MIDDLE-LATE HOLOCENE ARCHAEOLOGY OF THE UPPER DIAMOND FORK VALLEY, YUKON-CHARLEY RIVERS NATIONAL PRESERVE

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ABSTRACT

The upper Diamond Fork Valley contains middle to late Holocene archaeological components associated with large mammal hunting and processing. The region lies in the Yukon-Tanana Upland of interior Alaska at the northern extent of the North Lobe of the White River Ash, which fell around 1500 cal BP. This report presents the results of fieldwork in the upper Diamond Fork Valley and provides a preliminary outline for an archaeological district in the region. Nineteen sites were identified in the upper Diamond Fork area during preliminary surveys in 1985 and 2009. In 2016 and 2018, four sites (EAG-225, EAG-226, EAG-228, and EAG-662) were selected for intensive testing based on stratigraphic integrity and subsurface archaeology observed during initial survey. This research draws attention to middle and late Holocene land use in the Yukon-Tanana Uplands, a region that is often overlooked in interior Alaska archaeology.

INTRODUCTION

Yukon-Charley Rivers National Preserve (the Preserve; Fig. 1) encompasses 1 million hectares of east-central Alaska, stretching west from the United States–Canada border along 185 km of the Yukon River and south to include the entire Charley River watershed in the Yukon-Tanana Uplands (the Uplands). Since the formation of the Preserve in 1980 with the Alaska National Interest Lands Conservation Act (ANILCA), National Park Service (NPS) archaeologists have documented 659 archaeological sites within its boundaries. In an assessment of sites documented in the Preserve during the 1980s, Griffin and Chesmore (1988) described several limitations to our understanding of archaeology in the region. These limitations included uneven sampling during reconnaissance-level survey, insufficient comparative paleoenvironmental data, underdeveloped radiocarbon and typological chronologies, inconsistencies with site documentation, and a lack of synthesis of survey data.

NPS archaeologists have since increased survey coverage, developed standardized practices for site documentation, encouraged reporting, and contributed to the Alaska Heritage Resources Survey (AHRS) and NPS site databases. Additionally, increased attention on human migration in central Alaska and the Yukon, both as a route for the late Pleistocene colonization of the Americas (Goebel and Potter 2016) and in response to the deposition of the late Holocene White River Ash (Mullen 2012), has led to a surge in paleoenvironmental research that provides a backdrop for these events. These developments have increased the accessibility of archaeological data for the Preserve and broadened our understanding of land use in the Yukon and Charley River Valleys.

Recent efforts have focused on preparing determinations of eligibility (DOEs) for the National Register of Historic Places (NRHP) for sites in the Preserve. As a component of this project, NPS archaeologists revisited the upper Diamond Fork Valley in the Uplands to conduct intensive testing and complete site condition assessments (Fig. 1). This report presents the results of four seasons (1985, 2009, 2016, and 2018) of fieldwork in the upper Diamond Fork Valley and provides a preliminary outline for an archaeological district in the region. The results inform on middle to late Holocene human land use in the Uplands and contribute to our understanding of the archaeological record of an underconceptualized region and time period in interior Alaska (see discussions in Coffman et al. 2018; Gelvin-Reymiller and Potter 2009; Smith 2012).

THE UPPER DIAMOND FORK VALLEY

ENVIRONMENTAL CONTEXT

The project area lies in the southeast corner of the Preserve in the Uplands, which consist of incised valleys, gentle ridges, and tall peaks ranging from 500 to 1900 masl (Thorson 1982; Wahrhaftig 1965:24). Drainages in the Uplands generally feed north into the Yukon River and south into the Tanana River (Weber 1986). The Diamond Fork Valley forms at the junction of three small drainages that flow from narrow valleys to the west, southwest, and southeast, then continues north along a 6 km stretch before feeding into the Seventymile River, which flows into the Yukon River to the east (Fig. 2). Elevated glacial landforms and small lakes scatter the valley, which widens to approximately 1.5 km at the junction of the drainages, then narrows to roughly 1 km to the north.

At the peak Pleistocene glaciation, more than 20% of the Uplands were glaciated (Weber 1986:79); however, the majority of interior Alaska remained ice-free (Péwé 1975). The moraines and glacial features apparent throughout the Diamond Fork Valley are likely the product of the

