting of glacial drift capped with a sequence of three tephra deposits (from oldest to youngest the Oshetna, Watana, and Devil tephras) and aeolian silt (Figure 4). The pedostratigraphy at the site is also typical for the study area, consisting of a series of organic soils underlain by elluvial and illuvial horizons formed primarily on tephra sediments (Figure 5). There are three cultural components represented at Susitna River 3 (Table 1). Component 1 (C1) consists of 706 lithics and 5 highly fragmented faunal remains recovered from an early Holocene context (10,690–10,300 cal BP), Component 2 (C2) consists of consists of approximately 600 highly fragmented faunal remains and 3433 lithics primarily recovered from a charcoal-rich paleosol in a MH context (5711–3984 cal BP), and Component 3 (C3) consists of approximately 160 highly fragmented faunal remains and 1456 lithics recovered from a LH context (2682–2329 cal BP) (Blong 2016; Mueller 2015).

Lithic Analysis Methods

This paper presents the results of analysis of the early Holocene Component 1 lithic assemblage at Susitna River 3. There are four goals of this analysis: (1) to present the lithic assemblage from the early Holocene Component 1 at Susitna River 3, (2) to explore early Holocene lithic technological activities and raw material procurement patterns at Susitna River 3, (3) to use these data to assess early Holocene settlement organization and landscape use in the upper Susitna basin, and (4) to compare patterns of land use in the upper Susitna River basin to the broader central Alaska Range and southcentral Alaska. Component 1 represents the earliest substantial evidence for human occupation of the upper Susitna study area and thus the most relevant for investigating the process of settling the Alaska Range uplands.

The component 1 debitage and tool analyses use metric and non-metric technological and typological attributes designed to reconstruct lithic raw material procurement patterns, lithic reduction activities, and tool use-life histories. Local vs. non-local lithic raw material procurement is assessed by comparing lithic raw material types in archaeological assemblages with lithic raw material types collected during lithic raw material survey of the study area. In addition, the amount of cortex in lithic raw material types is used as a measure of locally available lithic raw materials. This study considers toolstone procurement, primary reduction technologies, secondary reduction technologies, and tool production and use to help delineate organization of technological activities and ultimately to understand provisioning and mobility strategies. Primary reduction refers to core preparation and tool-blank manufacture, and is used to assess the relative amount and formality of core reduction at each site. Secondary reduction refers to tool sharpening and re-sharpening, and is used to assess the relative amount and type of tool maintenance at each site. Tool production describes the types of tools produced at each site, focusing on whether the tool production is expedient or formal, and whether tools are specialized or multifunctional. Tool analysis also focuses on the intensity of tool retouch and state of discard. Additional details of the methods used for lithic analysis can be found in Blong (2016).

This study considers variation in lithic assemblages (technological and typological) from an adaptive, technological-organization perspective, and is focused on understanding human strategies employed during stone-tool manufacture, use, transport, and discard, as well as strategies used to obtain toolstone (Nelson 1991; Shott 1986). Lithic technological studies grounded in ethnographic research, actualistic studies, and controlled archaeological case studies have delineated expectations for lithic artifact assemblages

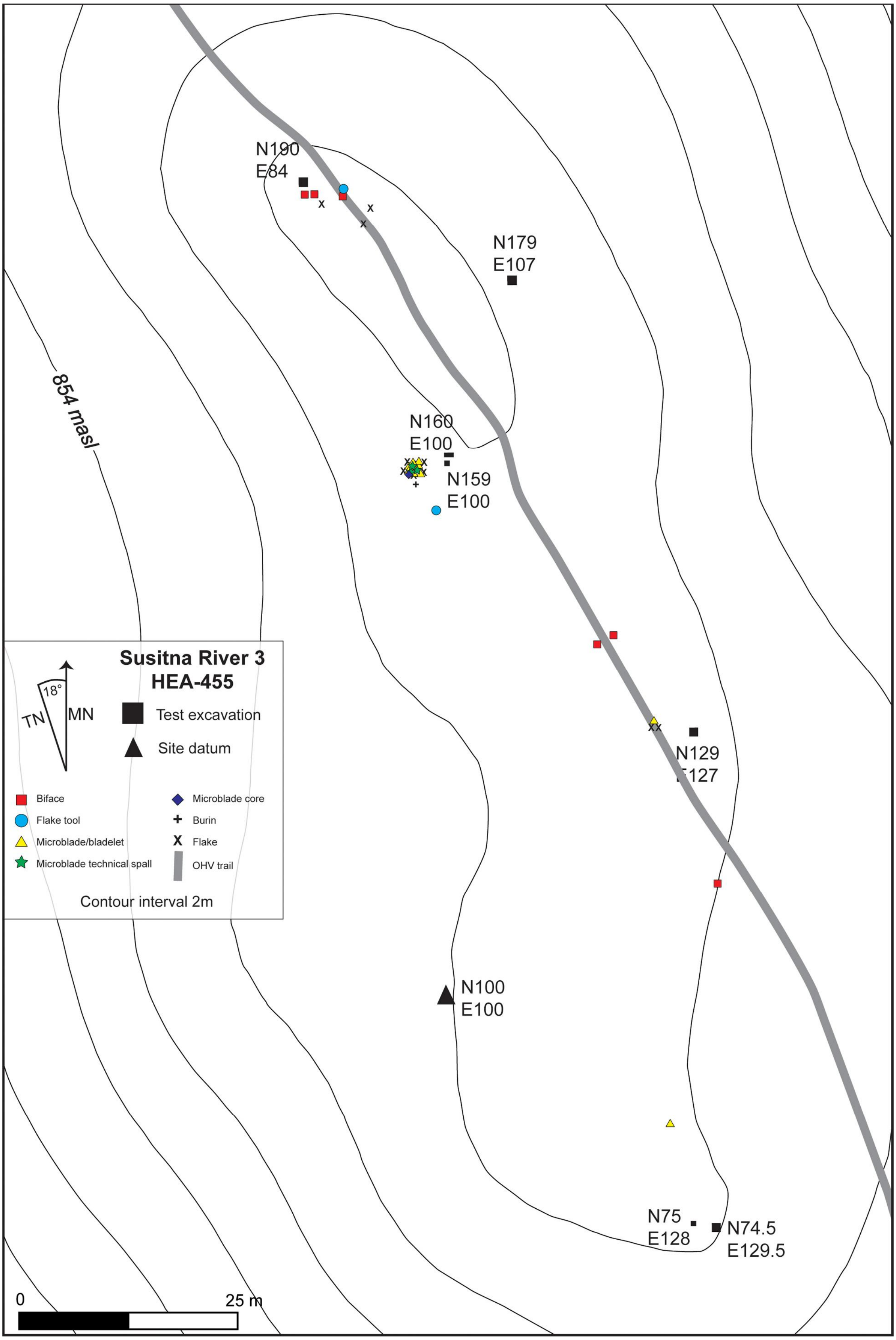

Figure 3. Susitna River 3 site map showing the location of test excavations and lithic artifacts collected on the surface
Рис. 3. Карта стоянки Саситна Ривер 3, демонстрирующая локализацию разведочных раскопок и каменных артефактов, собранных с поверхности

