Archaeology of the Little Trail Creek Site (24PA1081), Gardiner, Montana

Article · January 2014

CITATION
1

READS
1,169

5 authors, including:

Douglas Macdonald
University of Montana
23 PUBLICATIONS **385** CITATIONS
SEE PROFILE

Lisa M. Smith
University of Montana
3 PUBLICATIONS **34** CITATIONS
SEE PROFILE

Jannifer W. Gish
JG Research
6 PUBLICATIONS **145** CITATIONS
SEE PROFILE

Michael C. Livers
3 PUBLICATIONS **9** CITATIONS
SEE PROFILE

ARCHAEOLOGY OF THE LITTLE TRAIL CREEK SITE (24PA1081), GARDINER, MONTANA

DOUGLAS H. MACDONALD, LISA M. SMITH, JANNIFER W. GISH, MICHAEL C. LIVERS, AND JUSTIN MOSCHELLE

Archaeological excavations by the University of Montana (UM) at the Little Trail Creek Site (24PA1081) in the Gallatin National Forest near Gardiner, Montana, yielded burn features, as well as associated lithic, faunal, and ethnobotanical artifacts, that date to between 1,000-1,300 cal yr B.P. Twenty-four Late Prehistoric and Late Archaic projectile points support the presence of occupations spanning the transition from use of the atlatl to the bow and arrow. A deeper, Paleoindian occupation may also be present. Analysis of lithic debris from the site indicates a heavy emphasis on use of both Obsidian Cliff obsidian and Crescent Hill chert. As revealed by faunal remains, Late Archaic and Late Prehistoric site occupants of the Little Trail Creek site targeted medium and large artiodactyl species, including elk, deer, and sheep. Ethnobotanical analysis of hearth contents revealed evidence of juniper berry processing. Overall, Little Trail Creek was used on multiple occasions by Native Americans seeking resources in uplands of the Gardiner Basin, Montana, just north of Yellowstone National Park.

INTRODUCTION

In 2011, the University of Montana (UM) conducted archaeological excavations at the Little Trail Creek Site (24PA1081) in uplands above the Yellowstone River, Gardiner, Montana (Fig. 1). The work was conducted through a cooperative agreement between UM and Gallatin National Forest. Excavations at the Little Trail Creek Site yielded two large prehistoric burn features, as well as abundant lithic artifacts and faunal remains dating to between approximately 1,000 and 1,300 cal yr. B.P. These radiocarbon dates, as well as eight Late Prehistoric and 16 Late Archaic points, indicate that use of the site spans the transition period between use of the atlatl and the bow and arrow. Faunal remains and ethnobotanical remains at the site indicate use of a wide variety of upland resources.

This paper provides results of lithic, energy-dispersive x-ray fluorescence (EDXRF), ethno-botanical, and faunal analyses from the Late Archaic-Late Prehistoric occupations. We also provide evidence for a possible buried Late Paleoindian occupation at the site. Overall, the Little Trail Creek site contains an intensive series

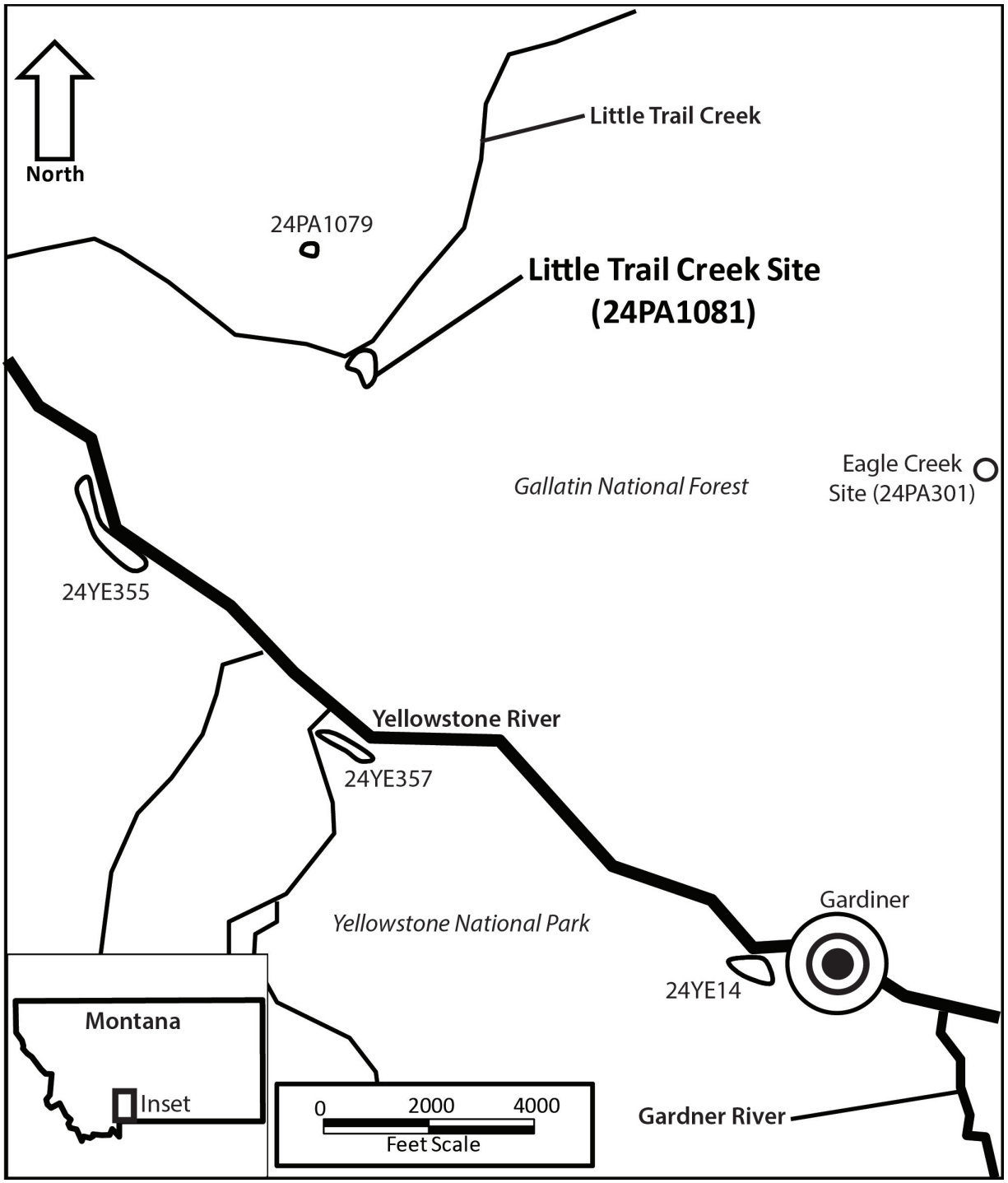

Figure 1: Location of Little Trail Creek Site and Other Sites Discussed in Text.

of occupations, suggesting patterned subsistence and land-use in the Upper Yellowstone River Valley during the transition period from the Late Archaic to Late Prehistoric periods. Lithic analysis indicates that Native Americans retooled hunting and gathering kits at the site, using Obsidian Cliff obsidian (Davis et al. 1995) and Crescent Hill chert (Adams et al. 2011), with both sources are 20-25 miles south and east of the site, respectively. These data support prior work in the region, which

Figure 2: The Little Trail Creek Site Setting. Electric Peak Is in the Far Background. Little Trail Creek Is to the Right (west). The Glacial Moraine is in the mid-Background. View South.

show active use of the Yellowstone ecosystem during the Late Archaic and Late Prehistoric periods (Arthur 1966a, 1966b; Foor 1998; Hale 2003; Johnson et al. 2013; MacDonald and Maas 2010; MacDonald and Maas 2011; Sanders 2000, 2001:219, and 2013).

BACKGROUND AND SETTING

The Little Trail Creek site (24PA1081) is within a small terminal glacial moraine three miles northwest of Gardiner, Montana, in the Gallatin National Forest (Fig. 2). The elevation of the site is 6,021 ft. above mean sea level (amsl). The site is in the mid-elevation foothills south of the grand Absaroka-Beartooth Mountains, which stretch to greater than 10,000 ft. amsl. Vegetation on-site is largely sagebrush, juniper, pine, and rabbit brush. Juniper and pine dominate along the creek valley, while sagebrush and grasses dominate in the main site area proper. The glacial moraine is the southern boundary and acts as a protective screen for the site. The site is, thus, often protected from southwesterly winds, which are so prevalent in this region, as they blow off of Electric Peak to the southwest. To the north, the site is bordered by steep glacial till slopes heading into the uplands above the site.

Little Trail Creek flows along the northwestern and western limits of the archaeological site; it flows west-southwesterly to its confluence with the Yellowstone River ca. 1.4 miles west-southwest of the site. The creek has its headwaters in the Absaroka-Beartooth Wilderness area above the site, approximately 4 miles to the north-northeast at elevations above 9,300 ft. (amsl). The Upper Yellowstone River Valley is in an intermediate zone between the Northern Great Plains and the higher-elevation Intermountain Zone of the Rocky

Mountains. The Little Trail Creek project area is within the Montana portion of the Yellowstone Plateau physiographic province, a high-elevation, geologically-active uplift. The Yellowstone Plateau was formed through a series of volcanic eruptions and lava flows between approximately 2.1 million and 70,000 years ago. The volcanic activity is well-evidenced by the numerous geysers, hot springs, and mud pots of which the closest is at Mammoth Hot Springs, Wyoming, located approximately 12 miles south of the project area.

The Pinedale Glaciation was the last glacial period in the Greater Yellowstone Region. The Yellowstone Plateau glacial icecap covered almost the entire Yellowstone area with a relatively flat mantle of ice that began melting as the climate warmed around 14,000 B.P. and was virtually gone by 12,000 B.P. (Hale 2003). The Little Trail Creek site is surrounded on its southern edges by a 10-20-m high glacial moraine associated with this last glacial episode (Fig. 2). Glacial till cobbles are abundant at the site.

Based upon pollen samples, among other paleoenvironmental proxy data, Whitlock (1993; Whitlock et al. 2012) suggest cooler, wetter conditions during the Late Pleistocene to early Holocene, as well as drier and warmer conditions during the middle Holocene, between approximately 8000 and 3000 B.P. The period of occupation at Little Trail Creek is 1000-1300 B.P., a period that coincides with the the Medieval Climate Anomaly (1200–800 cal yr B.P.). Whitlock et al.'s (2012:90) studies at Crevice Lake, a bound lake in the Black Canyon of the Yellowstone River, provide outstanding paleoenvironmental data that are directly applicable to Little Trail Creek occupation. In this region, the Medieval Climate Anomaly is marked by reduced distribution of pine when compared to other Holocene periods, as well as short springs and hot, dry summers. As discussed below, ethnobotanical remains at Little Trail Creek confirm that sagebrush (as opposed to pine) was dominant during site occupations about 1,200 years ago (Gish 2011, 2013), confirming Whitlock's data from Crevice Lake.

Earliest occupations of the Gardiner Basin occurred in the Paleoindian period. UM recovered a red porcellanite Clovis point fragment along the Yellowstone River below Little Trail Creek (MacDonald and Maas 2010). Early Archaic use of the Yellowstone region is noted at Yellowstone Lake by MacDonald (2013; MacDonald et al. 2012), as well as along the Yellowstone River by Sanders (2013). Occupations of the region intensify during the Middle Archaic period, ca. 4,000 B.P. (Carpenter and Fisher 2013). Pelican Lake and Besant Late Archaic projectile points (3,000 to 1,500 years ago) replace the Middle Archaic McKean Complex (MacDonald 2012a) and indicate a substantial increase in bison hunting, using techniques of the pound and jump (Davis and Wilson 1978; Foor 1982), widespread use of circular shelters outlined by stone, and basin-shaped rock-filled hearths (Maas et al. 2011). Late Archaic projectile points dominate the archaeology in the Gardiner Basin below Little Trail Creek (MacDonald and Maas 2011). Along with the change in projectile points, rock filled (roasting) pits, sandstone grinding tools, beveled edge side-notched knives, and concentrations of stone circles are other cultural hallmarks of the Middle Holocene (Frison 1991). Late Archaic hearths were radiocarbon dated to between 2200-1600 years ago at the Yellowstone Bank Cache Site (24YE355), approximately three miles downslope to the southwest of Little Trail Creek (MacDonald and Maas 2010).