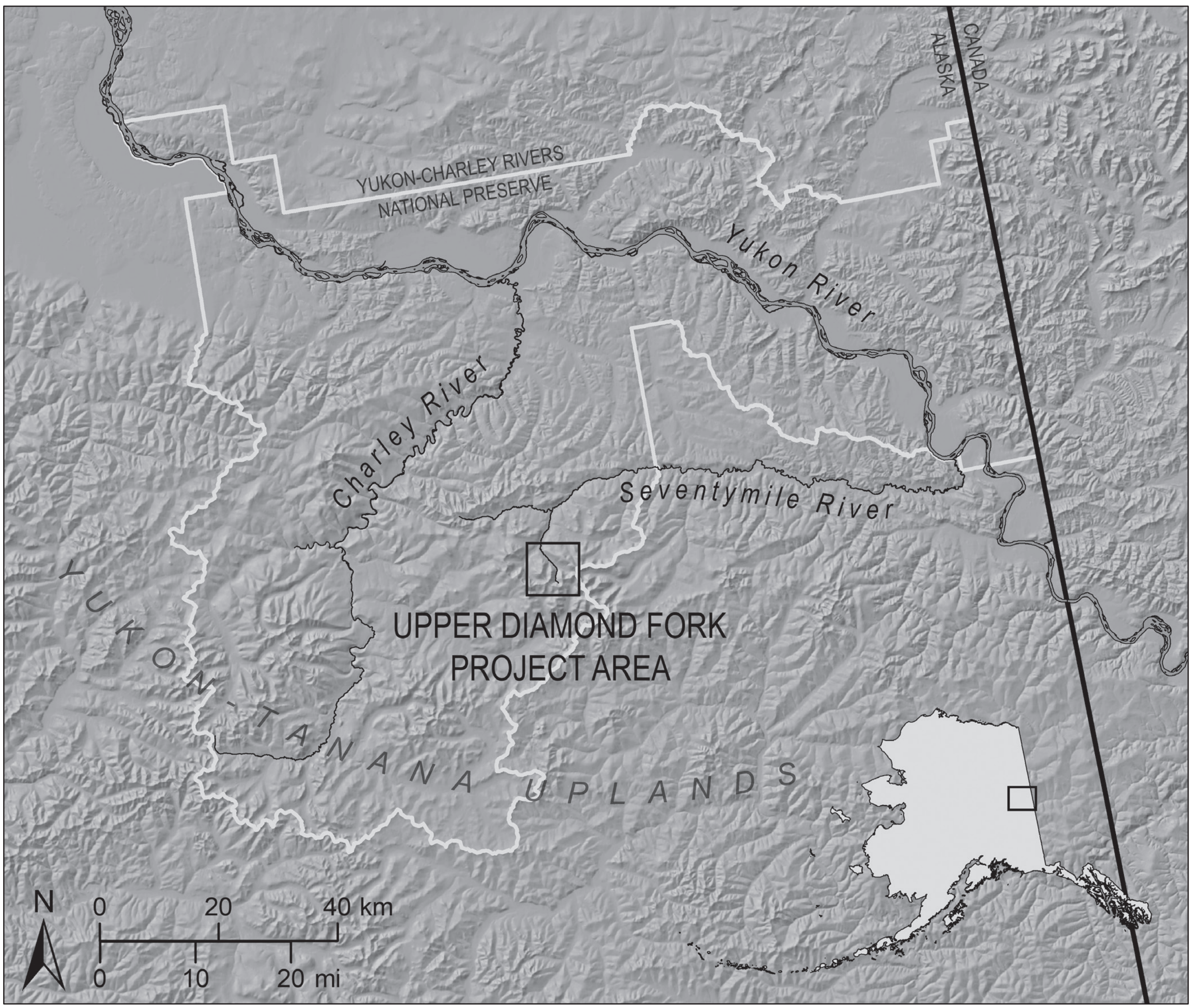

Figure 1. Yukon-Charley Rivers National Preserve and the upper Diamond Fork project area.

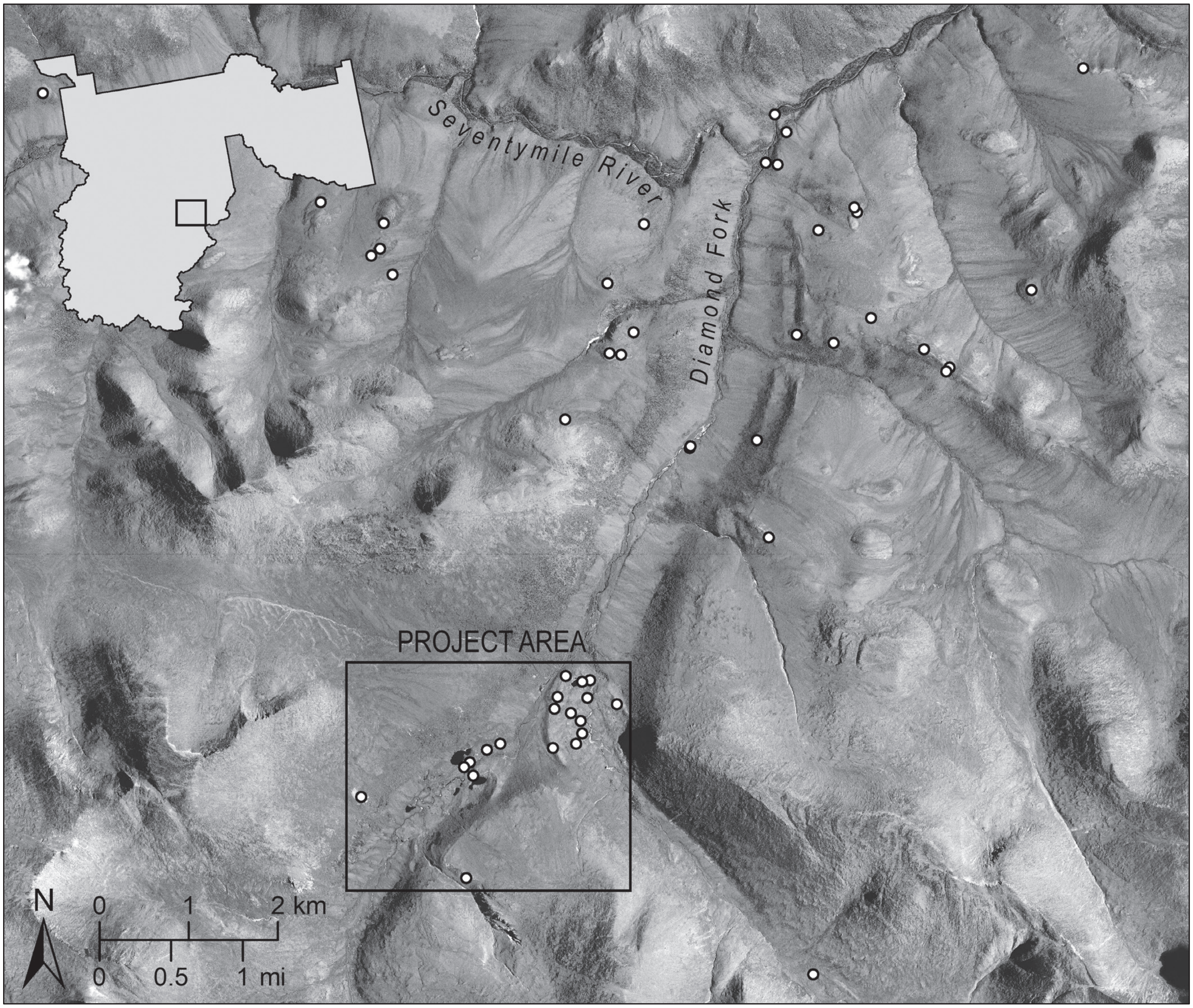

Figure 2. Known prehistoric archaeological sites in the upper Diamond Fork project area and surrounding locations.

late Pleistocene Salcha glacial episode (Weber 1986:90). Two minor Holocene glacial phases (Ramshorn I and II) produced terminal moraines in high north-facing cirques at the headwaters of Ramshorn Creek, the Seventymile River, and the Charley River and at Mount Harper in the Uplands (Weber 1986:93). Although the glaciers were restricted at high elevations, associated processes such as outburst flooding and proglacial aggradation likely affected local ecosystems in the Diamond Fork through the late Holocene, as such processes did in the Uplands during earlier glaciation (Froese et al. 2003).