Figure 4. Color photograph of N179 E107 east wall profile showing a typical stratigraphic sequence in the upper Susitna study area
Рис. 4. Цветная фотография N179 E107 профиля восточной стенки, показывающая типичную стратиграфическую последовательность в пределах исследуемой территории верхней Саситны

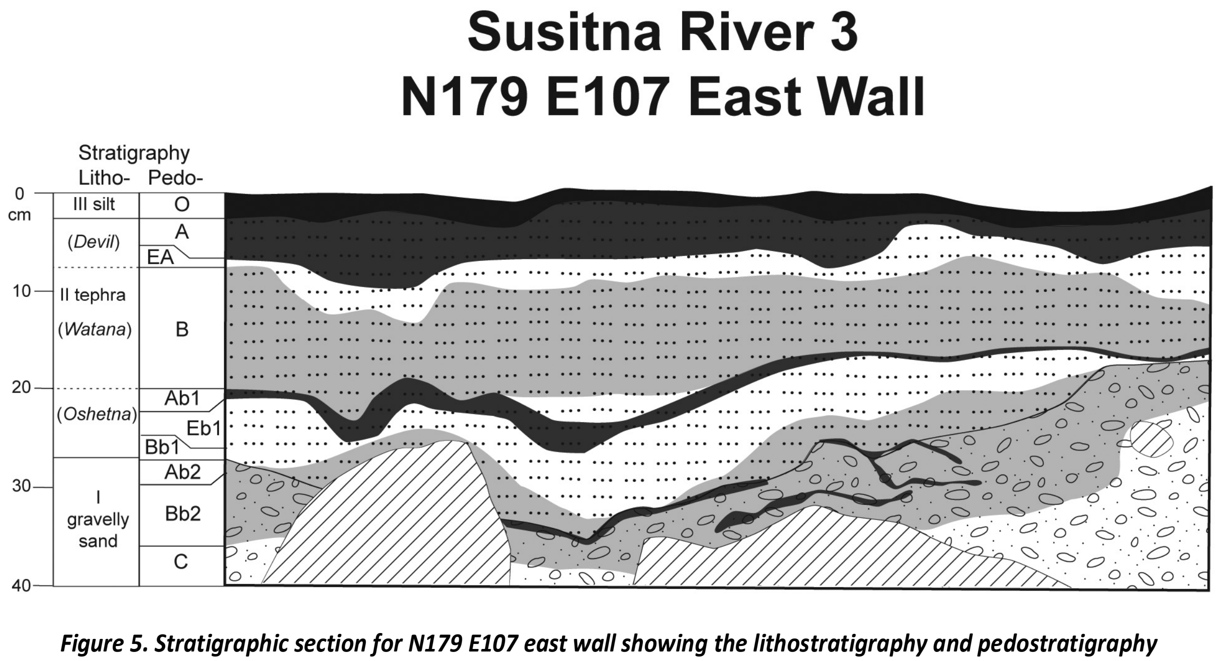

Figure 5. Stratigraphic section for N179 E107 east wall showing the lithostratigraphy and pedostratigraphy at Susitna River 3
Рис. 5. Стратиграфический разрез N179 E107 восточной стенки, демонстрирующий педостратиграфию Саситны Ривер 3

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Table 1

Radiocarbon dates from Susitna River 3

Таблица 1

Радиоуглеродные даты Састины Ривер 3

Lab # Лабораторный номер	Material (wood ID)[1] Материал (древесина определен.)	Component Культуросодерж. горизонт	Context Контекст	$\delta^{13}C$ (‰)	^{14}C B.P. ^{14}C л.н.	Cal B.P. (2σ)[2, 3] Калибров. л.н. (2σ)[2, 3]	Population mean cal B.P.[2, 3] Среднее значение калибров. л.н.[2, 3]
Beta-284747	Charcoal Уголь	3	Feature 1, shallow basin-shaped charcoal feature Комлпекс 1, тонкодисперсная котловидная форма угольной линзы	-23.9	2370 ± 40	2682-2329	2427
OS-101611	Charcoal Уголь (*Picea* sp.)	2	Feature 2, dense hearth associated w/notched points, bone Комплекс 2, плотный очаг, связанный с остриями с выемками, кость	-26.29	3740 ± 30	4224-3984	4089
OS-101612	Charcoal Уголь (*Picea* sp.)	2	Dispersed charcoal from paleosol at contact of Oshetna and Watana tephras Рассеянный уголь из палеопочвы на контакте с пеплом Осетны и Ватаны	-26.02	4890 ± 35	5711-5585	5626
OS-101613	Charcoal Уголь (*Salix* sp.)	1	Dispersed charcoal from Ab2 paleosol capping bedrock soils Древесный уголь из горизонта Ab2 палеопочвы, покрывающей цоколь	-26.71	9320 ± 60	10,690-10,300	10,520

[1] Wood taxa identified by Dr. David Rhode (Desert Research Institute, Reno, Nevada).
Таксоны древесины определены Др. Давидом Родом (Институт исследования пустыни, Рено, Невада).
[2] Radiocarbon dates calibrated using IntCal 2013 in Oxcal 4.2.
Радиоуглеродные даты калиброваны с использованием IntCal 2013 в Oxcal 4.2.
[3] Radiocarbon dates with standard errors 50–1000 have been rounded to the nearest decade.
Радиокарбоновые даты со стандартными ошибками 50–1000 округлены до ближайшего десятилетия.

produced within highly mobile versus low mobility land-use systems (Kelly 1992, 2001; Kuhn 1995; Parry and Kelly 1987). The lithic assemblage expectations used for this study are described in detail in Blong (2016). At the core of these expectations is the idea that hunter-gatherers make technological decisions balancing cost (time to procure lithic raw material, manufacture time) and utility (efficiency of a tool to perform a task).