The Late Prehistoric period (1500 to 300 B.P.) witnessed an increase in stone circle use in the Yellowstone region, as evidenced by the nearby Airport Rings Site (24YE357) below Little Trail Creek near the Gardiner Airport on the Yellowstone River (Livers 2011). The most significant technological shift of the Late Prehistoric period was the innovation of the bow and arrow, resulting in a decrease in projectile point size. While length and width of points have been shown to be poor measurements of dart or arrow function, recent work by Hildebrandt and King (2012) have shown that arrow and dart points can be distinguished in interior regions of western North America via their dart-arrow index (DAI). They use a simple formula which includes the sum of the notch width and maximum thickness. Experiments and measurements of hafted arrow and dart points indicate that arrow points generally have a DAI measurement of less than ±11 mm, while dart points tend to be greater than ±12 mm. We discuss this further in our analytic methodology below.

Intermountain pottery, though not as pervasive as the new weapon technology, appears in the region during the Late Prehistoric period (Frison et al. 1996). While pottery is somewhat rare in local assemblages, the nearby Eagle Creek (Jackman

1997) and Ryder (48YR765/24YE32) sites have yielded intermountain ware. Jerde (1988) provides a summary of pottery from sites within the Paradise Valley, north of Little Trail Creek along the Yellowstone River.

PRIOR ARCHAEOLOGY NEAR LITTLE TRAIL CREEK

Abundant archaeology has been conducted in the lower-elevation portions of the Gardiner Basin, as summarized by Maas et al. (2011). However, prior archaeological work in uplands at Little Trail Creek and vicinity is limited to the original recording of the site and of the hunting blinds above the site (24PA1079) by Forest Service archeologist Walt Allen (1993). A second site visit was conducted in 1994 during a Forest Service bison population survey. Over the last decade, the U.S. Forest Service has worked cooperatively with MSU-Bozeman to survey and map talus slope features at various locations in the Gardiner Basin near Yellowstone National Park. Some 16 stone features have been recorded. The talus features are interpreted to be pits and blinds associated with bighorn sheep hunting, probably by the Shoshone. A synthesis of this work was presented at a Montana Archaeological Society annual meeting in 2007, but lacked full reporting of the Little Trail Creek site (24PA1081), which was hypothesized by Allen (2007) as the location of sheep butchering and processing associated with the talus features.

The Little Trail Creek site is strategically located between two talus pit-blind complexes. Results of previously-unreported test excavations in 1992 and 1995 by the Gallatin National Forest at Little Trail Creek revealed eight indistinct levels, dating from 170±70 B.P. to 470±80 B.P. during the Late Prehistoric and Proto-Historic periods. The deposit yielded obsidian projectile points, pottery, and bison and deer remains in the upper levels and bighorn sheep in the lower—most of it highly pulverized. The testing yielded more questions than answers and additional work was needed to understand the archeological record at the Little Trail Creek site.

Another important study in uplands above the Gardiner Basin occurred at the Eagle Creek site, ca. two miles south of Little Trail Creek. The Eagle Creek site (24PA301), excavated by Arthur between 1962 and 1967, revealed four occupation levels, of which the lowest level (IV) is thought to be 3,000 years old based on the probable association with surface Middle Archaic age projectile points (Arthur 1966a, 1966b; Conner 1967). More recent Late Prehistoric occupations are indicated by the presence of pottery, a rarity among Gardiner Basin sites. A Master's Thesis completed by Janet Jackman at the University of Montana in 1997 indicated that the pottery has technological affinities to both Crow and Shoshonean wares. However, Johnson (personal communication, 2014) has extensively examined the Eagle Creek pottery and identified it all to be intermountain ware, as described above.

METHODS

Following up on the mid-1990s work, the Gallatin National Forest received funding in 2011 through the Forest Service-Region 1 Heritage Stewardship Enhancement (HSE) program to conduct test excavations at the Little Trail Creek site. Gallatin National Forest contracted with the University of Montana to conduct this work, under the direction of this paper's first author. UM's work at the Little Trail Creek site in summer of 2011 was comprised of four phases of archaeological work, including surface survey, shovel test pit (STP) excavation, sub-surface imaging, and test unit excavations. Methods of archaeological fieldwork and analysis are available in the Little Trail Creek site report (MacDonald 2012b. Of note, beyond the normal excavation procedures outlined in the site report, UM collected a 1-liter soil sample from every excavation level of every test unit. This was mainly intended to provide a sample of sediment by which to identify very small materials, including possible trade beads in the Late Prehistoric occupation. While no such trade beads were recovered, it was from these soil samples that macrobotanical remains were analyzed from the site. In addition to the ethnobotanical remains, 2011 excavations at Little Trail Creek yielded flaked stone artifacts and faunal remains.

While specific details regarding analytical methodologies are available in the site report (MacDonald 2012b), we want to further explain the methods by which we determined the differences between the various types of side and corner notched points recovered at Little Trail Creek. As discussed above, we incorporated Hildebrandt and King's (2012) dart-arrow index (DAI) as one helpful measure to distinguish arrow and dart points. While this formula has not proven useful

in some areas along the western coast (Erlandson et al. 2014), it has been useful in distinguishing arrow and dart points in the interior of western North America (Lyman et al. 2008). We use the DAI in tandem with traditional morphological and typological traits to determine projectile point age and function in this study.

While quantitative measurements, such as the DAI, are useful, they should not be utilized in a vacuum; we encourage researchers to continue to use existing projectile point typologies to aid in the determination of point types. For this study, we relied on projectile point typologies defined by MacDonald (2012a; MacDonald et al. 2010), Kornfeld et al. (2010), and Ireland (1983). Other local point typologies, such as those used by Arthur (1966) at the Emmigrant buffalo jump site, also are pertinent to this study. At Little Trail Creek, Late Archaic points closely resemble Arthur's Type XVI (~Besant) or MacDonald et al.'s (2010) Pelican Lake type, while Late Prehistoric points are most similar to Arthur's (1966: 117) Type XX (Late Prehistoric side/corner notched). In summary, this paper uses both the DAI, together with point typologies/morphologies, to distinguish arrow and dart points.

In the next sections of this paper, we summarize the results of excavations in the three areas of the Little Trail Creek site. Subsequently, we provide an analysis and interpretation of the site based on analysis of lithic, faunal, and ethnobotanical remains.

ARCHAEOLOGICAL RESULTS

Including surface, STP, and test unit excavations, UM collected a total of 3,807 artifacts at Little Trail Creek (Table 1). UM collected 93 lithic artifacts from the ground surface, including 88 flakes, three bifaces, and two unifaces. Among the bifaces was a Late Archaic obsidian projectile point. UM also recovered 27 STP artifacts, including 26 lithics and one bone fragment. These artifacts were distributed fairly evenly across the site, showing active use of the entire landform during prehistory. Based on surface and STP proveniences of artifacts, UM conducted a magnetometry study to facilitate placement of test units to better understand the possible locations of hearth features. Unfortunately, the magnetometry study was negatively impacted by the presence of metal objects associated with the site's modern use. Thus, subsurface imaging failed to identify useful targets for archaeological excavations.

In order to evaluate the importance of the site, UM and Gallatin National Forest excavated 14 test units within the northern (n=5), southern (n=4), and central (n=5) areas of the site (Fig. 3). Test unit excavation at Little Trail Creek yielded 3,687 artifacts, including 3,399 lithics and 288 faunal remains. As reflected in Figure 4, the central area yielded the majority of artifacts (n=2,546) from test units (69%), with 704 artifacts (19.1%) and 637 artifacts (17.3%) from the north and south areas, respectively. Test units clearly indicate a high-density living area—509 artifacts per sq.m.—within the central portion of the site. This portion of the site is adjacent to Little Trail Creek, suggesting that stream proximity was important to camp life. The north area (176 artifacts per sq.m.) and the south area (159 artifacts per sq.m.) yielded significantly fewer artifacts. As discussed below, the central area also yielded two prehistoric features, with both yielding calibrated radiocarbon dates of between 1340 and 1000 B.P.

Excavations in the Central Area

Excavations in the central site area included

Table 1. Summary of Results, Little Train Creek Site.

Excavation Type	Lithics (n)	Bone (n)	Total	Percentage
STP	26	1	27	0.7
Surface	93	0	93	2.4
TU	3,399	288	3,687	96.8
Total	3,518	289	3,807	100.0
Percentage	92.4	7.6	100.0	--

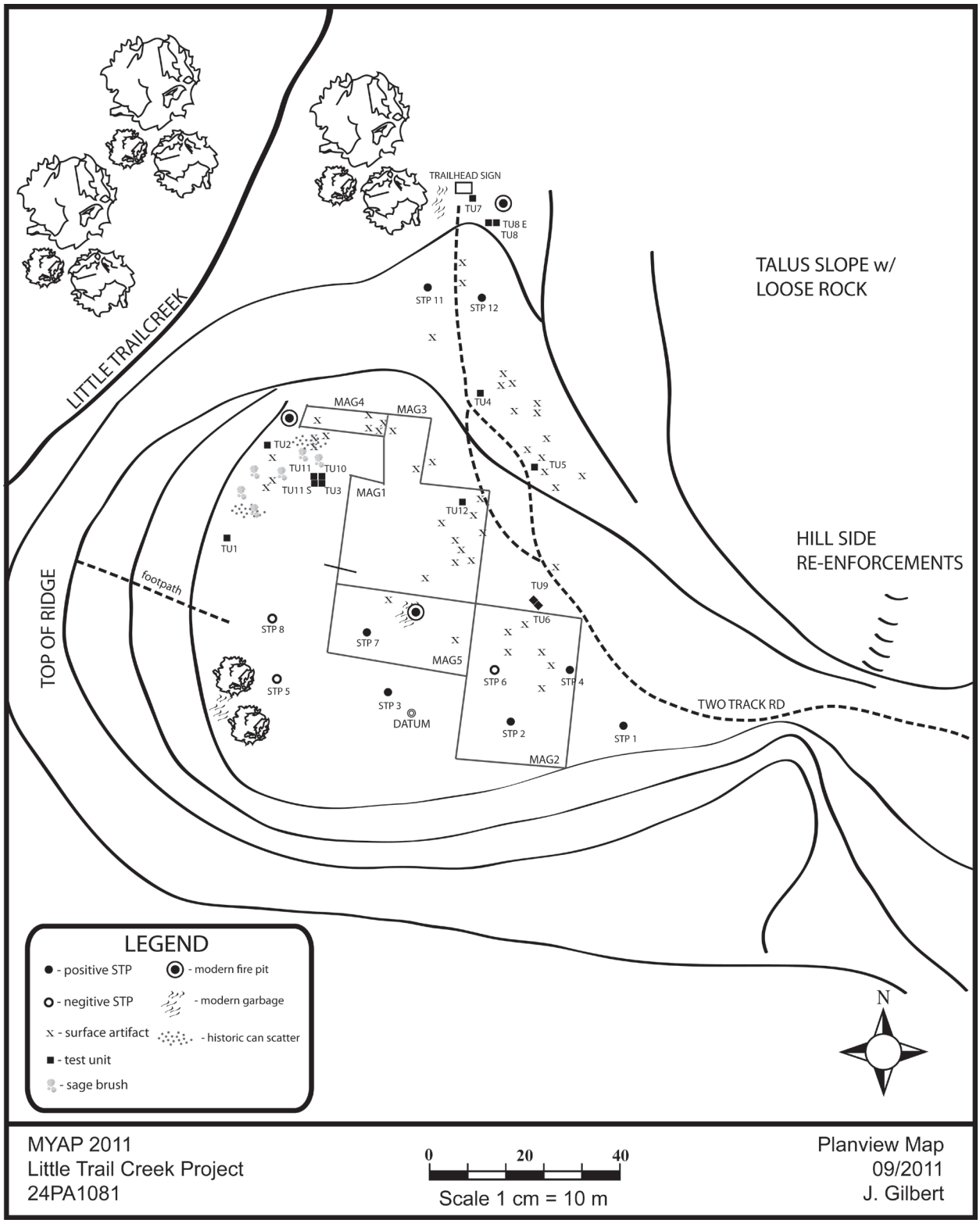

Figure 3: Little Trail Creek Site Map.

