Archaic Period Obsidian Use in the Greater Yellowstone Ecosystem: The 48PA551 Assemblage in Regional Context

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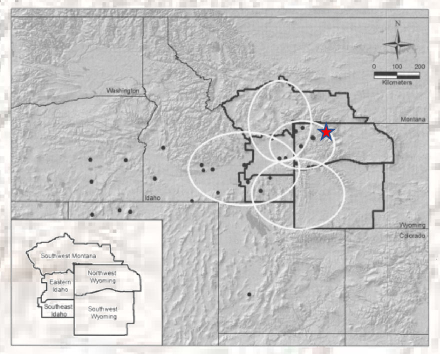
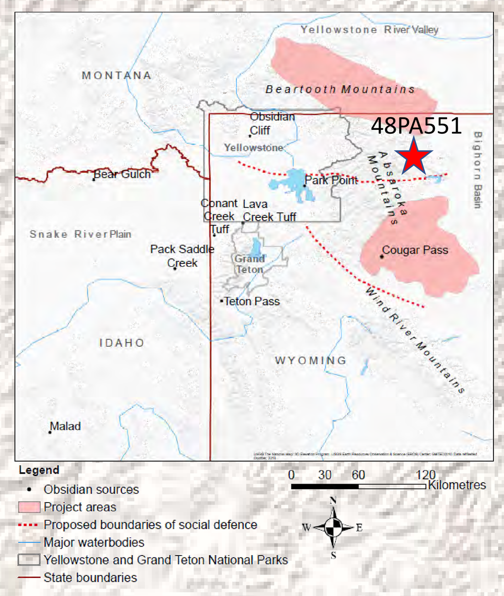
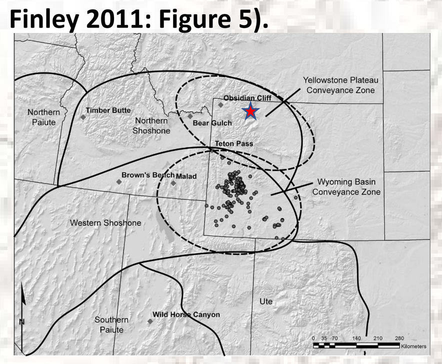
Recently several studies have brought together a wide range of data on distributions of artifacts from obsidian sources represented by sites in and around the Greater Yellowstone Ecosystem (GYE). In 2011 Scheiber and Finley assembled source information on 2297 artifacts from almost 250 sites in western Wyoming. Finley et al. (2015) incorporated about 500 additional sourced pieces from the Wyoming Basin to this sample. Reckin and Todd (2019) used existing source data from the Beartooth Mountains and added source location information for nearly 900 artifacts recorded by the GRSLE project (Todd 2015) in the Absaroka mountains at the southeastern margins of the GYE. Recently MacDonald et al. (2019) assembled source data from over 2000 artifacts from Yellowstone Park. These studies all provided insights into regional patterns of obsidian source/artifact discovery location and have developed models of conveyance zones and suggested possible social group boundaries within and around the GYE. These studies provide an exceptional baseline against which new samples from single sites (such as High Rise Village, Morgan et al. 2016) can be assessed. In 2017 as part of a study on NW Wyoming projectile points, we submitted 24 pieces from 48PA201 to Richard Hughes (Hughes 2017) for edxrf geochemical source characterization. Comparison of the new 48PA551 data with the existing regional studies provides additional support for aspects of these models as well as highlights site specific differences in source use within the broader zones.



Central Rocky Mountain postcontact obsidian use model (Scheiber and Finley 2011: Figure 5).



A social boundary model based on differences in obsidian source data from Beartooth Mountains and Absaroka Mountains (Reckin and Todd 2018: Figure 4). 48PA551 provides data from a site between these two higher elevation project areas.



Finley et al. (2015: Figure 6) suggest two long-term conveyance zones.