A range of forcing mechanisms impacted past environments in interior Alaska and spurred the shift from the mosaic of graminoid-herbaceous tundra of the Last Glacial Maximum to the expansion and development of the boreal forest by the middle Holocene (Anderson et al. 2004; Bigelow et al. 2003). Discontinuous permafrost underlies the region, and the current climate of the Preserve is subarctic, interior, and continental (Sousanes and Hill 2017). Modern vegetation communities range from open woodlands and boreal forests in sheltered settings, alpine tundra at higher elevations and in exposed environments, stands of early succession species in disturbed habitats, and graminoid-herbaceous tussock tundra in poorly drained locations (Nowacki et al. 2003). The Uplands serve as habitat for a variety of wildlife and provide spring calving grounds for the Fortymile Caribou Herd, which has rebounded to roughly 40,000 after population decline from 300,000 to 5000 between 1920 and 1970 (Harvest Management Coalition 2012).

The Preserve lies at the documented extent of the North Lobe of the White River Ash (WRA), which stretches across east-central Alaska into the Yukon Territory (Mulliken et al. 2018). The WRA is a Plinian tephra that erupted from the Bona-Churchill massif in the St. Elias Mountains in two events: the North Lobe (WRAn) between 1830 and 1500 cal BP and the East Lobe (WRAe) at 1147 cal BP (Clague et al. 1995; Lerbekmo 2008; Lynch et al. 2018; Preece et al. 2014). Documented terrestrial and aquatic ecosystem response to historic volcanism in North America (such as Dale et al. 2005; Griggs 1918; Hildreth and Fierstein 2012) can serve as a proxy for understanding prehistoric ashfalls. These records inform on the impact that variables such as tephra thickness and particle size, season of deposition, vegetation type, and precipitation can have on recovery time (see discussions in Mulliken 2016:110–115; VanderHoek and Nelson 2007; Workman 1979).

Researchers have speculated that the deposition of the WRA, particularly the East Lobe that dispersed as far as northern Europe (Jensen et al. 2014), could have affected vegetation and animal populations in northwestern North America. In turn, these changes could have influenced late Holocene human activity in the region, including subsistence, trade networks, technology, settlement patterns, and migration (Derry 1975; Fast 2008; Kristensen et al. 2019; Lynch et al. 2018; Moodie et al. 1992; Mullen 2012; Workman 1979). The late Holocene archaeological record in central Alaska and the Yukon exhibits shifts in technology, such as the increased presence of bone tools and the appearance of the bow and arrow, that are contemporaneous with a transition from residential to logistical mobility (see discussion in Potter 2008). The association between these changes and the deposition of the WRA remains uncertain.

HUMAN OCCUPATION

Large mammals such as bison (*Bison priscus*), elk (*Cervus elaphus*), and caribou (*Rangifer tarandus*) were important components of prehistoric subsistence practices in interior Alaska. This has led researchers to postulate that unglaciated regions of upland settings, which were likely key habitats for these species, were central to land use strategies throughout the late Pleistocene and Holocene (Blong 2018; Gelvin-Reymiller and Potter 2009; Glassburn 2015; Guthrie 1968; Potter 2008; Smith 2012; Wygal 2010). Although the Preserve's radiocarbon chronology continues to grow with additional testing, only 12 dates are directly related to prehistoric components and range from 4550 cal BP (Beta-258421; Buvit and Rasic 2011) to 530 cal BP (Beta-288585). Typological and relative chronological markers found at archaeological sites throughout the Yukon and Charley River Valleys (such as Northern Archaic side-notched points and the WRAn) also suggest that the region was occupied throughout the middle and late Holocene.

Researchers have identified precolonial and early historic Han Athabascan settlements (Andrews 1987; Morlan 1973; Shinkwin 1979; Workman 1978) and later nineteenth and twentieth century mining remains (Allan 2015; Beckstead 2003; Houlette 2016) throughout the Preserve and in surrounding regions. Traditional Han Athabascan territory stretched from the upper Yukon River near the Klondike to the mouth of the Kandik River and included the northern region of the Uplands (Crow and Obley 1981). The Han hunted caribou in the Uplands during the fall after the end of fishing season and in the spring, then cached the meat and returned to fish camps along the Yukon River and associated tributaries (Mishler and Simeone 2004; Osgood 1971). Although future research will likely expand the chronology of human occupation in the Preserve, these data illustrate the longstanding use of upland settings in precontact subsistence and settlement practices.

METHODS

During the 1985 field season, NPS archaeologists completed reconnaissance-level pedestrian survey of the Diamond Fork and upper Seventymile Rivers (Fig. 2), focusing on the east and south sides of both rivers due to time constraints, travel distance, and high water. The survey followed the route of the Diamond Fork from its headwaters to the junction with the Seventymile River, then turned east along the Seventymile River corridor. The crew targeted high-probability areas such as glacial features that could serve as natural barriers for game, while avoiding areas with little archaeological potential in low-lying regions, boggy and inundated settings, and steep slopes (Griffin and Chesmore 1988). The 1985 crew documented newly discovered sites and surrounding areas, though shovel testing in this area was minimal.

In 2009, an NPS crew returned to the Diamond Fork and relocated the 1985 sites to complete additional testing and assessment of cultural remains. The crew completed pedestrian survey and transects within range of the documented site locations to identify exposed surface artifacts or the site datum. Upon identification of a site, the crew assigned a unique field number, completed site forms, photographed the site and artifacts, and recorded GPS provenience of surface artifacts, features, and tests with a high-accuracy Trimble Geo 7x receiver. In keeping with the Preserve's Scope of Collection (Houlette 2012), only diagnostic, obsidian, and threatened surface artifacts were collected, in addition to all subsurface remains encountered while testing. Except at sites with no sediment deposition, at least one 30-cm-diameter shovel test was excavated to glacial till or bedrock, and all contents were screened through ¼-inch mesh to investigate stratigraphy and identify subsurface components.