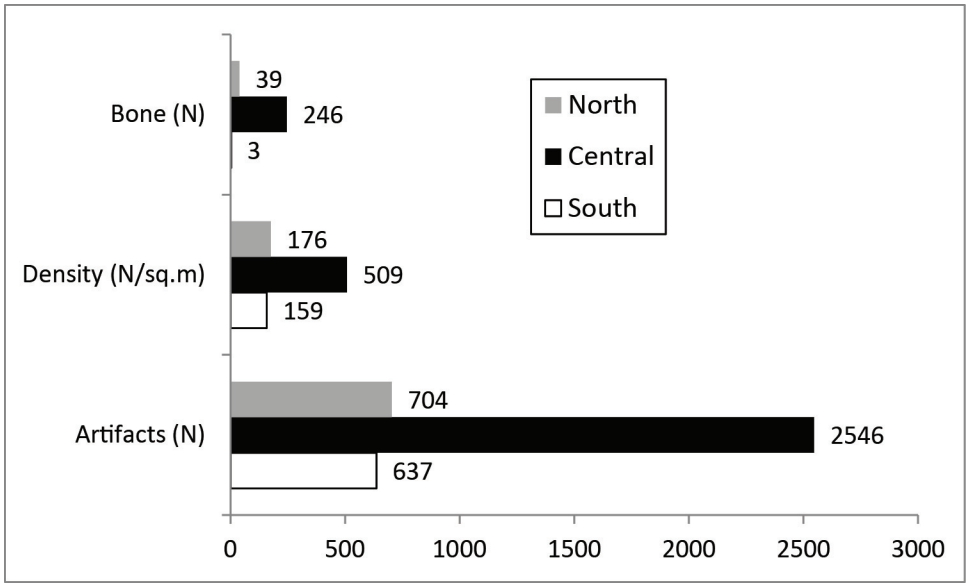

Figure 4: Summary of Test Unit Excavations, Little Trail Creek Site (24PA1081).

five 1x1-m test units, TUs 2, 3, 10, 11 and 11S. The latter four test units were oriented around a large feature, Feature 3, consisting of a dense concentration of fire-cracked rock, lithic artifacts, and faunal remains, discussed below. Feature 5 in TU 2 may be a westward extension of Feature 3. The features yielded radiocarbon dates of ca. 1000-1340 BP. As reflected above, the central area yielded 69 percent of the artifacts from the site, including 2,100 lithics and 246 bone fragments.

Stratigraphy of test units in the central site area is characterized by Ao-B1-Ab-B2-B3-BC horizons (Fig. 5). Cultural stratigraphy in the central site area consists of a single major use episode within excavation levels 3-5 (20-40 cm below surface [cmbs]), associated with Features 3 and 5 discussed below (Fig. 6). In Figure 5, the layer of cobbles in strata B-C indicate the living surface associated with the two features. The lithic densities drop-off considerably in the lower excavation levels of the site, likely reflecting trickle-down from the levels above. However, a Late Paleoindian projectile point was recovered in the deeper levels of the central area; we discuss the possibility of a buried Paleoindian component later in the paper.

Feature 3 Excavation Results. The archaeology in the central area was focused around Feature 3, a large concentration of FCR, lithics, and faunal material identified ca. 10-30 cmbs within TU 3. FCR, calcined bone, and lithic artifacts were found in high concentrations within the feature. Charcoal flecking and blackened soil also indicated an intensive cultural use episode. The artifact concentration extended northward, thus necessitating the opening of the adjacent TU 10, and westward, leading to the opening of TUs 11 and 11s.

Once all four of the test units were opened, they were excavated down to the level of the feature, ca. 10-30 cmbs (Fig. 7). The feature extended throughout the four test units, with no discernible boundaries and likely represents a prehistoric living surface. Pine charcoal collected from within the feature's dense FCR midden dated to the early Late Prehistoric period based on a conventional radiocarbon age of 1110±30 and a 2-sigma calibration of Cal B.P. 1070-950 B.P. (Beta-306070).

Within the 1.5x2 m block encompassed by TUs 3, 10, 11, and 11, UM recovered 11 projectile points, including two Late Prehistoric points and four Late Archaic points, with the remaining fragments untyped. As discussed above, the point types were conservatively based on Hildebrandt and King's (2012) dart-arrow index, as well as existing point typologies. Based on this combination of attributes, the presence of both arrow and dart points in Feature 3 may indicate use of both atlatl and bow/arrow technology during the site occupation or that two use episodes of the living

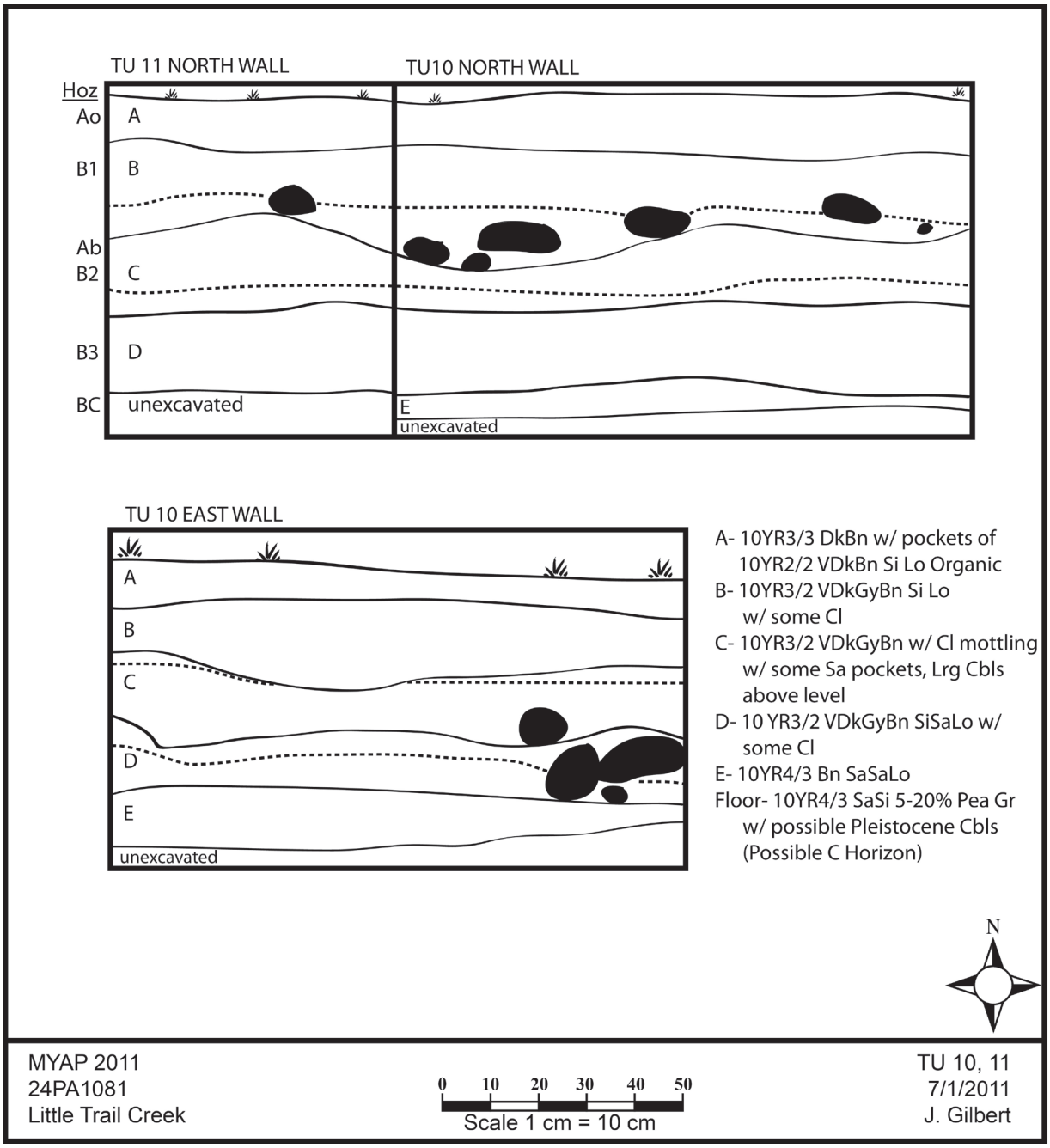

Figure 5: Profile of North Wall of TUs 10 and 11, Central Area, Little Trail Creek Site.

surface are represented in the feature. Point metrics and photographs are provided in the lithic analysis section.

The total lithic assemblage from the 1.5x2 m block encompassing Feature 3 includes 1,517 artifacts, with 894 of those directly associated with excavation levels 2-6, which encompass the feature (Table 2). Feature 3 is dominated by obsidian (n=471; 54%), Crescent Hill chert (n=250; 28%), among a variety of other local and semi-local materials (MacDonald 2012b: 76). Crescent Hill chert has been recently described by Adams et al. (2011).

Energy-dispersive x-ray fluorescence (EDXRF) analysis of 33 igneous artifacts in Feature 3

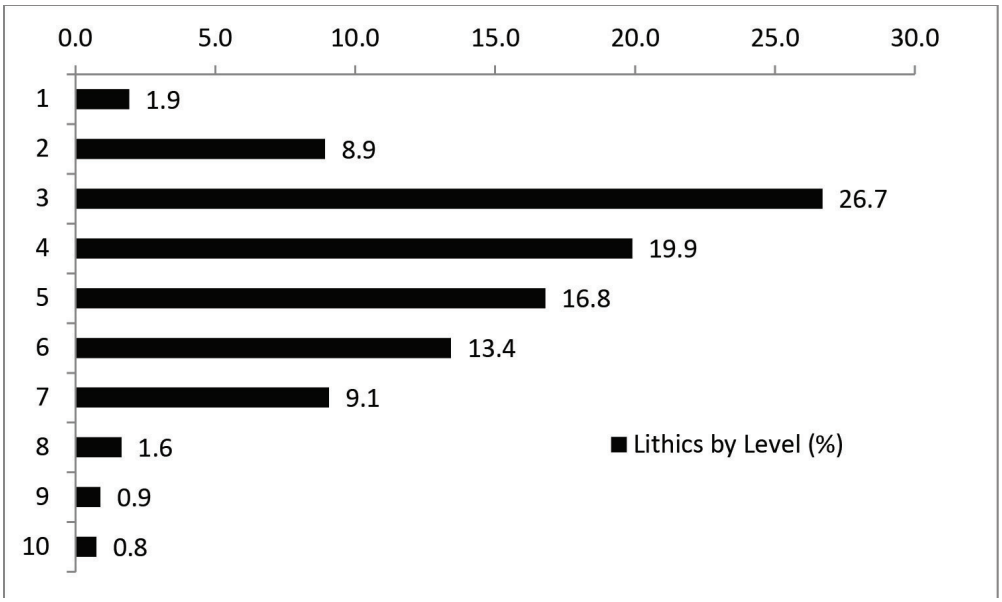

Figure 6: Distribution of Lithic Artifacts by Excavation Level within Central Area, Little Trail Creek Site.

indicate the nearly exclusive use of Obsidian Cliff obsidian (n=32; Table 3). The 32 Obsidian Cliff lithics include five Late Archaic points, three Late Prehistoric points, two untyped point fragments, two utilized flake tools, and 20 flakes. All of the flaking debris sourced from Feature 3 is from Obsidian Cliff, clearly indicating a strong emphasis on the use of that material in stone tool manufacture at Little Trail Creek.