The archaeological expectations for hunter-gatherers occupying the upper Susitna study area in a high residentially mobile or long-distance logistically mobile settlement system are very similar. These sites should have lithic assemblages representing use by individuals provisioned with lithic raw material and tools in anticipation of future use (Kuhn 1995; Torrence 1983). Lithic assemblages should have formal cores prepared in advance to maximize the number of flakes available from toolstone, and lithic reduction activities should focus on secondary maintenance of bifacial and unifacial tools. Primary reduction, while limited, should focus on producing and maintaining formal cores and producing formal tool blanks and formal tools. Tools should come in both specialized and multi-purpose forms, and be maintained, heavily reworked, and transported. Overall the toolkit in a system that provisions individuals is lightweight, portable, durable, and generalized enough to serve many purposes. This technological strategy is typically utilized by groups with a high number of residential moves, shorter occupation span, and unpredictable tool and toolstone needs (Kelly 1988, 2001; Kuhn 1995).

In a settlement system with low residential mobility (provisioning place), lithic technology should be focused on equipping the location where tools will be used (Kuhn 1995; Parry and Kelly 1987). Archaeological assemblages should be made on locally available lithic raw material. Lithic assemblages should have informal cores, with little investment in design to provide flexibility to make tools with a wider range of functions. Primary reduction should be common and focus on producing and reducing informal cores and producing informal tool blanks and tools. Secondary reduction should be relatively limited and focused more on unifacial tool maintenance. Tools should come in specialized forms, be infrequently maintained, and discarded on-site. Overall the toolkit in a system that provisions place is heavier, less durable, less portable, expedient, and specialized, with a variety of tool types. This system is geared towards groups with a low number of residential moves and longer occupational spans (or frequent reoccupation), with predictable tool and toolstone needs (Kelly 1988, 2001; Kuhn 1995).

Using the lithic assemblage expectations outlined above, lithic technological activities at Susitna River 3 are presented here to assess whether hunter-gatherers occupying the Susitna basin in the early Holocene exploited the uplands in a pattern of high residential mobility or long-distance logistical forays from lowland camps, provisioning themselves with lithic raw materials, or in a pattern of low residential mobility from camps in the uplands, provisioning base camps with lithic raw material.

Results

The lithic assemblage from Susitna River 3 C1 consists of 673 debitage and 33 tools. There are five classes of lithic raw material in the assemblage. The assemblage is dominated by chert, with lesser amounts of chalcedony, and minor amounts of basalt, rhyolite, and argillite (Table 2). The C1 debitage assemblage consists primarily of retouch chip fragments, retouch chips, and flake fragments, with lesser amounts of biface thinning flakes, core reduction flakes, and burin spalls, and few cortical spalls (Table 3).

Debitage in the C1 assemblage is predominantly very small, with lesser amounts of small debitage, and just one piece of medium debitage (Figure 6). Platform types for proximal flakes in the C1 assemblage are primarily smooth and complex, with lesser amounts of crushed and very few lipped (Figure 7). When assessed by debitage size, platform types on very small proximal flakes are predominantly smooth, with lesser amounts of complex and crushed types, and very few lipped. Platform types on small proximal flakes are predominantly complex, with lesser amounts of crushed and smooth types, and very few lipped platforms. The single medium proximal flake has a crushed platform (Figure 8).

Table 2

Toolstone types represented in the Susitna River 3 component 1 lithic assemblage

Таблица 2

Типы орудийного материала, представленные в индустрии 1 культуросодержащего уровня Састины Ривер 3

Raw material type Тип сырья	Debitage Дебитаж	Tools Орудия	Total Всего	Local raw material Местный материал сырья
	n (%)	*n (%)*	*n (%)*	*n (%)*
Chert / Кремень	388 (57.7)	31 (93.9)	419 (59.4)	0 (0)
Basalt / Базальт	37 (5.5)	-	37 (5.2)	37 (100)
Rhyolite / Риолит	21 (3.1)	-	21 (3.0)	0 (0)
Chalcedony / Халцедон	222 (33.0)	2 (6.1)	224 (31.7)	209 (93.3)
Argillite / Аргиллит	5 (0.7)	-	5 (0.7)	5 (100)
Total / Всего	*673 (100)*	*33 (100)*	*706 (100)*	*35.6*

Table 3

Debitage frequencies by toolstone type in the Susitna River 3 component 1 lithic assemblage

Таблица 3

Доли дебитажа в типах поделочного камня в культуросодержащем слое 1 Састины Ривер 3

Debitage type Типы дебитажа	Chert Кремень	Basalt Базальт	Rhyolite Риолит	Chalcedony Халцедон	Argillite Аргиллит	Total Всего
	n (%)	*n (%)*	*n (%)*	*n (%)*	*n (%)*	*n (%)*
Flake fragment Фрагмент отщепа	51 (13.1)	8 (21.6)	6 (28.6)	63 (28.4)	2 (40)	130 (19.3)
Core reduction flake Отщеп редукции нуклеуса	20 (5.2)	6 (16.2)	4 (19.0)	22 (9.9)	2 (40)	54 (8.0)
Primary cortical spall Первичный корковый скол	-	-	-	1 (0.5)	-	1 (0.1)
Secondary cortical spall Вторичный корковый скол	-	-	-	1 (0.5)	-	1 (0.1)
Cortical spall fragment Фрагмент коркового скола	-	-	-	1 (0.5)	-	1 (0.5)
Retouch chip fragment Фрагмент чешуйки ретуши	158 (40.7)	10 (27.0)	6 (28.6)	61 (27.5)	-	235 (34.9)
Retouch chip Чешуйка ретуши	115 (29.6)	6 (16.2)	4 (19.0)	48 (21.6)	1 (20)	174 (25.9)
Biface thinning flake Отщеп утончения бифаса	28 (7.2)	7 (18.9)	1 (4.8)	25 (11.3)	-	61 (9.1)
Burin spall Резцовый скол	16 (4.1)	-	-	-	-	16 (2.4)
Total / Всего	388	37	21	222	5	673