Based on the 2009 results, sites with potential for intact subsurface deposits were selected for intensive testing in 2016 and 2018. Test units ranged from 50 x 50 cm to 1 x 1 m and were placed over concentrations of surface artifacts or areas with suspected features. The goal of testing was to identify components with dateable organic remains, delineate local stratigraphy, and evaluate sites for eligibility in the NRHP. Test units were oriented toward true north, excavated with a trowel in 5 cm arbitrary levels, and vertical control was maintained with a unit datum. Each unit was photographed, and all in situ surface artifacts were mapped and collected with associated provenience information prior to excavation. The excavators obtained soil matrices from suspected features, and all other sediment was screened through ⅛-inch mesh. Excavators photographed and profiled the unit walls before backfilling and obtaining end-of-excavation overview photos.

General post-field processing procedures included digitizing field notes, uploading GPS data (differentially corrected with GPS Pathfinder Office) into ArcMap 10.7.1 GIS software for mapping, geotagging field photos, and cataloging collections in the DOI Interior Collections Management System database. Relevant organic samples were submitted to Salix Archaeological Services for taxonomic identification and then forwarded to the Center for Accelerator Mass Spectrometry at Lawrence Livermore National Laboratory (CAMS) and the Center for Applied Isotope Studies at the University of Georgia (UGAMS) for radiocarbon dating services. Updated site information was submitted to the AHRS and NPS databases.

RESULTS

SURFACE SURVEY

Between 1985 and 2018, NPS crews identified 19 prehistoric sites in exposed areas on prominent glacial landforms in the Diamond Fork region (Table 1; Fig. 2). The sites range from small surface lithic scatters to multi-scatter sites with formal tools and hundreds of pieces of debitage of multiple material types. Thirty-three discrete surface lithic scatters were documented at 19 sites in the Diamond Fork project area, accounting for roughly 3500 surface artifacts. At least 20 distinct material types were identified, including chert, chalcedony, basalt, obsidian, and quartz. The local Seventymile chert (a fine- to medium-grained light to dark grayish green chert with a dull luster and a cream-colored weathering rind) accounted for roughly 94% of all surface lithic artifacts and was present in 32 lithic scatters at sites in the project area. Otherwise, a fine-grained black chert with a dull to waxy luster was found in 12 scatters at nine sites in the project area, but only accounted for roughly 3% of the total Diamond Fork surface lithic assemblage. The remaining lithic material types were found at no more than six sites in the project area, and each comprised 1% or less of the overall surface lithic assemblage.

Table 1. Diamond Fork survey totals.

Survey year	Known sites	New sites
1985	–	9
2009	7	8
2016	15	4
2018	5	–

SUBSURFACE TESTING

During the 2016 and 2018 field seasons, 51 shovel tests (30 cm diameter) were excavated at the 19 sites previously documented in the project area. Shovel test depths averaged 34.2 cmbs, with minimum and maximum depths of 14 and 78 cmbs, respectively. Of the 51 shovel tests, 20 were positive for cultural resources, with a total of 142 artifacts recovered. The WRAn was documented in 21 of the test pits and averaged in depth from 5.8 to 9.3 cmbs. Of the 21 test pits that contained the tephra, three had cultural material above the tephra, two had cultural material below the tephra, one had cultural material both above and below the tephra, and three had cultural material with unclear association with the tephra.

Four sites were selected for intensive testing (EAG-225, EAG-226, EAG-228, and EAG-662) based on the presence of subsurface archaeology and stratigraphic integrity observed during initial testing. EAG-225 consisted of five surface lithic scatters found in a deflated area on a knoll overlooking a small unnamed lake and the upper Diamond Fork Valley. Eight material types were noted at the site, and artifacts included 115 flakes, a microblade, a flake core, and two retouched flakes. EAG-226 and EAG-228 overlook a small lake to the south and east and are located along a crescent-shaped lateral moraine south of the junction of the drainages that form the upper Diamond Fork. Together, the sites consisted of nine surface lithic scatters with five distinct material types and an estimated 200 flakes, one biface fragment, two unifacial tools, and one flake tool. EAG-662 consisted of a subsurface lithic scatter eroding out of the east face of a cutbank to the west of a tributary of the upper Diamond Fork. The site contained roughly 200 flakes, two biface fragments, and one flake tool. Three different material types were identified in the lithic assemblage.

Ten test units were excavated at these four sites in 2016 and 2018 (Table 2), with an average depth of 33.5 cmbs and a minimum and maximum depth of 20 and 50 cmbs, respectively. Of the 2278 artifacts collected from the 10 test units, 1564 had defined spatial association with the WRAn. Only 2% of the assemblage was found above the tephra. Approximately 68% of the material was found below the tephra, and 30% had unclear association with the tephra (disturbed, within the deposit, or at the contact with underlying or overlying horizons). In addition, two potential features were identified at EAG-228, one below the tephra and the other from a test unit that did not contain the WRAn.

COLLECTIONS AND RADIOCARBON DATES

The total assemblage from the 19 sites documented in the project area during 2016 and 2018 includes 2475 artifacts and samples, the majority of which (93%) were collected during excavation of the 10 test units at EAG-225, EAG-226, EAG-228, and EAG-662. Ninety-five percent of the material consisted of lithic artifacts, while the remainder included a small faunal assemblage, sediment samples, and charcoal samples. Twelve tools were identified in the upper Diamond Fork collection and include one biface, three microblades, and seven unifacial tools from EAG-228 and one additional unifacial tool from EAG-662 (Fig. 3). Twelve organic samples were radiocarbon dated in 2016 and 2018 (Table 3).

STRATIGRAPHY

The larger test units allowed for documentation of stratigraphy with greater detail than the shovel tests (see USDA 2015 for horizon designation guidelines; Fig. 4). A very dark reddish brown (5YR 2.5/2) to very dark brown and black (10YR 3/2, 2/2, 2/1) vegetation mat with dense root cover (O horizon) and underlying loamy humic horizon

Table 2. Shovel test and test unit totals from four Diamond Fork sites.