ABSTRACT

In comparison to other Archaic sites in the eastern portions of the Greater Yellowstone Ecosystem (GYE), 48PA551 has an unusually high number of obsidian projectile points (N=29). Geochemical source characterization of 23 of the 48PA551 obsidian points suggests that not only was the use of obsidian by Middle Archaic occupants of the site regionally anomalous in terms of frequency of use, but also in source selection. In this poster, we use a large sample of sourced obsidian from montane sites in the eastern and northern GYE to provide a regional baseline for examination of the 48PA551 assemblage. In the higher elevations of the Absaroka Mountains to the south of 48PA551, Lava Creek Tuff makes up just 2.0% (N=23/1087) of the sourced assemblage of obsidian. In contrast, 56.5% (N=13/23) of the Middle Archaic obsidian points from 48PA551 are sourced to Lava Creek Tuff. This suggests a vital pathway for people across the northern Absarokas and south through the Yellowstone Plateau from Lava Creek Tuff to 48PA551 during the Middle Archaic. It also suggests that cultural and social connections between the northern and southern Absarokas during this period may not have been particularly robust.

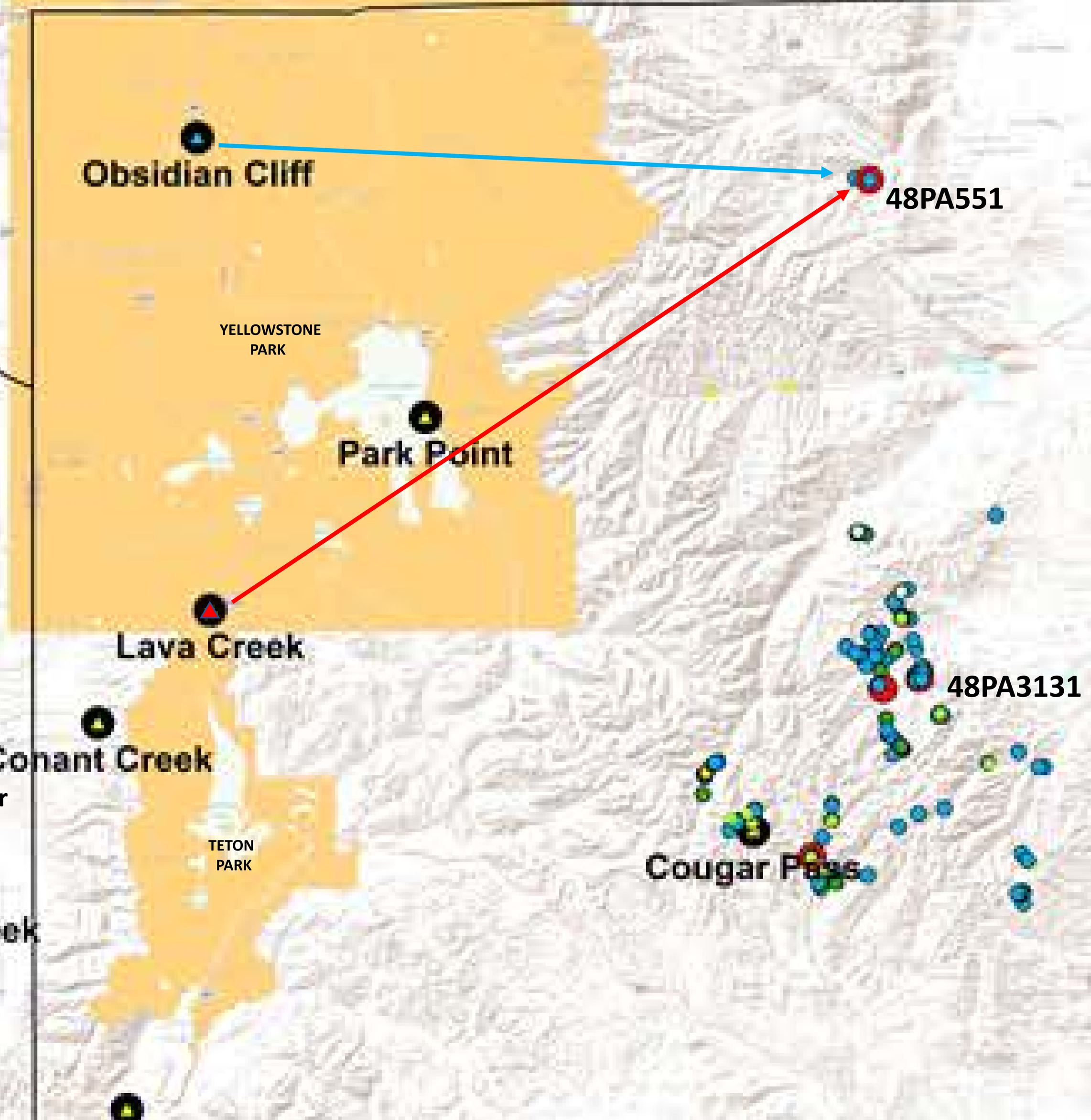
48PA551 Obsidian Points

With the exception of one fragment from an unknown source area, all of the Middle Archaic points from 48PA551 are from two Yellowstone Park Sources: Obsidian Cliff (35%) and Lava Creek (57%). A single Late Prehistoric point is from an often more commonly used source in eastern Idaho (Bear Gulch).

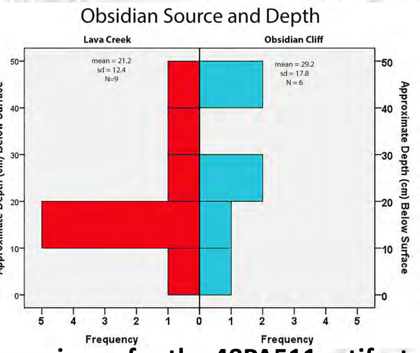
One the one hand, the obsidian source data from 48PA511 offers few surprises. It is clearly within a Yellowstone Plateau Convergence Zone (Finley et al. 2015) and also that within this zone, that there may well be additional boundaries that demarcate the Beartooth and Absaroka Mountains of south central Montana/northwestern Wyoming (Reckin and Todd 2019). On the other, the abundance of the usually minor Lava Creek Tuff source area captures our attention. From the regional, top-down perspective 48PA511 exhibits a predominance of northern Yellowstone obsidian that fits comfortably with a pattern seen in Beartooth archaeological collections. However, at the level of the single site assemblage 48PA551 stands out. Is this have something to do with unusual characteristics of Middle Archaic peoples interactions with GYE landscapes, or is the 48PA511 obsidian picture capturing something of a more site-specific, smaller scale nature?