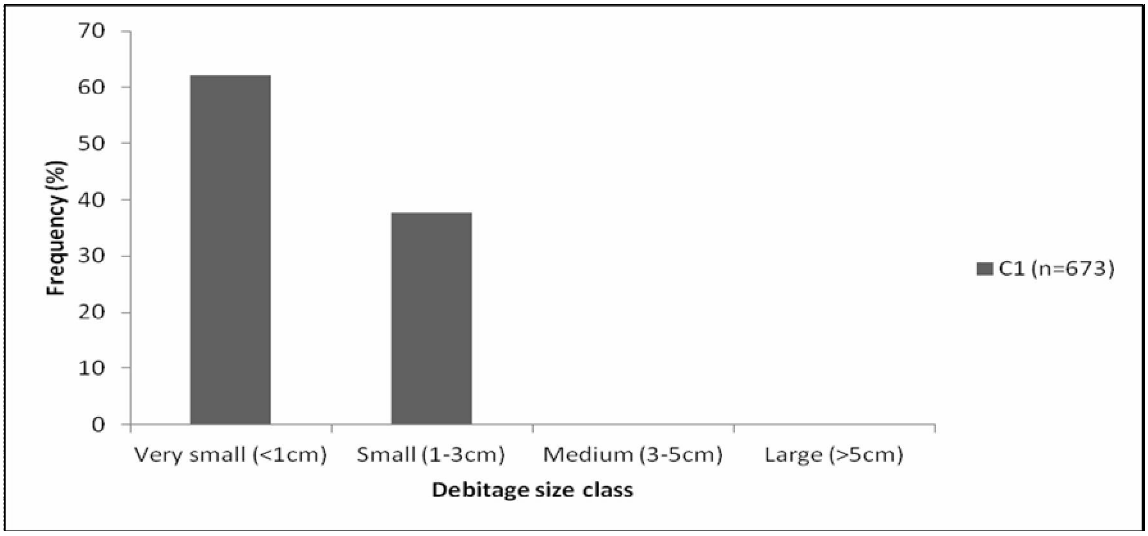

Figure 6. Debitage size classes in the Susitna River 3 component 1 lithic assemblage
Рис. 6. Классы размеров дебитажа каменного ансамбля 1 культуросодержащего уровня Састины Ривер 3

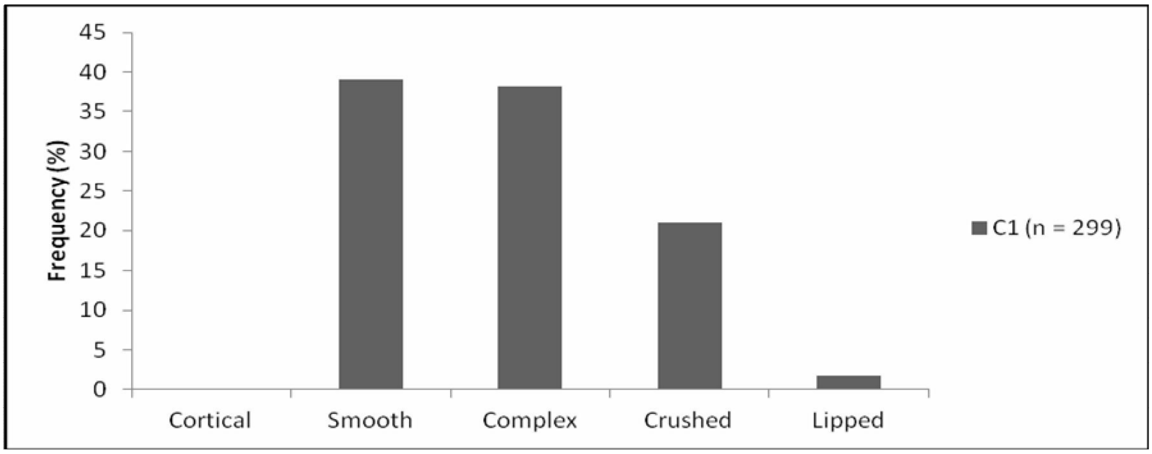

Figure 7. Proximal flake platform type in the Susitna River 3 component 1 debitage assemblage
Рис. 7. Типы ударных площадок отщепов каменного ансамбля 1 культуросодержащего уровня Састины Ривер 3 (cortical – корковая, smooth – гладкая, complex – сложная,crushed – смятая, lipped – с носиком)

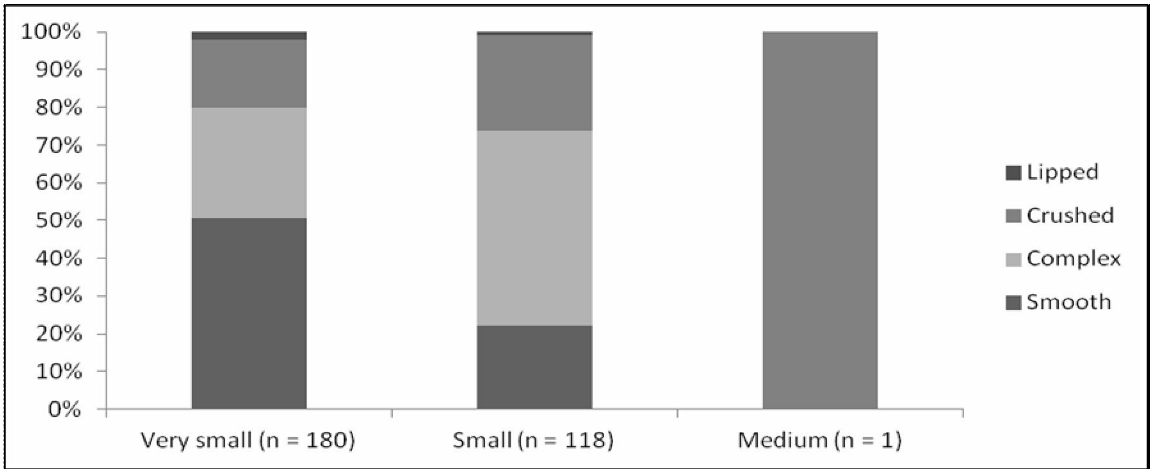

Figure 8. Proximal flake platform type within each debitage size class in the Susitna River 3 component 1 lithic assemblage
Рис. 8. Типы Фрагментов ударных площадок отщепов в каждом размерном классе дебитажа каменного ансамбля 1 культуросодержащего уровня Састины Ривер 3

There are 33 tools in the C1 assemblage (Table 4). Tools are predominantly made on chert, and tool forms consist primarily of informal types (78.9 % of tool assemblage) such as retouched burin spalls and flakes, but also formal types (18.1 % of tool assemblage) such as burins and a small scraper-like tool with invasive retouch and a steep edge angle (Figure 9). The most common tool blank is flake, with lesser amounts of burin spall and bladelet blanks, and few microblade and biface thinning flake blanks (Figure 10). The majority of tools in the assemblage are broken, and complete tools have a low mean weight (Table 4). None of the tools in the C1 assemblage bear cortex. Chert tools in the C1 assemblage were retouched on 52.6 % of available margins, while chalcedony tools were retouched on 40 % of available margins (Table 5). Similarly, chert tools have a higher retouch index (0.54) than chalcedony tools (0.28). There are no cores in the C1 assemblage.