Site	Volume excavated (m^3)	Assemblage content	Number of artifacts with clear tephra assoc.	Percent above tephra	Percent below tephra
EAG-225	0.51	debitage (*n* = 746); charcoal samples (*n* = 1); sediment samples (*n* = 7)	479	4	96
EAG-226	0.34	debitage (*n* = 25); charcoal samples (*n* = 4); sediment samples (*n* = 6)	10	60	40
EAG-228	0.88	biface (*n* = 1); microblades (*n* = 3); unifacial tools (*n* = 7); debitage (*n* = 1045); fauna (*n* = 86); charcoal samples (*n* = 11); sediment samples (*n* = 12)	218	7	93
EAG-662	0.76	unifacial tool (*n* = 1); chert flakes (*n* = 473); charcoal samples (*n* = 2); sediment samples (*n* = 6)	462	5	95

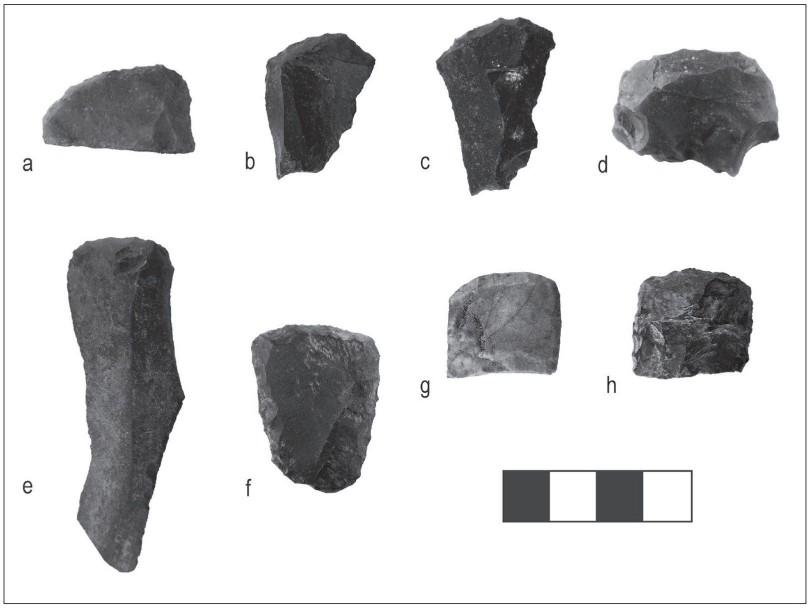

Figure 3. Unifacial tools from TU01CRH (a–d), TU01JDR (e–f), and TU02JDR (g) at EAG-228 and TU03CRH (h) at EAG-662.

(A horizon) capped each test unit. Underlying the organic-rich horizons, the test units generally exposed unaltered silty to sandy loam parent material (C horizon) ranging from olive brown (2.5Y 5/3) to dark yellowish brown (10YR 4/2). In all test units, with the exception of TU01CRH at EAG-228, a roughly 3 cm thick paleosol (Ab horizon) and deposit of light olive brown (2.5Y 5/3) to light gray (2.5Y 7/2) creamy silty clay that retained water (tephra; 2C horizon) was noted underlying several centimeters of unaltered sediment. These test units generally continued into strong brown (7.5YR 4/6) to very dark grayish brown (10YR 3/2) coarse sand with silt (3C1) before terminating in gravels and cobbles (glacial till; 3C2). All test units exhibited various signs of disturbance due to cryoturbation, bioturbation, and solifluction.

Table 3. Diamond Fork radiocarbon dates from 2016 and 2018 testing.

Lab no.[1]	Provenience	Material[2]	RCYBP	Cal BP (2σ)[3]	δ13C
CAMS 178984	EAG-228, S11JDR, assoc. w/biface	charcoal	1910 ± 30	1740–1930	–25
CAMS 178985	EAG-225, TU02EC, paleosol beneath tephra, 10 cmbs	charcoal	2445 ± 35	2360–2700	–25
CAMS 178986	EAG-226, S07JDR, assoc. w/flakes	charcoal	1845 ± 30	1710–1865	–25
CAMS 178987	EAG-226, S02EC, beneath tephra, 14 cmbs	charcoal	3850 ± 40	4155–4410	–25
UGAMS 40196	EAG-228, TU01CRH, potential hearth, 7 cmbs	*Picea* sp. charcoal	1680 ± 20	1540-–1690	–24.53
UGAMS 40197	EAG-228, TU01CHP, beneath tephra, 8 cmbs	*Picea* sp. charcoal	2140 ± 20	2050–2300	–25.06
UGAMS 40198	EAG-228, TU02JDR, assoc. w/bone, 10 cmbs	*Picea* sp. charcoal	1990 ± 20	1890–1990	–23.73
UGAMS 40199	EAG-228, TU02JDR, hearth, 20 cmbs	*Picea*/*Larix* sp. bark	1860 ± 20	1730–1870	–24.22
UGAMS 40200	EAG-662, TU03CRH, Paleosol 1/2, 5-10 cmbs	cf. *Alnus*/*Betula* sp. charcoal	150 ± 20	0–280	–28.06
UGAMS 40201	EAG-662, TU03CRH, Paleosol 3, 20-–25 cmbs	*Alnus* sp. charcoal	450 ± 20	490–530	–25.38
UGAMS 40202	EAG-662, TU03CRH, Paleosol 4, 25–30 cmbs	*Alnus* sp. charcoal	1240 ± 20	1080–1260	–27.03
UGAMS 40203	EAG-662, TU03CRH, within tephra, 25–30 cmbs	cf. *Alnus*/*Betula* sp. charcoal	1210 ± 20	1070–1220	–25.57

1 CAMS = Center for Accelerator Mass Spectrometry at Lawrence Livermore National Laboratory; UGAMS = University of Georgia Center for Applied Isotope Studies