One obsidian artifact (FS 185) was sourced to the Crescent H source south of Jackson, Wyoming. This artifact is an untyped projectile point fragment from TU 3, level 4 within Feature 3. The fragment is a very small corner tang of a side-notched projectile point that could date to either the Late Prehistoric or Late Archaic periods.

Among the flaked stone tools from Feature 3 (n=23), bifaces predominate (n=13), with seven unifaces and three cores as well. Crescent Hill chert bifaces occur in Feature 3 exclusively in the middle-to-late stages of manufacture, while obsidian bifaces are all finished and broken projectile points. The three cores at the site are all non-obsidian materials. The seven unifaces suggest that chert and obsidian flakes were utilized as expedient cutting tools, perforators, and chisels in the manufacture of a range of other non-lithic tools, such as hunting equipment. One large orthoquartzite butchering tool has extensive retouch and was probably used to process large game at the site (MacDonald 2012b:78). No scraping tools were recovered in Feature 3.

Table 2. Summary of Artifacts from 1.5x2 m in Feature 3.

Test Unit	Lithics (n)	Bone (n)	Total Artifacts	Percentage
3	568	52	620	35.8
10	522	81	603	34.8
11	234	58	292	16.9
11S	193	23	216	12.5
Total	1,517	214	1,713	100.0

Figure 7: Feature 3 Planview.

Flaking debris dominates the Feature 3 lithic assemblage (n=867; 97%). Reduction of obsidian and Crescent Hill chert bifaces was the focus of lithic manufacture at the site, with late-stage biface-reduction and shaping flakes comprising more than 92% (n=365) of the typed flake assemblage (n=393). As indicated above, sourced obsidian flakes derived solely from the Obsidian Cliff source. Early-stage decortication and early-reduction flakes comprise 4% (n=18) of the typed flakes; nearly all of these were produced from obsidian.

Overall, the lithic assemblage from Feature 3 indicates the production and maintenance of hunting and gathering tool kits from local and semi-local lithic raw materials, including predominantly Obsidian Cliff obsidian and Crescent Hill chert. The presence of both Late Archaic dart and Late Prehistoric arrow points in the 1100-year-old feature suggests the use of both technologies by hunter-gatherers who lived in the central area of Little Trail Creek.

In support of our interpretation of Feature 3, nearly three-times as many faunal remains—214 bone fragments—were recovered in the 1.5x2 m block encompassing Feature 3 than all other areas of the site combined (n=75). As described by Lisa Smith (2012) (Fig. 8), medium and large mammal/artiodactyl fragments (n=203) dominate the Feature 3 assemblage, with only deer (Odocoileus sp.) identified to genus. Deer/sheep size animals (n=29) predominate among identifiable bone fragments in Feature 3. All but 62 of the bone fragments showed evidence of burning, while five of the bones have evidence of cut/hack marks from human butchering. Teeth fragments (n=38) dominate the identifiable bone elements, with most being indeterminate. One bone fragment showed evidence of dog knawing. No complete bones were recovered, with all of them small fragments broken during processing at the site.

Feature 5 Excavation Results. Located approximately 40 m northwest of Feature 3 within the central portion of the site, UM excavated TU 2 in an area of dense surface lithic artifacts. TU 2 is the test unit most proximate to Little Trail Creek, which is downslope to the west ca 50 m. Within the initial 10 cm of the surface in TU 2, excavations identified Feature 5, including densely-packed FCR, lithics, and bone fragments indicative of a living surface. UM recovered 615 artifacts from Feature 5, including 583 lithics and 32 faunal remains.

Table 3. EDXRF Results, Feature 3, Central Area, Little Trail Creek (Hughes 2012).

FS	TU	Level	XRF Results	Count	Description	Age
65	3	1	Obsidian Cliff	1	Late Prehistoric point	LP
68	3	3	Obsidian Cliff	1	Untyped point	LA/LP
181	3	2	Obsidian Cliff	1	Late Archaic point	LA
148	3	3	Obsidian Cliff	1	Late Archaic point	LA
150	3	3	Obsidian Cliff	1	Utilized flake	LA/LP
185	3	4	Crescent H	1	Untyped point	LA/LP
204	10	2	Obsidian Cliff	1	Late Archaic point	LA
205	10	2	Obsidian Cliff	1	Late Prehistoric point	LP
206	10	2	Obsidian Cliff	1	Late Prehistoric point	LP
139	10	3	Obsidian Cliff	6	Biface reduction flake	LA/LP
139	10	3	Obsidian Cliff	1	Decprtocatopm f;ale	LA/LP
139	10	3	Obsidian Cliff	2	Early-Middle Reduction flake	LA/LP
139	10	3	Obsidian Cliff	8	Flake fragment	LA/LP
139	10	3	Obsidian Cliff	2	Indeterminate flake	LA/LP
139	10	3	Obsidian Cliff	3	Shaping flake	LA/LP
134	10	3	Obsidian Cliff	1	Utillized flake	LA/LP
230	10	4	Obsidian Cliff	1	Late Archaic point	LA
155	11S	2	Obsidian Cliff	1	Untyped point	LA/LP
215	11S	6	Obsidian Cliff	1	Late Archaic point	LA

Table 4. EDXRF Results from TU 2/Feature 5, Central Area, Little Trail Creek.

FS	Excavation Level	XRF Results	Count	Type Code	Age
246	7	Obsidian Cliff	1	Late Archaic point	Late Archaic
247	8	Obsidian Cliff	1	Paleo Point base	Paleoindian
124	2	Obsidian Cliff	1	Late Archaic point	Late Archaic
127	3	Obsidian Cliff	1	Late Archaic point	Late Archaic
163	3	Unknown Dacite	1	Biface Reduction flake	--
163	3	Unknown Dacite	1	Decort. flake	--
163	3	Obsidian Cliff	7	Biface Reduction flake	--
163	3	Obsidian Cliff	10	Flake fragments	--
163	3	Obsidian Cliff	2	Indeterminate flake	--
215	6	Obsidian Cliff	1	Late Archaic point	LA

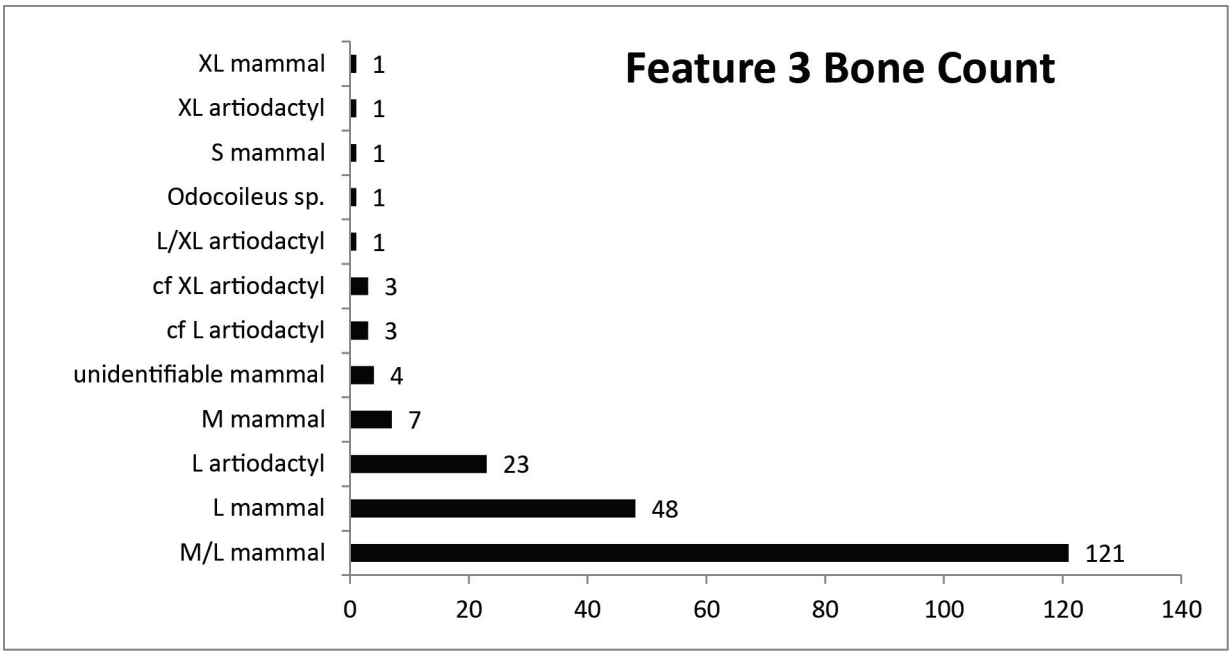

Figure 8: Bone Count by Animal within the Block Encompassing Feature 3.

Charcoal was abundant in Feature 5. Pine charcoal from Feature 5 in TU 2 yielded a conventional radiocarbon age of 1340±30 and a 2-sigma calibration of Cal B.P. 1300-1260 B.P. (Beta-306071). Three Late Archaic projectile points were found associated with Feature 5, suggesting use of the feature at the very end of the Late Archaic period. Photographs and metrics for these points are provided in the lithic analysis section below. Lithic density is very high in TU 2 (16.7% of site lithics) of Feature 5, on par with TU 3 (16.8%) and TU 10 (16.1%) of the nearby Feature 3. As with Feature 3, Feature 5 does not have well-defined limits and represents a living floor associated with hunting and gathering activities at the site. The feature continues beyond the limits of TU 2.

Lithic artifacts (n=583) from Feature 5 are dominated by flaking debris from stone tool manufacture (96.2%), with bifaces (n=11) and unifaces (n=6) also present. As with Feature 3, obsidian (46%) was used to produce the majority of the flaked stone tool assemblage, with Crescent Hill chert (30%) also important.

EDXRF results of volcanic materials from Feature 5 confirm the almost exclusive use of local Yellowstone lithic materials in stone tool manufacture (Table 4). Hughes (2012) reports that 23 of the 25 sourced lithic artifacts from Feature 5 are from the Obsidian Cliff source. Among the Obsidian Cliff lithics from Feature 5 are three Late Archaic points and and 20 flakes. As with Feature 3 above, Feature 5 obsidian flaking debris is exclusively from Obsidian Cliff, supporting its dominance in the lithic procurement patterns of people that lived at Little Trail Creek. Two flakes from Feature 5 were sourced to an unknown dacite source, the most proximate of which are in southwest Montana near Ennis, Montana, on the Madison River.

Among the flaked stone tools from Feature 5 are five projectile points, including four Late Archaic points and one possible Paleoindian point. Three of the Late Archaic points were recovered within Feature 5, while one was recovered just below it. Each of these was produced from Obsidian Cliff obsidian. The possible Paleoindian point (FS 247) was found near the bottom of TU 2 in level 8, suggesting the presence of a buried component. The point most closely resembles Foothill/Mountain Late Paleoindian points from sites like Barton Gulch (Davis et al. 1989), Mummy Cave (Husted and Edgar 2002), and Black Bear Coulee (MacDonald 2012a). This possible Late Paleoindian point was XRF-sourced to Obsidian Cliff.