Lithic Raw Material Procurement

Only 35.6 % of the lithics in the C1 assemblage are made on lithic raw material types collected during our raw material survey of the study area. There is little diversity within the C1 raw material classes: there are nine types of chalcedony, three types each of chert and rhyolite, two types of argillite, and one type of basalt. The assemblage is dominated by one type of chert in particular, a fine-grained grayish orange (10YR 7/4) to moderate yellowish brown (10YR 5/4) material that was occasionally banded with very pale orange (10YR 8/2). The majority of the lithics in the C1 assemblage (53.7 %) are made on this material, followed by a medium light gray (N6) to medium gray (N5) chalcedony with black (N1) speckles (28.2 % of assemblage). Tools in the assemblage are made primarily on a distinct, fine-grained grayish red (5R 4/2, 10R 4/2) material (n=13, 52 %), as well as the grayish-orange chert (n=10, 40 %). Neither of the chert types described here were collected during our raw material survey of the study area, but we did collect samples of the gray chalcedony in the Butte Creek drainage approximately 13 km to the south of the site. Local procurement of chalcedony is supported by the presence of cortex on two chalcedony flakes; this cortex has the appearance of being from a bedrock geologic source. In addition, the basalt and argillite in the assemblage is similar to the material we collected from multiple locations within 15-20 km of the site.

The chert and rhyolite lithic raw material that dominates the C1 assemblage was likely transported to the study area from a more distant source. The chalcedony, argillite, and basalt in the assemblage were likely procured locally. This suggests that lithic raw material procurement during the C1 occupation focused primarily on non-local, high-quality cherts, supplemented by locally-available chalcedony, basalt, and argillite, most of which was available within 13 km of the site.

Primary Reduction

Primary reduction was a minor component of lithic technological activities during the C1 occupation (27.8 % of debitage assemblage). This is supported by the low frequency of core-reduction flakes and cortical spalls in the debitage assemblage, the low frequency of large and medium debitage, and the low frequency of smooth platforms on small and medium debitage. The lack of cortical debitage for most lithic raw material classes suggests that raw materials were initially reduced elsewhere. The exception to this is chalcedony, which is locally available and appears to have undergone some primary reduction onsite. There are higher than expected amounts of argillite, basalt, chalcedony, and rhyolite primary reduction debitage in the assemblage, suggesting that primary reduction focused on these materials; differences in the proportion of these materials is significant (χ^2 = 45.463, df = 4, p < .0001).

The high frequency of chalcedony flake fragments supports chalcedony core production and reduction, and suggests that chalcedony was reduced informally. In addition, the frequency of chert flake fragments could also represent informal chert core production and reduction, but flake fragments represent a small percentage of chert debitage at the site, so this was a minor component of chert reduction. Mean argillite debitage weight (Wilcoxon each pair: z = 3.83831, p = 0.0001), chalcedony debitage weight (z = 8.52888, p < .0001), basalt debitage weight (z = 6.75048, p < .0001) and rhyolite debitage weight (z = 2.23866, p = 0.252) are significantly higher that

Table 4

Tool frequencies by toolstone type in the Susitna River 3 component 1 lithic assemblage

Таблица 4

Доли орудий в типах поделочного камня в культуросодержащем слое 1 Састины Ривер 3

Tool type Типы орудий	Chert / Кремень *n (%)*	Chalcedony / Халцедон *n (%)*	Total / Всего *n (%)*
Retouched flake fragment Фрагмент ретушированного отщепа	9 (29.0)	-	9 (27.3)
Retouched flake Ретушированный отщеп	3 (9.7)	2 (100)	5 (15.2)
Retouched microblade fragment Фрагмент ретушированной микропластины	1 (3.2)	-	1 (3.0)
Retouched bladelet Ретушированная пластина	1 (3.2)	-	1 (3.0)
Retouched bladelet fragment Фрагмент ретушированной пластины	2 (6.5)	-	2 (6.1)
Retouched burin spall Ретушированный резцовый скол	2 (6.5)	-	2 (6.1)
Retouched burin spall fragment Фрагмент ретушированного резцового скола	6 (19.4)	-	6 (18.2)
Scraper on flake fragment Фрагмент скребка на отщепе	1 (3.2)	-	1 (3.0)
Burin fragment / Фрагмент резца	1 (3.2)	-	1 (3.0)
Burin on snap / Резец на осколке	2 (6.5)	-	2 (6.1)
Burin on snap fragment Резец на фрагменте скола	1 (3.2)	-	1 (3.0)
Angle burin fragment Фрагмент углового резца	1 (3.2)	-	1 (3.0)
Burin on notch fragment Резец на выемчатом фрагменте	1 (3.2)	-	1 (3.0)
Tool subtotal *Орудия, всего*	*31*	*2*	*33 (100)*
Formal: informal count Ratio Формальные: неформальные количество рацио	7:24 0.3	0:2 0	7:26 0.3
Complete: broken count Ratio Целые: сломанные количество рацио	9:22 0.4	2:0 -	11:22 0.5
Mean complete tool weight (g) Средний вес целых орудий (г)	0.4	0.4	0.4
Tool: debitage count Ratio Орудия: дебитаж количество рацио	31:388 0.08	2:222 0.01	0.05

Figure 9. Lithic tools from Susitna River 3 component 1 assemblage:
a–l – retouched flakes; j–o – burins; p – scraper-like tool; q–x – retouched burin spalls
Рис. 9. Каменные орудия ансамбля Састины Ривер 3 культуросодержащего уровня 1:
a–i – ретушированные отщепы; j–o – резцы; p – скребловидное орудие; q–x – ретушированные резцовые сколы