2 Salix Archaeological Services

3 CALIB 7.1 (Stuiver and Reimer 1993)

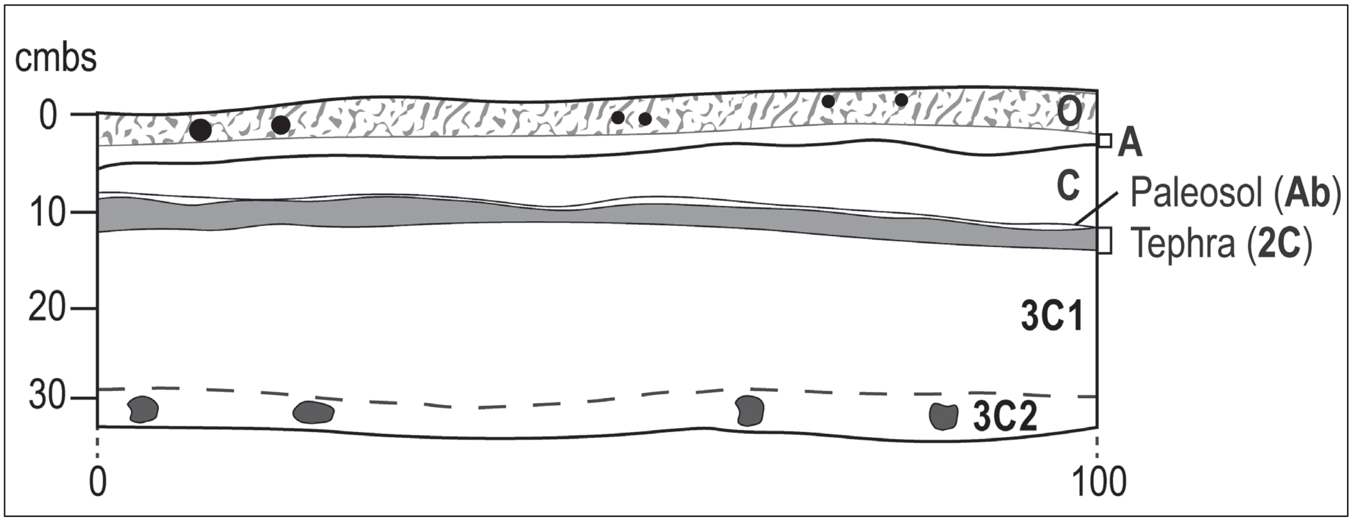

Figure 4. Stratigraphic profile generalized from testing at EAG-225, EAG-226, and EAG-228.

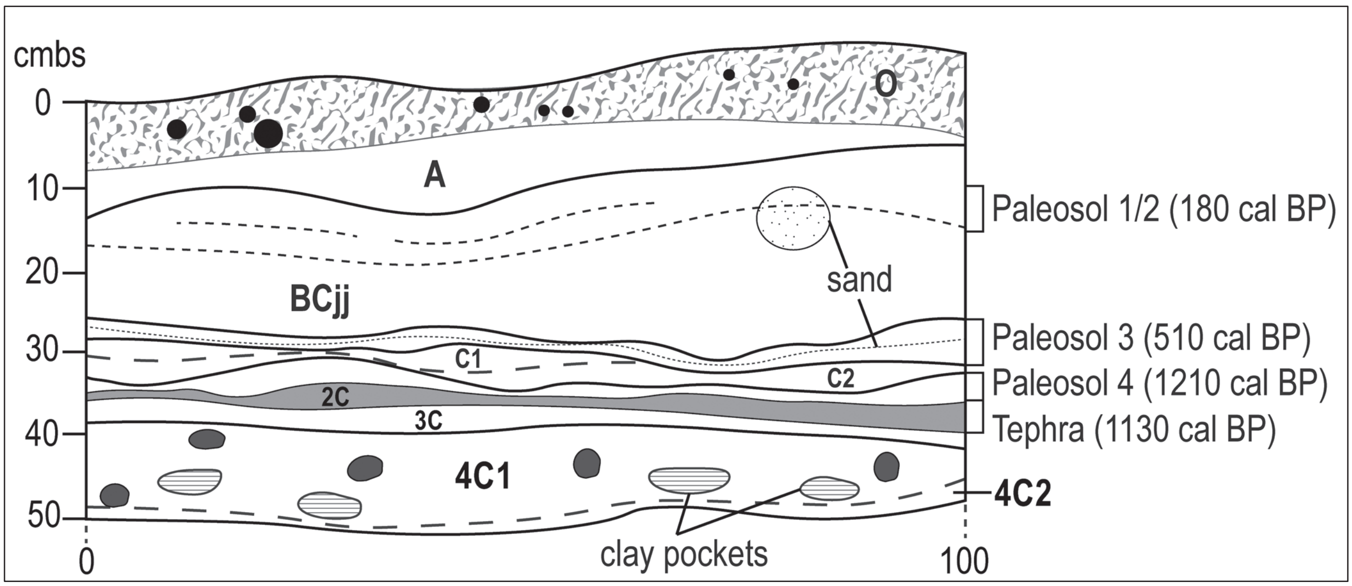

Figure 5. EAG-662 stratigraphic profile.

Testing at EAG-662 revealed a substantial deposit of alluvial sediments with buried horizons not observed elsewhere in the project area (Fig. 5). Underlying the organic horizons, excavation exposed a cryoturbated, mottled olive and dark brown (2.5Y 4/3; 10YR 3/3) coarse sand with silt (BCjj horizon), and two discontinuous dark brown to black (10.5YR 3/2; 10YR 2/1) silty clay paleosols (Ab and 2Ab horizons). Following these horizons, the unit exposed a pedocomplex with dark brown to black (7.5YR 3/2; 10YR 3/2, 2/1) paleosols of silty clay that retained water, interspersed with lenses of dark grayish to yellowish brown (10YR 4/2, 4/4) coarse sand. A dark gray (10YR 4/1) coarse sand with some clay and silt (3C horizon), which was also observed at EAG-226, was found immediately beneath the tephra. The unit terminated in sterile, mottled dark yellowish to reddish brown (10YR 4/4; 5YR 3/3) coarse sand with gravels, cobbles, and pockets of olive brown (2.5Y 4/3) clayey silt (4C2 horizon).