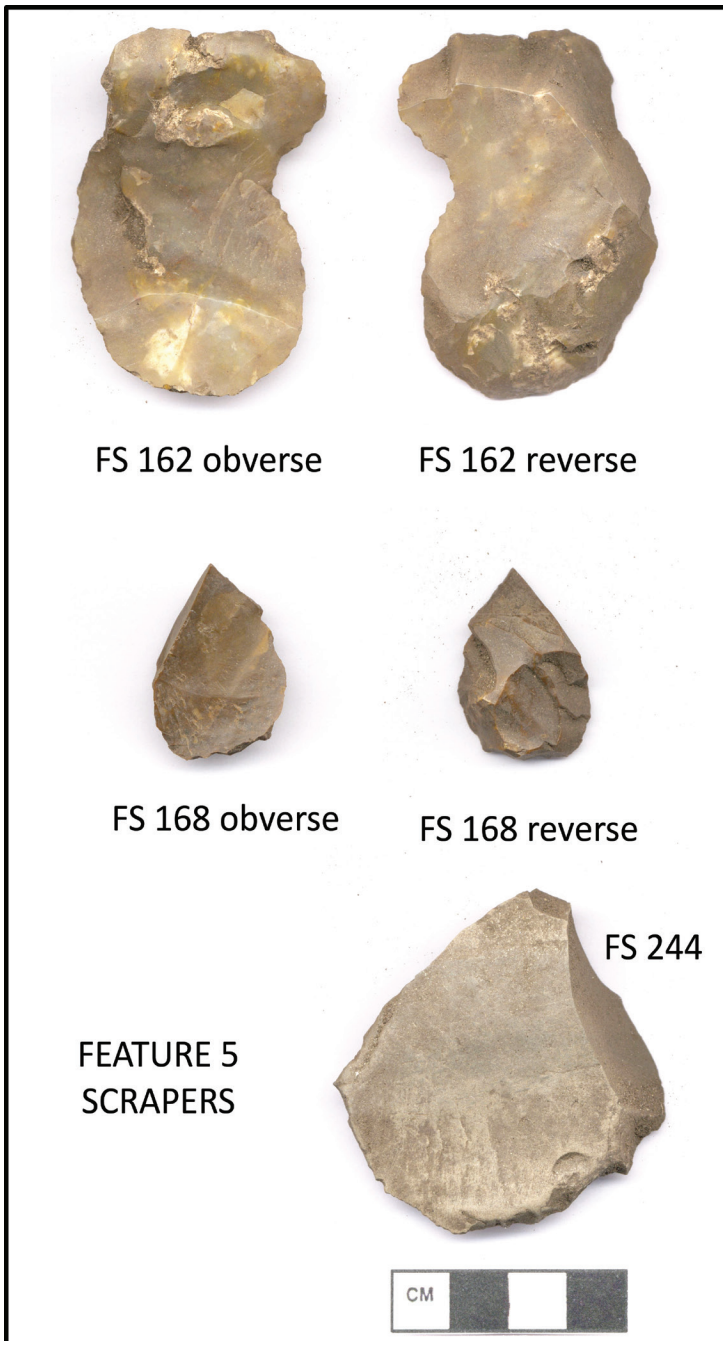

Figure 9: Scrapers from TU 2/Feature 5, Little Trail Creek Site.

Late-stage bifaces (n=4) and projectile points (n=5) comprise the majority of stone tools in Feature 5. In contrast to Feature 3 which did not have endscrapers, Feature 5 has three, as well as a denticulate and a utilized flake (Fig. 9). The presence of endscrapers suggest hide-scraping activities associated with Feature 3 and may also indicate spatially-segregated work areas at Little Trail Creek. The low density of bone (discussed below) in Feature 5 compared to Feature 3 also supports spatial segregation of different activities at the site.

Faunal remains from Feature 5 include 32 fragments (Fig. 10), none which could be identified to genus, with most being medium/large mammal (n=22) (Smith 2012). The six extra large mammal fragments are of elk/bison size, while the medium/large mammals are sheep/deer size. Of the Feature 5 bone, two have cut/butchery marks, nine are burned, and one has a spiral fracture. As with Feature 3, the only identifiable elements of the animals in Feature 5 were nine small teeth fragments. In general, the faunal assemblage from TU 2 indicates the processing of elk/bison and sheep/deer, although in significantly less quantities as Feature 3.

Ethnobotanical Analysis Results, Features 3 and 5. As described by Gish (2011, 2013), soil samples from within Feature 3 and Feature 5 were processed for macrobotanical remains. Gish's (2011) site report provides a detailed account of the botanical remains, with the following being a brief summary. From an ethnobotanic perspective, the burned plant remains from Features 3 and 5 indicate the use of pine cones from lodgepole pine along with cf. pine, aspen/willow, and alder wood for fuel in Feature 3 and the use of lodgepole pine cones and pine and cf. pine wood for fuel in Feature 5. Hence, exploitation of wet habitat trees is better represented in Feature 3, while it is not evident in Feature 5. The Feature 5 samples are slightly earlier in time (1340±30 B.P.) than the Feature 3 samples (1110±30 B.P.). The contrast in the variety of fuel woods in Features 5 and 3, respectively, probably relates to this temporal distinction and different activities at the site. A juniper seed fragment in Feature 5 provides the only evidence for food use of plants. Juniper berries can be eaten raw, boiled, or roasted, dried and ground for meal, or used for tea and flavoring (Harrington 1967:242). It is conceivable that berries could enter hearths on wood branches used for fuel in hearths as well.

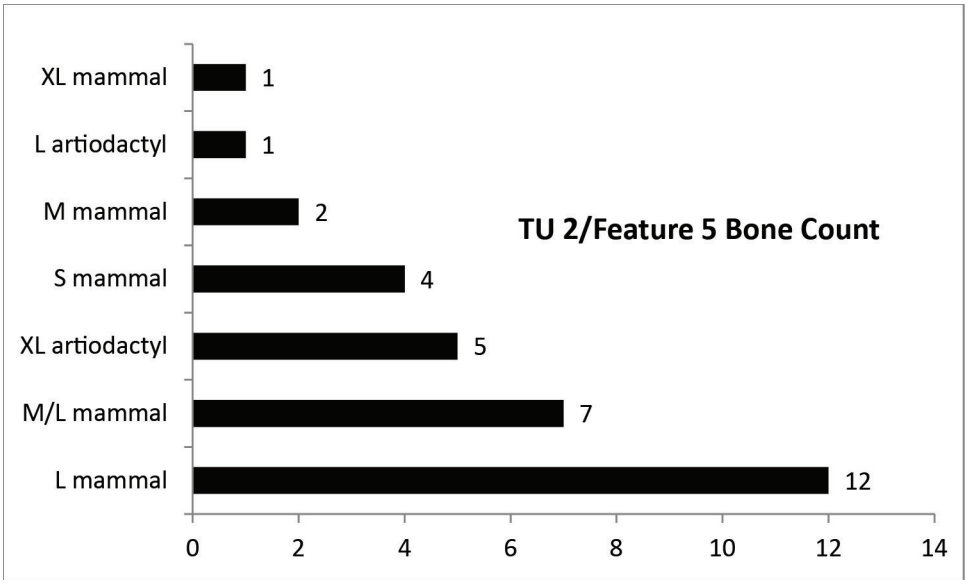

Figure 10: Faunal Remains, TU 2/Feature 5, Little Trail Creek Site.

The ethnobotanic evidence also has ecological significance. The TU 2 samples document the presence of lodgepole pine stands and juniper on dry settings at site 24PA1081 either directly at the site or on the dry, rocky hill slopes overlooking the site. The Feature 3 samples further indicate the presence of lodgepole pines and also occurrences of aspen/willow and alder, which evidently grew along Little Trail Creek in the past. These results show similarities between the prehistoric and modern vegetation in the local presence of pine and occurrences of deciduous trees along the creek. The modern site setting includes sagebrush, which was not documented in the prehistoric samples, but no major contrasts in ecological conditions between the past and present are necessarily indicated.

Excavations in the South Area

As discussed above (see Fig. 3), excavations in the south area of the Little Trail Creek site yielded fewer artifacts (n=637) compared to the central area (n=2,546). Approximately 160 artifacts were recovered per square meter in the south area, compared to more than 500 in the central area.

Table 5: EDXRF Results, South Area, Little Trail Creek Site.

FS	TU	Level	XRF Results	Description
1	Surface	Surface	Obsidian Cliff	Late Archaic point
69	1	1	Obsidian Cliff	Late Prehistoric point
77	6	2	Cashman Dacite	Late Archaic point
109	9	2	Obsidian Cliff	Late Archaic point

Table 6: EDXRF Results, North Area, Little Trail Creek Site.

FS	Site Area	TU	Level	XRF Results	Description
100	North	4	1	Obsidian Cliff	Late Prehistoric point
195	North	8	4	Bear Gulch	Late Archaic point
251	North	5	1	Obsidian Cliff	Untyped (LP?) point fragment

Lithics comprise the bulk (n=634) of the artifacts in the south, with only three recovered bone fragments. No prehistoric features were identified in TUs 1, 6, 9, and 12 in the south area. In all respects, the south area of Little Trail Creek was less-intensively used in prehistory than the central area.

Diagnostic projectile points in the south area include four Late Archaic projectile points and a single Late Prehistoric point. South area EDXRF results indicate widespread use of Obsidian Cliff obsidian (n=3), with one Late Archaic point also sourced to the Cashman dacite source near Ennis, Montana (Table 5). The south area Obsidian Cliff artifacts include two Late Archaic points and a Late Prehistoric point.

Overall, while the intensity of use was decreased, the character of the south area is similar to the center, in that lithic manufacture was a focus of activity, with a definite emphasis on use of Obsidian Cliff obsidian and Crescent Hill chert. The major difference of the central and south areas is the lack of faunal remains in the south, suggesting that butchering of animals was not conducted in this area. The two highest-density test units in the south area are on the edge of the central area and likely are associated with those central area occupations.

North Area Excavations

The University of Montana and Gallatin National Forest also excavated five 1x1 m test units in the northern area of the site, including TUs 4 and 5 in the southeast portion of the north area and TUs 7, 8, and 8E on the far northern end of the north area near a forest service trail head sign. UM's excavations in the north area of the site yielded a total of 704 artifacts, including 665 lithics and 39 faunal remains. Overall, these artifact counts are similar to the south area of the site in being of comparatively low density compared to the center. The artifact assemblage in the north area comprises 19.1 percent of the total artifacts from the site.

While artifact densities are low in the north (compared to the central area), similar types of activities were conducted in the north as in the central and south areas. Elk and sheep were butchered and obsidian and Crescent Hill chert bifaces were finished on site, likely as replacement for broken points. In total, five Late Prehistoric points and one Late Archaic point were recovered in the northern area; most of these are point bases, likely discarded by hunters after breakage during use. Two of the Late Prehistoric points were sourced to Obsidian Cliff, while one was sourced to Bear Gulch. Another Late Prehistoric point is a Crescent Hill chert Wahmuza point. This is an unnotched small square stemmed point identified as Late Prehistoric in the nearby Malin Creek Site (Vivian et al. 2008). The point could also be the preform to a Late Prehistoric sidenotched point.

Table 7: Summary of Artifacts, Little Trail Creek Site.

Artifact Type	Central	North	South	Total
Flakes	2034	675	663	3372
Bifaces	64	16	19	99
Unifaces	14	5	4	23
Natural Rock	10	1	2	13
Cores	3	1	0	4
FCR	3	1	0	4
Other Tools	3	0	0	3
Lithics Total	*2131*	*699*	*688*	*3518*
Faunal Remains	246	39	4	289
Total Artifacts	*2377*	*738*	*692*	*3807*

Table 8. Descriptionsn of Projectile Pionts, Little Trail Creek Site.