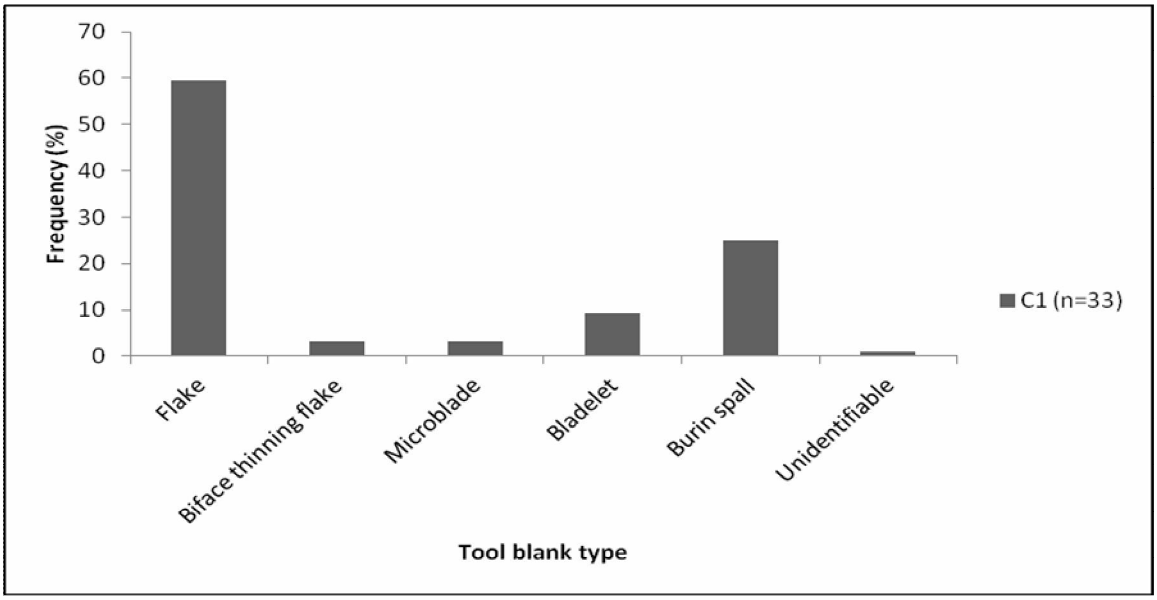

Figure 10. Tool blank type for tools in the Susitna River 3 component 1 assemblage
Рис. 10. Типы заготовок орудий из Састины Ривер 3 культуросодержащего уровня 1: *отщеп, отщеп утончения бифаса, микропластина, пластина, резцовый скол, неопределимые*

Table 5

Unifacial tool retouch data for Susitna River 3 component 1

Таблица 5

Данные по ретуши унифасиальных орудий Састины 3 культуросодержащего уровня 1

Raw Material Class Класс сырья	Retouched unifacial tool edge units Количество ретушированных орудийных лезвий (n=27)		Unifacial tool retouch index Индекс ретуши унифасиальных орудий	
Chert Кремень	Used Использован.	100	n	16
	Available Доступные	190	Mean RI Среднее RI	0.54
	%	*52.6*	σ	0.52
Chalcedony Халцедон	Used Использован.	8	n	2
	Available Доступные	20	Mean RI Среднее RI	0.27
	%	*40.0*	σ	0.28
Total Всего	Used Использован.	108	n	18
	Available Доступные	210	Mean RI Среднее RI	0.51
	%	*51.4*	σ	0.50

mean chert debitage weight. This supports primary reduction of locally available argillite, chalcedony, and basalt, and also non-local rhyolite. Primary reduction of non-local rhyolite could represent informal rhyolite cores entering the site. Tools in the assemblage are primarily made on informal flake blanks, but there is evidence for formal core reduction in bladelet, microblade, and biface thinning flake tool blanks. There is no evidence for bipolar knapping or scavenging in the assemblage. Taken together, the debitage and tool blank data suggest that primary reduction was a minor component of lithic reduction activities, but focused on informal reduction of locally available raw material, with some formal reduction of non-local cherts.

Secondary Reduction

Secondary reduction was a significant component of lithic technological activities during the C1 occupation (72.2 % of debitage assemblage), supported by the frequency of small and very small debitage. There are higher than expected amounts of chert secondary reduction debitage in the assemblage, suggesting a focus on secondary reduction of chert lithic raw materials. Differences in the proportions of reduction for raw materials are significant (χ^2 = 45.463, *df* = 4, *p* < .0001). Secondary reduction likely focused on biface production, supported by the high frequency of complex platforms on small debitage, despite the relatively small number of distinct biface thinning flake types. The high frequency of retouch chips supports a focus on tool maintenance, and the high frequency of smooth platforms on very small debitage supports a focus on unifacial tool maintenance. However, the presence of complex platforms on small debitage indicates bifacial tool maintenance also occurred.

Tools in the C1 assemblage are primarily informal tool types, are lightweight, and show overall moderate amounts of retouch. Most of the tools were made on non-local, high-quality chert. Chert tools exhibit retouch on a moderate percentage of edge units and were discarded with a moderate amount of utility remaining. Chert tools were retouched on a higher percentage of edge units and discarded with less utility remaining than chalcedony tools. Both chert and chalcedony tools were frequently discarded broken, suggesting conservation of lithic raw material. Given the frequency of retouch chips at the site, it is possible that additional formal chert tools (e.g., bifaces) were carried onto the site, resharpened, then carried away, and only more expedient tool types were discarded as they broke. The relatively high chert tool-to-debitage ratio also suggests that chert tools were carried onto the site, while chalcedony tools were probably made onsite and discarded after minimal use.

The relatively high number of burin spalls in the assemblage suggests that tool resharpening by burination occurred frequently. In several cases chert burin spalls were utilized as tools after removal, suggesting that chert lithic raw material was being used to the last amount of utility. The presence of burins suggests a specialized toolkit for working osseous or wood materials (Guthrie 1983). These data suggest that lithic activities during the C1 occupation focused on informal chert tool production, secondary reduction of chert bifaces and chert biface and unifacial tool maintenance.