DISCUSSION

LAND USE

In the Diamond Fork Valley, the presence of at least one hearth feature, large mammal remains, and the dominance of unifacial tools in the lithic assemblages suggest a range of activities likely occurred in the region. Although archaeologists debate the use of unifacial tools to remove hair and flesh from hides (Siegel 1984), the co-occurrence of the lithic and faunal remains at EAG-228 indicates that occupants likely processed game at the site. These remains demonstrate that organic artifacts and features can preserve in shallow contexts at sites that may initially appear to contain only surface components. Furthermore, the presence of lithic tools associated with animal processing suggests that sites in the Diamond Fork were occupied for a longer duration than brief lookout or tool maintenance stations. Identification of additional faunal material could contribute to our understanding of animal processing techniques, resource transportation, and mobility.

Griffin and Chesmore (1988:98, 145) commented on the repeated use of "dead-end" drainages, such as the upper Diamond Fork Valley, in the Uplands for hunting throughout prehistory. The density of artifacts and sites in the Diamond Fork supports this idea and suggests that the region was used intensively throughout the middle to late Holocene. If upland drainages were used exclusively for shorter-term hunting and processing camps, then the archaeological record in lower regions of the Uplands should contain evidence of residential sites occupied for a longer duration.

For example, Coffman et al. (2018) report on late Holocene residential and storage features at EAG-863, EAG-865, and EAG-866 that are roughly contemporaneous with components in the Diamond Fork Valley. The sites are approximately 50 km to the south-southwest along the Middle Fork of the Fortymile River and sit at approximately 600 masl. The stratigraphic context of pre-ashfall cultural remains at these sites is similar to that observed in the Diamond Fork, with artifacts immediately beneath the WRAn at the contact with the underlying silt (Coffman et al. 2018). Comparison of residential sites with shorter-term hunting camps can contribute to our understanding of mobility in the Uplands and could identify potential impacts of the WRAn on human settlement and subsistence strategies.

DEPOSITIONAL ENVIRONMENT

Within the Diamond Fork Valley, the elevated sites along moraines generally expressed compressed stratigraphy that made distinction between pre- and post-ashfall components difficult to interpret. At EAG-228, the 1890–1990 and 1730–1870 cal BP dates (UGAMS 40198 and 40199) from TU02JDR and the 1540–1690 and 1740–1930 cal BP dates (UGAMS 40196 and CAMS 178984) from TU01CRH and S11JDR were derived from charcoal assumed to be associated with the same subsurface hearth features, but the calibrated age ranges do not overlap for either pair (Table 3). The discrepancies in the dates suggest that firmer sampling control is required, particularly at sites with compressed stratigraphy.

In contrast, the two sites tested on a cutbank in the project area revealed discernible stratigraphy that informs on the paleoenvironment of the river valley before and after the deposition of the WRAn. Multiple depositional events occurred in the region after alteration of the valley during late Pleistocene glaciation (Weber 1986). At least one depositional event preceded the WRAn ashfall, which is reflected in the light gray sands overlying basal glacial till and coarse outwash sediments at EAG-226 and EAG-662. After the deposition of the WRAn, which was disturbed and redeposited in many contexts, pedogenesis occurred on the tephra. Soil formation on tephra is often attributed to the fact that these deposits cover vast surface areas, are able to retain water, and often contain weatherable elements (Dilley 1988; Ping et al. 1989).

The charcoal pulled from the tephra and overlying paleosol dated to 1070–1220 and 1080–1260 cal BP, respectively (USGAMS 40203 and 40202). Although a slight reversal is present, the calibrated date ranges overlap. The charcoal likely relates to a natural burn event that occurred at approximately 1200 cal BP, after the deposition of the WRAn by 1500 cal BP. The pedocomplex present in the stratigraphy at EAG-662 likely reflects a period of ecological recovery and reestablishment of vegetation communities following the ashfall. This period of general landform stability was intermixed with brief periods of fine clay and silt deposition and some higher-intensity deposition of thin sand lenses, which are present throughout the paleosols. Based on a date derived from charcoal sampled from the surficial paleosol, this series of depositional events occurred until 490–530 cal BP (UGAMS 40201) and could relate to overbank flooding and aeolian redistribution of floodplain sediments from the drainage to the east of the site.

After this period, roughly 25 cm of coarser silty sand was deposited over a 500-year period, with one hiatus in deposition indicated by a weak paleosol dating to around 150 years ago. The cause of the shift toward a higher-energy depositional environment in the river valley is unclear, but the thick deposit of the coarser silty sand overlying the pedocomplex could relate to increased seasonal flooding and reworking of floodplain sediments. Notably, the charcoal from EAG-662 is predominantly alder (*Alnus* sp.), while the current vegetation is dominated by shrub birch, small stands of spruce, and a lesser component of alder. Alder is an early-succession species that generally prefers disturbed habitats, and the presence of this genus could reflect landform characteristics and disturbance regimes. Overall, this suggests that the landform is in a period of stability relative to its history. Additional survey and testing in the Uplands could clarify whether the depositional event that occurred over the last 500 years was the result of localized processes or a reflection of broader environmental change.

THE WHITE RIVER ASH NORTH LOBE

The results of testing in the upper Diamond Fork Valley suggest that the region was occupied before and after the deposition of the WRAn. Modern seasonal trends in high-atmosphere winds (Muhs and Budahn 2006) and ice-core data (Jensen et al. 2014) suggest that the WRAn was deposited during the summer. In upland settings such as the Diamond Fork Valley, summer deposition could have allowed for wind scouring and exposure of surfaces and vegetation (Workman 1979). However, precipitation can harden fine ash commonly observed in distal tephra deposits into an impenetrable barrier (Antos and Zobel 2005). Ashfalls as thin as 2 cm can hinder growth of plant species such as reindeer lichen (*Cladonia rangiferina*), which can take 20 to 80 years to recover after major disturbances (Henry and Gunn 1991). Taller vegetation can generally recover from ashfalls less than 5 cm thick a few years after deposition (Antos and Zobel 2005).

Bunbury and Gajewski (2013) describe a 60- to 100-year period of recovery in lacustrine ecosystems in the southwest Yukon after the deposition of the WRAe. Historical observations suggest that riverine resources such as salmon can recover within 10 years of an eruption (Hildreth and Fierstein 2012). Researchers have documented the WRAn in exposures to the north along the Yukon River and associated tributaries (Froese et al. 2005). If summer salmon fishing occupied a significant portion of subsistence strategies for late Holocene inhabitants in the Preserve, as it did ethnohistorically (Mishler and Simeone 2004; Osgood 1971), then a single season of reduced fishing returns would have a drastic impact on these communities.