FS	Feature	Length (mm)	Width (mm)	Thick (mm)	Neck (mm)	DAI (mm)	Point Type	Lithic Material	(cm below datum)
181	3	17.4	19.8	5.9	12.9	18.8	Late Archaic	Obsidian Cliff	15
77	--	33.9	27.2	4.8	16.1	20.9	Late Archaic	Cashman dacite	17
93	--	20.5	19.3	8.3	14.3	19.6	Late Archaic	Crescent Hill	28
109	--	20.6	17.7	3.6	10.6	14.5	Late Archaic	Obsidian Cliff	15
124	5	29.0	22.0	4.8	15.0	19.8	Late Archaic	Obsidian Cliff	15
145	--	8.4	16.4	3.9	12.5	16.4	Late Archaic	untyped chert	16
148	3	10.8	22.2	4.5	17.2	21.7	Late Archaic	Obsidian Cliff	25
161	5	26.0	22.3	4.2	14.2	18.4	Late Archaic	untyped chert	25
195	--	6.8	16.6	3.7	14.5	18.2	Late Archaic	Bear Gulch	32
204	--	9.2	18.4	5.4	15.6	21.0	Late Archaic	Obsidian Cliff	15
215	3	18.8	21.0	4.5	13.0	17.5	LA Pelican Lake	Obsidian Cliff	43
230	3	8.8	16.8	4.2	13.2	17.4	Late Archaic	Obsidian Cliff	35
127	5	28.3	22.7	5.2	12.7	17.9	Late Archaic	Obsidian Cliff	15
246	--	16.0	9.0	4.4	10.0	14.4	Late Archaic	Obsidian Cliff	70
1	--	32.9	19.7	4.6	12.7	17.3	Late Archaic	Obsidian Cliff	0
155	--	29.1	20.1	6.4	10.9	17.3	Late Archaic	red chalcedony	17
205	3	20.0	8.2	2.4	7.0	9.4	Late Prehistoric	Obsidian Cliff	15
240	--	6.7	13.9	2.4	9.6	12.0	Late Prehistoric	Crescent Hill	45
206	3	15.1	7.5	2.5	6.1	8.6	Late Prehistoric	Obsidian Cliff	15
65	--	18.1	13.3	3.0	8.7	11.7	Late Prehistoric	Obsidian Cliff	5
100	--	7.9	14.4	3.2	9.3	12.5	Late Prehistoric	Obsidian Cliff	5
100	--	5.7	13.1	3.1	7.4	10.5	Late Prehistoric	Crescent Hill	5
274	--	18.4	15.2	3.4	0.0	3.4	Wahzuma Late Prehistoric	Crescent Hill	2
69	--	25.6	13.8	3.5	6.9	10.4	Late Prehistoric	Obsidian Cliff	8

Spatial Analysis Summary

Overall, use of the south, central, and north site areas was similar at Little Trail Creek, with food processing and toolkit preparation the focus in all three. In all three areas, Native Americans emphasized use of Obsidian Cliff obsidian and Crescent Hill chert in production and maintenance of their toolkits, using the tools to process medium and large game. A few differences are worthy of note between the site areas. Most obviously, the central area of the site witnessed the most intensive use in prehistory, likely due to its proximity to Little Trail Creek. Within the central area, we also observed spatial segregation of activities between the locations of Features 3 and 5. Feature 5 contained three endscrapers, while none were recovered in Feature 3, which showed largely hunting and butchery implements. This likely denotes hide-scraping by users of Feature 5, but not in Feature 3. These areas also showed significant differences in faunal remains, with medium and large game (sheep/deer) dominating in Feature 3 and large and extra large game (bison/elk) in Feature 5. Thus, while hunting-gathering-related activities were consistently the focus across the site, use of distinct site areas reflect differential success of Native Americans in food acquisition, as well as

Figure 11: Late Archaic Projectile Points, Little Trail Creek Site.

their activities related to hunting preparation and game processing.

ANALYTICAL RESULTS

As described above, there is fairly consistent use of stone tools and lithic raw materials between the various site areas at Little Trail Creek (Table 7). Late Archaic (n=16; Fig. 11) and Late Prehistoric points (n=8; Fig. 12) dominate across the site, with no separation in their use at the site, vertically or horizontally. Mean depths below datum of Late Archaic (26 cm) and Late Prehistoric (19 cm) points within the central area of the site show some stratigraphic separation that was not discernable in excavations (Table 8). For the site as a whole, depths of Late Archaic points (23.9 cm) are also 10 cm below that of the Late Prehistoric points (13 cm). While vertical separation is evident in these data, both types of points occurred throughout all excavation levels and features, indicating that the living surfaces of Features 3 and 5 were likely utilized during both periods with little soil deposition between occupations. Alternatively, the occupations resulting in Late Archaic and Late Prehistoric points actually were the same, indicating use of both technologies during those occupations.

Figure 12: Late Prehistoric and Paleoindian Projectile Points, Little Trail Creek Site.

Figures 11 and 12 show the diagnostic projectile points recovered at the site, while Table 8 provides metric and provenience data. The mean dart-arrow index for Late Archaic points is 18 mm, well above the 12mm threshold set to distinguish dart points in this study; in comparison, the mean DAI for Late Prehistoric points is 9.8 mm, almost half that of Late Archaic points. In tandem with the morphological and typological characterization, we are confident in our attribution of point age for Little Trail Creek points.

Finally, the single Paleoindian point base—an Obsidian Cliff Foothill/Mountain type—was recovered at the base of TU 2, perhaps indicating an earlier site occupation, although data are scarce for that occupation of the site. Interestingly, chert percentages are similar across excavation levels 0-6 with little variation (obsidian=50-60%; chert=40-50%) (Fig. 13). These data suggest fairly consistent lithic material use in the Late Archaic-Late Prehistoric occupations. However, within excavation levels 7-9, obsidian use decreases to 20-34% of the lithics by excavation level, with chert increasing to 67-80%. For uncertain reasons, chert use is known to have been significantly greater during the Paleoindian period compared to the subsequent Archaic periods across the Greater Yellowstone Ecosystem (Kornfeld et al. 2010; MacDonald 2013). Future work should target Little Trail Creek's deeper site component. The presence of the Late Paleoindian point and the significant shift to chert lithic material suggests the possible presence of a buried Paleoindian occupation.

Lithic debitage at the site is dominated by biface reduction and shaping flakes, reflecting the finishing of bifaces and projectile points at the site. As shown in Figure 14, late-stage flakes, including biface reduction and shaping flakes, account for 91% of all typed flakes at the site, with a range of 89-91%. In comparison, early and middle stage

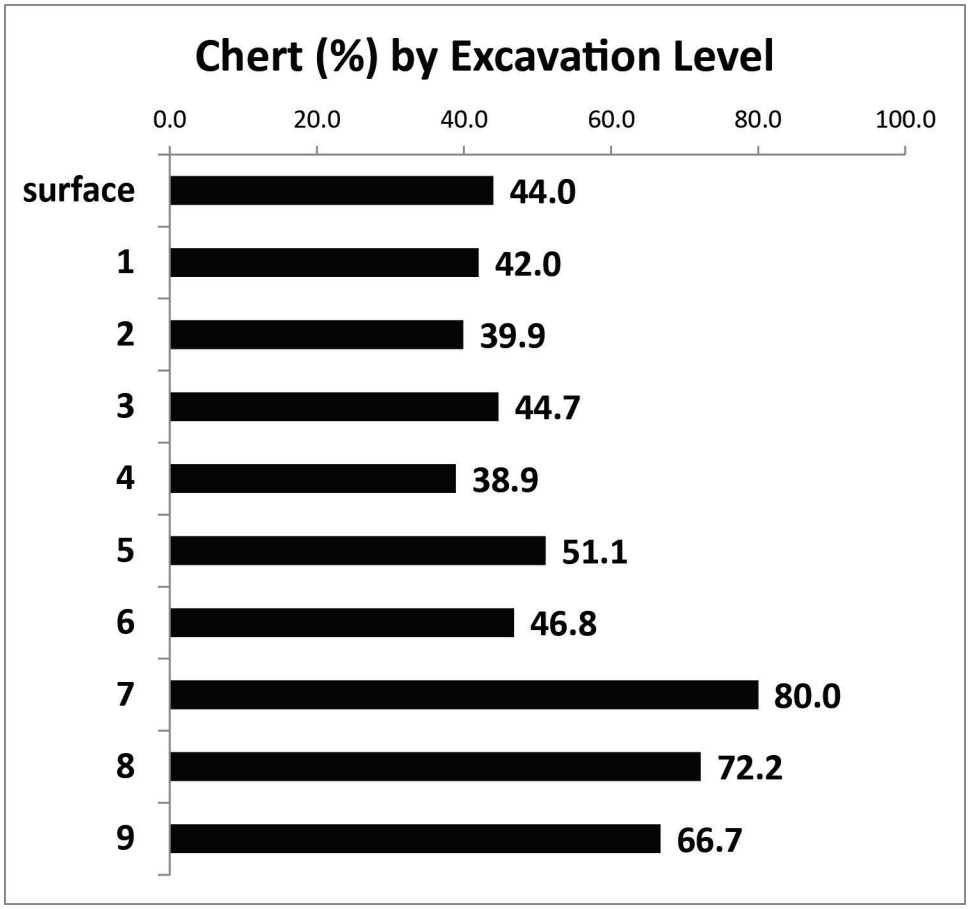

Figure 13: Chert Lithics by Excavation Level, Little Trail Creek Site.

flakes account for only nine percent, with a range of 9-12% by site area.

In terms of lithic raw material use, obsidian accounts for 55 percent of the lithics at the site, ranging from a low of 52% in the central area to a high of 62% in the north area (Table 9). Crescent Hill chert is also very common, accounting for 27% of the lithics with a range of 23-28 percent. Other interesting lithics in the assemblage include 65 orthoquartzite and 13 Moss Agate artifacts. Moss Agate has primary/secondary sources to the east in the Big Horn Basin, but may have local or semi-local sources within river gravels. Reeves (2006) also documents a quartzite material source in the Hellroaring Creek Valley, indicating local or semi-local sources in the Yellowstone region. Thirty-three dacite lithics show use of southwest Montana to the west of Little Trail Creek along the Madison River and beyond. Finally, two porcellanite flakes, as well as one Knife River flint flake, suggest links between southwest Montana and eastern Montana/western North Dakota.

Finally, for igneous lithic materials, EDXRF results point to Obsidian Cliff obsidian as the major lithic supplier for Native Americans camped at Little Trail Creek (Hughes 2012). Obsidian Cliff obsidian (n=62 of 67 sourced lithics) dominates for all site areas (Table 10) and for all lithic artifact types (Table 11). One artifact each was sourced to the Cashman dacite and Bear Gulch sources as well, also indicating movements within southwest Montana. The Crescent H source near Jackson is the only non-local source represented in the EDXRF results, suggesting some trade and/or human movements toward the south and the Snake River valley. None of the 27 EDXRF-sourced lithics from MacDonald et al.'s (2012) Gardiner Basin study yielded artifacts from Crescent H, also supporting the infrequent use of this material in the region.