Discussion

The Susitna River 3 site has only been initially tested, so it is possible that the lithic assemblage presented here represents a relatively small sample of lithic reduction and tool use at the site. Further excavation could reveal more diversity in the lithic assemblages, as assemblage diversity is strongly correlated with sample size (Kintigh 1984), and archaeological deposits are often spatially variable (Binford 1978). The episodic depositional sequence in the study area may have resulted in a palimpsest early Holocene assemblage at Susitna River 3 representing repeated site use over hundreds or thousands of years, however, the fact that the assemblage shows relatively little lithic raw material diversity suggests that it may represent a single occupation. This discussion works under the assumption that the Susitna River Component 1 assemblage represents a single occupation and is an accurate approximation of early Holocene lithic technological organization in the study area.

Early Holocene Lithic Technological Organization in the Upper Susitna Basin

Here I use toolstone procurement, primary reduction, secondary reduction, and tool production and discard patterns from Susitna River 3 Component 1 to reconstruct early Holocene lithic technological organization in the upper Susitna River basin (Table 6). The C1 lithic assemblage has a high percentage of non-local lithic raw materials. Lithic raw materials are primarily high-quality chert, presumably procured from at least two source locations outside of the study area. Locally available lithic raw material was used to supplement lithic technological activities during this occupation, primarily poorer-quality chalcedony available within 13 km of the site. There small amount of cortical debitage in the assemblage is all on locally available chalcedony, suggesting that primary reduction of lithic materials occurred elsewhere, and raw materials entered the site as tools and/or cores.

Primary reduction was a minor component of lithic reduction activities at Susitna River 3, and focused on informally reducing locally available chalcedony and minor amounts of non-local chert. There are no cores in the assemblage, suggesting that raw materials carried onto the site in core form left with the site's occupants. Tool production focused on burins, as well as small tools made on flakes, bladelets, and microblades. Tools were made on both informal and formal flake blanks, including bladelet, microblade, and biface thinning flake blanks. Formal tool blanks made on chert suggest that formally prepared chert cores were carried onto the site, reduced, and carried away. These assemblage attributes suggest raw material economization. Secondary reduction was the dominant technological activity at Susitna River 3, and focused on unifacial tool maintenance, with lesser amounts of biface production. The C1 toolkit is lightweight, consisting mostly of informal retouched flakes made on non-local, high quality cherts, as well as burins, a formal, specialized tool type typically associated with bone or woodworking. There are no bifaces in the C1 assemblage, although debitage indicates that some biface production and maintenance occurred.

Tools in the C1 assemblage show overall moderate amounts of edge retouch, and tools were discarded with moderate remaining utility. Non-local

Table 6

Lithic technological organization characteristics of the Susitna River 3 component 1 assemblage

Таблица 6

Характеристики каменной технологической организации Састины Ривер 3 культуросодержащего уровня 1

Technological activity Технологическая активность		C1 assemblage С1 ансамбль
Toolstone procurement *Производство орудий*		
Local / Местное		36%
Non-local / Неместное		64%
Cortical debitage/tools / Галечный дебитаж/орудия		0.004%
Primary reduction *Первичное расщепление*		
Primary reduction debitage Дебитаж первичного расщепления		28%
Formal tool blank Формальная орудийная заготовка		41%
Secondary reduction, tool production and use *Вторичное расщепление, производство и использование орудий*		
Secondary reduction debitage Вторичное производство дебитажа		72%
Formal: informal tool ratio Индекс формального: неформального орудия	count ratio количество рацио (индекс)	7:26 0.3
Mean retouched edge unit Средняя доля ретушированных лезвий		51%
Mean retouch index Средний индекс ретуши		0.51
Tool: debitage ratio Индекс орудия: дебитаж		0.05
Complete: broken tool ratio Индекс целых: брошенных орудий	count ratio количество рацио (индекс)	11:22 0.5
Raw material selection Избирательность материала сырья		Yes Да
Inferred mobility Предполагаемая мобильность		High Высокая

chert tools were more intensively reduced than local chalcedony tools. The frequency of burin spalls in the assemblage suggests that burins made on non-local chert were heavily retouched. Many chert burin spalls exhibit retouch, and chert tools were primarily discarded broken. There is raw material selection occurring at the site; primary reduction focused on locally available raw materials and non-local rhyolite, while secondary reduction focused on non-local, high quality cherts, suggesting economization of non-local chert. Site density is relatively low compared to later occupations at Susitna River 3 (Blong 2016).

There are patterns in the Susitna River 3 Component 1 assemblage that can be used to infer early Holocene mobility and provisioning strategies. The Susitna River 3 C1 assemblage meets several expectations of high mobility including lithic raw material procurement focused on high-quality non-local material, economization of non-local raw material, few artifacts bearing cortex, technological activities focused on tool maintenance, high tool-to-debitage ratio, evidence for raw material selection, lightweight tools that are both multipurpose (retouched flakes) and specialized (retouched bladelets, burins), and low artifact density. Interestingly, while tool blank data suggests that both formal and informal cores were reduced onsite, there is no technical debitage representing formal core reduction and maintenance, but this may be explained by the limited testing conducted at the site. Tools in the assemblage are mostly moderately retouched informal types, and complete tools were discarded onsite. These characteristics of the assemblage do not fit a high mobility pattern, but it could be that formal tools were maintained onsite and carried away, while informal tools were moderately retouched, and discarded onsite. This would explain the apparent informal aspects of the lithic technology, but cannot be proven with the current dataset.

In sum, the lithic technological characteristics of Susitna River 3 C1 suggest that this site represents a short-term camp occupied by a highly mobile group, traveling to the study area provisioned with the lithic raw material required for subsistence activities. The C1 occupants of the site created small, lightweight, informal and functionally specific tools on the material they carried with them, as well as informal tools on locally available lithic raw material. There are indications of a formalized, economized technology, but a significant portion of the technology was also informal, possibly to maintain a flexible component of the toolkit that can be used for a variety of activities (Nelson 1991). Burins–presumably used for bone and/or woodworking–suggests that organic material may have been incorporated with lithic technology into a complex gear system.

The preparation apparent in carrying high-quality lithic raw material in formal cores may be due to uncertainty about raw material resources in the study area, or knowledge that raw material resources in the study area were poor. Artifact density is relatively low in Susitna River 3 C1, and there is very little primary reduction, suggesting a short-term camp. The informal bladelet tools appear to have been produced for a single purpose, and not designed for long use-life and multiple functions. The presence of burins and tiny retouched bladelets and burin spalls in the toolkit suggests specialized activity at the site. These data suggest that Susitna River 3 C1 represents a long-distance logistical resource extraction camp, and not a residential forager camp.