In response, populations in the region may have emphasized terrestrial mammal hunting in unaffected or minimally impacted regions the season following the ashfall to supplement winter stock. However, consumption of plants or contaminated water after an ashfall could lead to the ingestion of chemicals that would cause health problems or death (Cronin et al. 2003; VanderHoek and Nelson 2007). Kuhn et al. (2010) describe a partial genetic replacement in caribou population in the southern Yukon at approximately 1000 years ago, which is likely linked to local extirpation as a result of the WRAe and subsequent recolonization by a genetically distinct population following ecosystem recovery.

Although the deposition of the tephra likely affected large mammal range in the Uplands, and therefore human land use strategies, the draw to the upper Diamond Fork was significant enough for people to return after the ashfall. However, initial assessment of the stratigraphic context of the archaeology recovered during testing at EAG-225, EAG-228, and EAG-662 (Table 2) suggests that there may have been decreased use of the upper Diamond Fork Valley following the deposition of the WRAn. Additional testing is required to establish this pattern as a trend, and any correlation between these events does not necessarily mean that they are related. Alternative factors that could have impacted late Holocene occupation in the upper Diamond Fork Valley should be considered.

The context of the cultural components and level of testing in the region is not sufficient to establish a chronology of post-ashfall occupation. The two flakes found at EAG-662 above the tephra were indirectly dated to approximately 500 cal BP by association with dates obtained from the paleosol that they were found in. Furthermore, the lithic assemblages from the upper Diamond Fork sites lack typological diagnostic artifacts that could inform on cultural continuity or modification of technology to accommodate post-ashfall conditions. Additional survey and testing in surrounding drainages in the Uplands would provide a valuable basis for comparison of pre- and post-ashfall components and could address these data gaps.

DEFINING AN ARCHAEOLOGICAL DISTRICT

The upper Diamond Fork Valley sites likely meet the National Register's definition of an archaeological district as a concentration of cultural resources that retain integrity, share common characteristics, reflect related activities, and are geographically distinguishable from surrounding cultural remains by density, scale, type, or age. This research illustrates that the Diamond Fork sites are related by function, depositional context, and representation of intensive use of a discrete geographic region of the Uplands. Although the sites may lack individual distinction, they collectively provide information regarding the WRAn, which was a major prehistoric event that affected the environment of Alaska and the Yukon and, in turn, human subsistence and land use strategies.

Continued comparison of this region to other clusters of upland sites will illustrate the unique characteristics of sites in the Diamond Fork and help to define the spatial boundaries of this potential district. Notably, the Foster-Keith Site (CHR-077) sits within a complex of sites stretching along an 8 km ridge system roughly 20 km to the north and downstream from the junction of the Diamond Fork with the Seventymile River. This complex also likely merits district-level nomination in the NRHP, and archaeologists have cited the area as containing some of the densest and potentially oldest sites within the Preserve boundaries (Devinney 2003). This further illustrates the intensity of past land use along the Seventymile River corridor and associated tributaries, such as the Diamond Fork. Comparison between the lithic assemblages documented in these regions could clarify trends in technological organization and raw material procurement, particularly for the local Seventymile chert, and provide a basis for comparing pre- and post-ashfall components in the area.

CONCLUSION

Although many of the problems outlined by Griffin and Chesmore (1988) still affect our understanding of archaeology in the Preserve, archaeologists have worked to address uneven survey coverage, synthesize survey data, standardize site documentation practices, and contribute to radiocarbon chronologies in the region. This report presented the results of four seasons of fieldwork (1985, 2009, 2016, and 2018) in the upper Diamond Fork Valley in the Yukon-Tanana Uplands. In addition, the report briefly outlined avenues for future research that would contribute to defining an archaeological district and a broader cultural landscape in the upper Diamond Fork Valley. The results highlight the benefit of intensive fieldwork in a single location and contribute to our understanding of middle to late Holocene land use in this region of interior Alaska.

The density of artifacts and sites in the Diamond Fork indicate intense and recurrent use of the upland drainage for large mammal hunting throughout the middle to late Holocene. Sites in the Diamond Fork demonstrate that organic remains and features can preserve in shallow contexts and can yield data that contribute to our understanding of upland land use. Specifically, the Diamond Fork sites likely represent longer-term occupations than inferred from preliminary site assessments. However, the discrepancies apparent in the radiocarbon dates from the project area indicate that greater control is required for sampling organic remains at sites with conflated stratigraphy. Refined chronologies and comparison of these hunting and processing camps with residential areas could clarify general trends in middle to late Holocene subsistence and settlement practices in the Uplands.

The stratigraphy and radiocarbon dating at sites in the Diamond Fork reflect alternating periods of high- and low-intensity sediment deposition, which could be related to minor Holocene glacial advances in the Uplands. The WRAn delimits these depositional events, and the associated 1200 cal BP date and overlying pedocomplex likely reflect a period of ecological recovery following the ashfall. Modern and historic analogs suggest that the ashfall likely affected riverine and terrestrial ecosystems. Although the duration of this impact is unclear, a single season of resource scarcity would have had drastic effects on human populations residing in the Yukon and Charley River watersheds. However, the presence of post-ashfall archaeological components suggests that the upper Diamond Fork region retained significance in subsistence practices following ecological recovery. Additional assessment of artifact assemblages from pre- and post-ashfall components could clarify the impact of the WRAn on human occupation in the Uplands.

This review highlighted the relationship of sites in the Diamond Fork Valley, which may lack distinction on an individual scale but cumulatively yield significant information regarding the prehistory of the Uplands. Furthermore, the results informed on the context of archaeology in the upper Diamond Fork in relation to the WRAn tephra, which was deposited during the larger

WRA volcanic event that likely impacted the broad pattern of prehistory in Alaska and the Yukon. Based on this evidence, these sites can contribute to the definition of an archaeological district encompassing the Diamond Fork Valley and merit nomination in the NRHP.

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