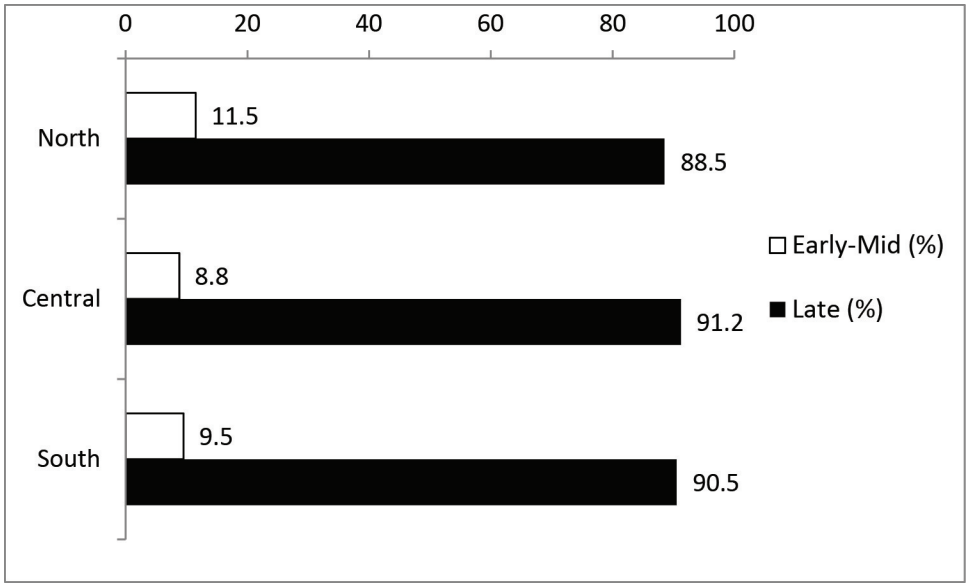

Figure 14: Comparison of Flake Types by Site Area, Little Trail Creek.

Hunters at the site were successful in procuring several medium, large, and extra large game, including deer, sheep, and elk, among the only identified species (Table 12; Fig. 15). The central area of the site, most proximate to the creek, contained the bulk of the faunal remains and was the core game processing area. Many of the faunal remains show evidence of human modification, including butchery marks, burning, fracturing, and crushing to maximize yields from the bone (Fig. 16). Finally, ethnobotanical remains in the two features indicate the burning of pine, aspen/willow, and alder in hearths, as well as the use of juniper berries as food.

SUMMARY AND CONCLUSION

In summary, two prehistoric features in the central site area of Little Trail Creek yielded radiocarbon dates of between 1000-1340 B.P., while diagnostic projectile points show use of both atlatl darts and arrow points across all site areas, including the north, central and south. Even in the two Late Prehistoric dated features, a mix of dart and arrow points is present, suggestive that site users employed both technologies in hunting at the site. Alternatively, due to some vertical separation between Late Archaic and Late Prehistoric projectile points, use of the features may have simply occurred during both periods,

Table 9. Summary of Lithic Raw Material Use by Site Area, Little Trail Creek.

Material	Central	Central %	North	North %	South	South %	Total	Total %
Obsidian	1104	51.6	432	61.8	389	56.5	1925	54.6
C. Hill	601	28.1	177	25.3	158	23.0	936	26.5
other chert	360	16.8	85	12.2	108	15.7	553	15.7
dacite	10	0.5	1	0.1	22	3.2	33	0.9
orthoquartzite	52	2.4	4	0.6	9	1.3	65	1.8
Moss Agate	13	0.6	0	0.0	0	0.0	13	0.4
RFK	1	0.0	0	0.0	0	0.0	1	0.0
porcellanite	0	0.0	0	0.0	2	0.3	2	0.1
Total	2141	100.0	699	100.0	688	100.0	3528	100.0

Table 10. Summary of EDXRF Results (Hughes 2012) by Site Area.

XRF Results	Central	North	South	Total	Percentage
Obsidian Cliff	57	2	3	62	92.5
Unknown Dacite	2	0	0	2	3.0
Bear Gulch	0	1	0	1	1.5
Cashman Dacite	0	0	1	1	1.5
Crescent Hill	1	0	0	1	1.5
Total	60	3	4	67	100.0

Table 11. Summary of EDXRF Results (Hughes 2012) by Lithic Artifact Type.

Artifact Type	Bear Gulch	Cashman Dacite	Crescent Hill	Unknown Dacite	Obsidian Cliff	Total
Projectile Point	1	1	1	0	19	22
Flake Fragment	0	0	0	0	18	18
Bif. Red. Flake	0	0	0	1	13	14
Indet. Flake	0	0	0	0	4	4
Shaping Flake	0	0	0	0	3	3
Decort. Flake	0	0	0	1	1	2
Early-Mid Flake	0	0	0	0	2	2
Utilized Flake	0	0	0	0	2	2
Total	1	1	1	2	62	67

resulting in an indistinguishable palimpsest dating to the terminal Late Archaic and earliest Late Prehistoric periods. Whichever the interpretation, the two features show densely-packed FCR and faunal remains, suggesting that Late Archaic-Late Prehistoric hunter-gatherers transported a variety of game and plants to the site for processing.

Little Trail Creek is intimately linked to nearby hunting sites, including the proposed sheep-hunting pits in talus slopes above the site (24PA1079). At an elevation of 6,000 ft. amsl, Little Trail Creek is the most proximate camping area for hunters using uplands. The site is adjacent to the creek and provides a nice, protected, and flat area for camp life. The site is at an intermediate elevation between the Yellowstone River Valley—ca. 5,000 ft. amsl—and the very steep slopes which push into the Absaroka-Beartooth Wilderness with peaks above 9-10,000 ft. amsl.

Based on the faunal and ethnobotanical remains from the site, Little Trail Creek apparently functioned as a base camp for hunter-gatherers exploring uplands above the river valley. The sheep hunting blinds above the site were likely used by hunters from Little Trail Creek, with procured game easily dragged downslope a few hundred feet across talus slopes to the site. Deer, elk, and perhaps even bison were also hunted and transported back to the site for processing.

The Late Archaic and Late Prehistoric periods witnessed an increase in Native American use of the Greater Yellowstone Ecosystem, with numerous sites along the Yellowstone River — including Little Trail Creek — yielding Late Archaic atlatl dart points, as well as Late Prehistoric arrow points (Sanders 2000, 2001, and 2013; Maas et al. 2011; MacDonald and Hale 2011; MacDonald and Maas 2010). As with Little Trail Creek, lithic analysis of Late Archaic and Late Prehistoric artifacts from other Gardiner Basin sites indicates

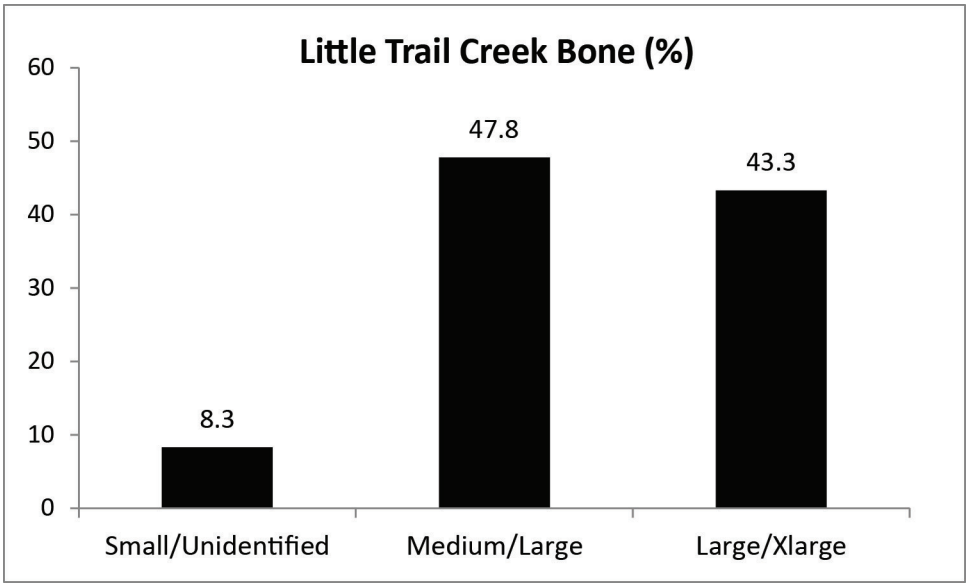

Figure 15: Summary of Faunal Remains at Little Trail Creek by Animal Size.

active use of local Crescent Hill chert and Obsidian Cliff obsidian, both with sources 20-25 miles from the site (Adams et al. 2011; MacDonald and Maas 2011). Large bifaces were transported from the material sources to the Gardiner Basin en route northward to the Paradise Valley and beyond. Lithic data indicate that the Gardiner Basin was, thus, a staging area for Late Archaic and Late Prehistoric hunter-gatherers entering and exit-ing the nearby Yellowstone Plateau and its rich and diverse ecosystem. As indicated by Carpenter and Fisher's (2013) work at the Yearling Spring Cache near Livingston, such land use patterns extend into the Middle Archaic period as well.

The Little Trail Creek Site (48YE1081) contains informa-tion useful in understanding the Late Archaic and Late Prehistoric occupation of the

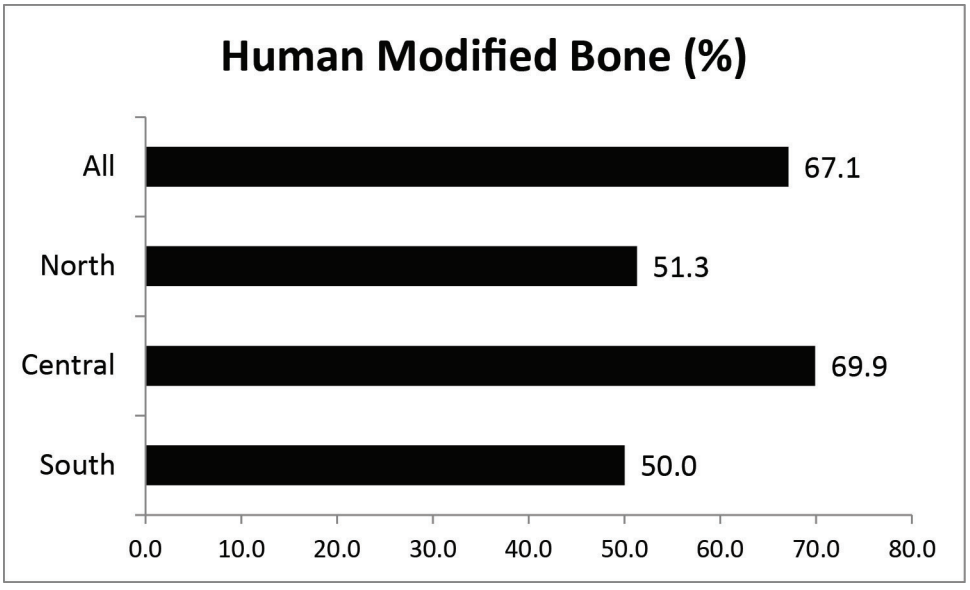

Figure 16: Summary of Human Modified Faunal Remains at Little Trail Creek.

Table 12. Summary of Faunal Analysis Data by Taxon/ID and Site Account.

Taxon/ID	Central	North	South	Total	Percentage
Cervus sp. (elk)	0	2	0	2	0.69
Odocoileus sp. (deer)	1	0	0	1	0.35
Ovis sp. (sheep)	0	1	0	1	0.35
Thomomys talpoides (gopher)	0	1	0	1	0.35
Small mammal	5	0	0	5	1.73
Medium mammal	9	2	0	11	3.81
Medium-large mammal	128	6	2	136	47.06
Large artiodactyl	24	3	1	28	9.69
Large mammal	60	17	0	77	26.64
Extra Large artiodactyl	6	0	0	6	2.08
Extra Large mammal	2	3	0	5	1.73
cf Extra Large artiodactyl	3	0	0	3	1.04
cf Large artiodactyl	3	1	1	5	1.73
Large/Extra Large artiodactyl	1	0	0	1	0.35
Unidentifiable mammal	4	3	0	7	2.42
Total	246	39	4	289	100.00
Percentage	85.1	13.5	1.4	100.0	--

Gardiner Basin. The site may also have a deeper, as yet unexcavated, Late Paleoindian occupation as well. For at least the last 1,300 years, the site was a hunting and gathering camp used by Native Americans venturing into uplands above the Upper Yellowstone River Valley. The site is closely associated with several other hunting sites in the valley and uplands, including sheep hunting blinds above the site, and possible base camp sites in the Yellowstone Valley bottom below the site. Together, these sites provide data that support the hypothesis that Native Americans actively utilized the entire Gardiner Basin landscape as they travelled through the Rockies and Plains of southwest Montana. The Late Archaic and Late Prehistoric periods were a particularly intensive period of use for people in the Yellowstone region, as evidenced by Little Trail Creek and the many other sites in the vicinity.