What is the Nature of Upland Use in the Early Holocene?

The early Holocene C1 assemblage at Susitna River 3 has characteristics of a highly mobile land-use system. It is difficult to interpret broad patterns of landscape use from one site, but the C1 lithic assemblage suggests that early Holocene occupants of the site entered the study area on a long-distance logistical foray from a base camp outside of the study area. It is possible that the C1 occupation represents a long-distance logistical resource extraction camp tied to a base camp in the lowlands. A similar pattern of long-distance logistical forays into the uplands from lowland camps appears to have emerged in the Younger Dryas, characterize by the production and maintenance of formalized toolkits (e.g., microblades) by individuals provisioned primarily with non-local lithic raw materials (Graf and Bigelow 2011; Graf and Goebel 2009; Wygal 2017). This land use strategy is hypothesized to represent the spread of mobile groups hunting bison, wapiti, and caribou in the foothills and uplands of the Alaska Range, and may have been an adaptation to cooler and dryer conditions and accompanying increase in grass and forb vegetation favorable for mobile herd animals (Graf and Bigelow 2011). A highly-mobile logistical subsistence strategy appears to have continued into the early Holocene, again characterized by use of the uplands of the Alaska Range by hunter-gatherers targeting herd animals and carrying small, portable toolkits made on high quality non-local lithic raw material. While the early Holocene was warmer than the Younger Dryas, there is evidence for periods of drought, as well as period of cooler temperatures from 8500-8000 cal BP, suggesting that this highly mobile adaptation was a response to early Holocene climate instability (Mason et al. 2001). The early Holocene Susitna River 3 C1 assemblage supports an early Holocene highly mobile land use strategy in the central Alaska Range.

Previous research suggests that in the early Holocene hunter-gatherers abandoned the foothills and uplands of the central Alaska Range as climate warmed and became more mesic, re-focusing subsistence in the Tanana lowlands (Graf and Bigelow 2011), or even abandoning large parts of interior Alaska in response to the spread of boreal forest and accompanying lower carrying capacity (Potter 2008a). The initial occupation of the upper Susitna basin dates to the hypothesized period of abandonment in interior Alaska, and there may be a link between the dramatic ecological shift in interior Alaska and the initial settlement of the upper Susitna basin and surrounding regions (Wygal and Goebel 2012; Yesner 1998). Paleoecological data from the middle Susitna basin suggest an early Holocene expansion of cottonwood/aspen deciduous woodland (UAF, USGS, URS 2016). Perhaps this was the case in the upper Susitna as well, but Cervidae faunal remains recovered from an early Holocene context in the upper Susitna study area (Blong 2011) suggest that shrub and herbaceous vegetation persisted here in the early Holocene. It is possible that the upper Susitna basin offered a refugium for faunal species pushed out of the greater Tanana basin by spreading spruce forests; however, further paleoecological research is needed to determine the local sequence of terminal Pleistocene and early Holocene vegetation change.

Following deglaciation of southcentral Alaska, genetic evidence indicates that caribou populated southcentral Alaska from the north, from a larger Beringian population that persisted through the glacial period (Flagstad and Roed 2003; Hoffecker and Elias 2007). The modern-day Nelchina caribou herd ranges over 51,800 km^2 of caribou habitat across southcentral Alaska, moving great distances during its seasonal rounds through spring calving, summer and early fall range, fall rut, and winter range. The nature and location of seasonal movement can vary annually, but generally follow an east to west seasonal pattern (Hemming 1971; Skoog 1968). The earliest sites in southcentral Alaska are all situated near important seasonal Nelchina herd caribou locations; the Tangle Lakes sites are nearby historically known spring and fall caribou migration routes, Jay Creek Ridge is located in the eastern Talkeetna Mountains nearby historically known spring calving grounds, and the upper Susitna Basin is within the historically known summer range of the herd (Skoog 1968). While speculative, the connection between the earliest archaeology in the region and key historic caribou migration routes suggest that caribou may have been a significant subsistence resource here, and may have motivated increased use of the region by logistical parties (Robinson 2008; West 1974). The Susitna River 3 early Holocene component 1 data presented here offers support for the hypothesis that hunter-gatherers operated in a highly-mobile logistically oriented settlement pattern in the Younger Dryas and early Holocene, possibly moving through the Alaska Range in search of gregarious large mammals.

Understanding what motivated humans to move into the Alaska Range and southcentral Alaska sets up interesting questions that are beyond the reach of the lithic assemblage data from one site, or even the few sites we currently have marking the first appearance of humans in the Alaska Range and southcentral Alaska. Did terminal Pleistocene and early Holocene climate change drive changes in landscape use in central Alaska? Where did the initial settlers of southcentral Alaska come from, and what routes did they take to get there? What role, if any, did demographic pressure play in human range expansion? What opportunities did the recently deglaciated regions of the Alaska Range and southcentral Alaska offer early settlers of the region, and what were the constraints of these landscapes? Of critical importance to understanding human settlement of southcentral Alaska the timing of post-glacial landscape recovery. We currently have little paleoecological data that extends back to the period of initial settlement of this region (UAF, USGS, URS 2016). What evidence we do have suggests that there was a productive landscape in the region for thousands of years prior to initial settlement, so delayed landscape recovery does not appear to have been a factor limiting human settlement of this region (Blong 2016; UAF, USGS, URS 2016). The Alaska Range Uplands project has shown that with focused research in the uplands of the central Alaska Range we can make strides towards answering these questions.

Conclusions

The early Holocene Susitna River 3 Component 1 lithic assemblage offers a first take on early Holocene lithic technological organization in the upper Susitna basin. While more early Holocene sites need to be documented to expand our understanding of settlement of this region, the Susitna River 3 C1 assemblage provides insight into early Holocene settlement organization, landscape use, and the initial settlement of southcentral Alaska. The data presented here suggest that early Holocene settlers in the upper Susitna River basin were operating in a highly mobile logistical land-use system, where individuals occupied short-term camps and arrived provisioned with the lithic raw materials they needed for subsistence activities. Initial movement of hunter-gatherers into the study area may be tied to the spread of boreal forest biomes in the interior lowland and foothills regions, coupled with the emergence of upland caribou herd populations as an important resource.

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