ACKNOWLEDGEMENTS

Many people contributed to the success of the University of Montana test excavations at the Little Trail Creek Site (24PA1081). Michael Livers directed fieldwork along with Principal Investigator Doug MacDonald. Associate Professor MacDonald is this paper's main author, with contributions by Michael Livers (culture history and background research), Steven Sheriff (sub-surface imaging), Jordan Gilbert (maps, soil flotation and data entry), and Kristin Hare (maps and soil flotation). Lisa Smith conducted faunal analysis and wrote those sections of this paper, while Jannifer W. Gish conducted ethnobotanical analysis of macrobotanical plant remains recovered from feature flotation samples. Richard Hughes conducted EDXRF analysis of selected igneous materials from the Little Trail Creek site.

Justin Moschelle was instrumental in the organization and funding of the project at the Gallatin National Forest in Bozeman. Marcia Pablo took over the reigns on the project in 2011. Carl Davis and Walt Allen were also helpful in the early planning of this project.

REFERENCES CITED

Adams, Jacob S., Douglas H. MacDonald and Michael C. Livers
2011 Crescent Hill Chert. In *Yellowstone Archaeology: Northern Yellowstone*, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(1).

Allen, Walter
1993 24PA1081 Site Form. On file at Gallatin National Forest, Bozeman.

2007 Upland Hunting Sites in the Gardiner Basin, Montana. Paper presented at the Montana Archaeological Society Meeting.

Arthur, George W.
1966a An Archaeological Survey of the Upper Yellowstone Drainage, Montana. Agricultural Economics Research Report No. 26, Department of Agricultural Economics and Rural Sociology, Montana Agricultural Experiment Station, Bozeman.

1966b The Eagle Creek Site, 24PA301. *Archaeology in Montana* 7(2):11-12.

Carpenter, Scott L. and Philip R. Fisher
2013 From Cliff to Cache: Analysis of a Middle Archaic Obsidian Cache from Southwestern Montana. In *Lithics in the West: Using Lithic Analysis to Solve Archaeological Problems in Western North America*, pp. 171-191, edited by Douglas MacDonald and Elaine Hale. University of Montana Press, Missoula.

Conner, Stuart W.
1967 Eagle Creek Site. *The Billings Gazette,* July 23, 1967.

Davis, Leslie B., Stephen A. Aaberg, William P. Eckerle, John W. Fisher, and Sally T. Greiser
1989 Montane Paleoindian Occupation of the Barton Gulch Site, Ruby Valley, Southwestern Montana. *Current Research in the Pleistocene* 5: 9-11.

Davis, Leslie B. and Michael Wilson
1978 Bison Procurement and Utilization: A Symposium. *Plains Anthropologist Memoir* 14 82(2).

Davis, Leslie, B. Stephen A. Aaberg, and James G. Schmitt
1995 The Obsidian Cliff Plateau Prehistoric Lithic Source, Yellowstone National Park, Wyoming. National Park Service, Rocky Mountain Region, *Selections from the Division of Cultural Resources*, No. 6. Denver, Colorado.

Erlandson, Jon M., J. Watts, and N. Jew
2014 Darts, Arrows, and Archaeologists: Distinguishing Dart and Arrow Points in the Archaeological Record. *American Antiquity* 79(1): 162-169.

Foor, Thomas A.
1982 Cultural Continuity on the Northwestern Great Plains – 1300 B.C. to A.D. 200, Pelican Lake Culture. Ph. D. Dissertation, University of California.

1998 Pelican Lake. In *Archaeology of Prehistoric Native America*, edited by G. Gibbon. Garland Publishing, Inc. New York.

Frison, George C.
1991 *Prehistoric Hunters of the High Plains*. 2nd ed. Academic Press, San Diego, California.

Frison, George C., David C. Schwab, L. Adrian Hannus, Peter Winham, D. Walter and R. C. Mainfort.
1996 Archeology of the Northwestern Plains. In *Archeological and Bioarcheological Resources of the Northern Plains*, edited by George C. Frison and R. C. Mainfort. A Volume in the Central and Northern Plains Archeological Overview. Arkansas Archeological Survey Research Series No. 47, Fayetteville, Arkansas.

Gish, Jannifer W.
2011 MYAP 2011 Archaeobotanical Analysis. Report submitted to University of Montana by J. Gish, December, 2011.

2013 Archaeobotanical Results from Gardiner Basin Sites, Yellowstone National Park, Montana. In *Yellowstone Archaeology: Northern Yellowstone*, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(1): 107-115.

Hale, Elaine Skinner.
2003 A Culture History of the Yellowstone River and Yellowstone Lake, Yellowstone National Park, Wyoming and Montana. M.A. Thesis, University of Montana, Missoula.

Harrington, H.D.
1967 *Edible Native Plants of the Rocky Mountains*. The University of New Mexico Press, Albuquerque.

Hildebrandt, William R. and Jerome H. King
2012 Distinguishing between Darts and Arrows in the *Archaeological Record: Implications for Technological Change in the American West.* American Antiquity 77: 789-799.

Hughes, Richard E.
2012 Geochemical Research Laboratory Letter Report 2011-114. Report submitted to University of Montana by Geochemical Research Laboratory, March 26, 2012.

Husted, Wilfred M., and Edgar, Robert
2002 The *Archeology of Mummy Cave, Wyoming: An Introduction to Shoshonean Prehistory*. Midwest Archeological Center Special Report No. 4, and Southeast Archeological Center Technical Report Series No. 9, National Park Service, Lincoln, Nebraska. Manuscript on file at the Midwest Archeological Center, Lincoln, Nebraska.

Ireland, Arthur K.
1983 *Projectile Point Typologies. In Seedskadee Project: Remote Sensing in Non-Site Archeology*, edited by D. Drager and K. Ireland. National Park Service.

Jackman, Janet A.
1997 The Eagle Creek Site (24PA301): A Prehistoric Archaeological Site Near Gardiner, Montana, Unpublished Master's Thesis, University of Montana, Missoula.

Jerde, Thomas R.
1988 Prehistoric Pottery in the Upper Yellowstone Valley Area. *Archaeology in Montana* 28(1): 55-68.

Johnson, Ann, Brian O.K. Reeves, and Mack W. Shortt.
2013 Precontact Occupations at Osprey Beach, Yellowstone Lake. In *Yellowstone Archaeology: Southern Yellowstone*, pp. 59-75, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(2), Missoula.

Kornfeld, Marcel, Mary Lou Larson, and George C. Frison
2010 *Prehistoric Hunter-Gatherers of the High Plains and Rockies*, 3rd Edition. Left Coast Press, Walnut Creek, California.

Livers, Michael C.
2011 Airport Rings: Stone Circle Archaeology in the Gardiner Basin, Montana. In *Yellowstone Archaeology: Northern Yellowstone*, pp. 72-97, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(1), Missoula.

Lyman, R. Lee, T. VanPool and Michael O'Brien
2008 Variation in North American Dart and Arrow Points when One or Both are Present. *Journal of Archaeological Science* 35: 2805-2812.

Maas, Lester E., Michael C. Livers, Elaine S. Hale and Douglas MacDonald
2011 Prehistory and Archaeology within the Gardiner Basin, Upper Yellowstone River, Montana/Wyoming. In *Yellowstone Archaeology: Northern Yellowstone*, pp. 56-71, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(1), Missoula.

MacDonald, Douglas H.
2012a *Montana Before History: 11,000 Years of Hunter-Gatherers in the Rockies and Plains*. Mountain Press Publishing Company, Missoula.

2012b Little Trail Creek: Test Excavations at 24PA1081, Gallatin National Forest, Park County, Montana. Report submitted by University of Montana to Gallatin National Forest, January, 2012.

2013 Early and Middle Holocene Hunter-Gatherers at the Fishing Bridge Point Site, Northern Yellowstone Lake. In *Yellowstone Archaeology: Southern Yellowstone*, pp. 76-91, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(2), Missoula.

MacDonald, Douglas H. and Lester E. Maas
2010 Yellowstone Bank Cache Site: A Pelican Lake Site in the Upper Yellowstone Valley, Montana. *Archaeology in Montana* 51(2):1-24.

2011 Late Archaic Lithic Technology and Land Use within the Gardiner Basin, Upper Yellowstone River, Montana/Wyoming. In Y*ellowstone Archaeology: Northern Yellowstone*, edited by D. MacDonald and E. Hale. UM Contributions to Anthropology 13(1): 56-71.

MacDonald, Douglas H. and Elaine S. Hale (editors)
2011 Yellowstone Archaeology: Northern Yellowstone. University of Montana *Contributions to Anthropology* 13(1).

MacDonald, Douglas H., Jordan C. McIntyre, and Michael C. Livers
2012 Understanding the Role of Yellowstone Lake in the Prehistory of Interior Northwestern North America. *North American Archaeologist* 33(3): 251-289..

Reeves, B. O. K.
2006 1999-2001 Archaeological Inventory Yellowstone River Tower Falls-Gardiner and Hellroaring Creek, Wyoming and Montana, Yellowstone National Park, Mammoth Hot Springs, Wyoming.

Sanders, Paul H.
2000 The 1999 Archaeological Test Excavations of Site 24YE14, Yellowstone National Park, Wyoming, Office of Wyoming State Archaeologist, Laramie, Wyoming.

2001 Archaeological Test Excavations of Eight Prehistoric Sites Along the Canyon to Lake Junction Highway, and Additional Recording at Historic Sites 48YE23 and 48YE155, Yellowstone National Park, Wyoming, Project 254H. Office of the Wyoming State Archeologist, Laramie, Wyoming.

2013 A Reassessment of Prehistoric Land-Use Patterns within the Yellowstone Lake Basin and Hayden Valley Region, Yellowstone National Park. In *Yellowstone Archaeology: Southern Yellowstone*, pp. 22-41, edited by D. MacDonald and E. Hale. University of Montana Contributions to Anthropology 13(2), Missoula.

Smith, Lisa M.
2012 Faunal Analysis Results, Little Trail Creek Site. Report on file at University of Montana, Missoula.

Whitlock, Cathy
1993 *Postglacial Vegetation and Climate of Grant Teton and Southern Yellowstone*. National Park Ecological Monograph 63(2): 173-198.

Whitlock, Cathy, Walter E. Dean, Sherilyn C. Fritz, Lora R. Stevens, Jeffery R. Stone, Mitchell J. Power, Joseph R. Rosenbaum, Kenneth L. Pierce, and Brandi B. Bracht-Flyr
2012 Holocene Seasonal Variability inferred from Multiple Proxy Records from Crevice Lake, Yellowstone National Park, USA. *Palaeoecology* 331-332: 90-103

Vivian, Brian, Brian O.K. Reeves, and Ann M. Johnson
2008 Historical Resources Mitigative Excavations at Site 24YE353: Malin Creek Site Final Report. Report on file, Yellowstone National Park, Mammoth Hot Springs.

Douglas H. MacDonald
Department of Anthropology
The University of Montana
Missoula, MT 59812
douglas.macdonald@umontana.edu

Lisa M. Smith
Department of Anthropology
The University of Montana
Missoula, MT 59812
lmsmitharchaeology@gmail.com

Jannifer W. Gish
JG Research
5146 Longmeadow Cove
Memphis, TN 38134
jgresearch@yahoo.com

Michael C. Livers
433 Woodlman Drive
Belgrade, MT 59714
mclivers@gmail.com

Justin Moschelle
Kootenai National Forest
31374 US Highway 2
Libby, MT 59923-3022