In terms of broad-scale, regional patterns the abundance of Lava Creek obsidian at 48PA511 is clearly unusual. But, what about at the single site scale? Are there other locations where Lava Creek is more common that we might expect? As indicated in the summary of source data from the Beartooths, Absarokas, and Yellowstone, there is no Lava Creek material represented in the sample from the north of 48PA551, and only a small amount (1.8%) from the Absaroka sample to the south, and in fact, it is only represented at four of the nearly 700 sites in the Absaroka GRSLE project sample. Of these only one, 48PA3131, has a large enough sample of sourced obsidian (N=21) to merit additional attention.

The first observation about Lava Creek obsidian at this second site is that it represents a clear departure from the more common Obsidian Cliff dominated source background. As with 48PA551 (although we don't currently have corresponding landscape scale data in proximity to 48PA551), 48PA3131 stands out as being different from its regional aggregate neighbors. Of interest is that both the artifact assemblage and radiocarbon dates from 48PA3131 mark it as being several thousand years more recent than the main Middle Archaic occupation of 48PA551. These two cases highlight the fact that embedded within the broad, regional patterns there are a number of smaller scale obsidian source studies that have potential for opening a wider array of interpretive potentials.



48PA511's location in a high, montane basin on the eastern margins of the Yellowstone Plateau may have played a role the unusual mix of obsidian sources. Or perhaps, source data are suggesting differences in Middle Archaic landuse dynamic in comparison to earlier and later peoples?



Although provenience for the 48PA511 artifacts is limited, for the points with depth below surface, there is a tendency for Lava Creek to be more common in the upper levels.

As shown here, 48PA551 sources show a strong preference of Yellowstone Plateau sources with almost no other sources represented. At the regional scale, 48PA551 fits our understanding of distributional patterning. However at the scale of the single site, 48PA551 exhibits a very unusual predominance of one Yellowstone source – Lava Creek – that is regionally rarely represented. In the regional samples, Lava Creek accounts for at most 1-2% of the sourced obsidian. At 48PA551, it makes up 57% of the obsidian collection while the oft predominate Obsidian Cliff source accounts for only 35% of this sample. While MacDonald et al. indicate that in relation to other Yellowstone sources, Lava Creek has a high quality but low abundance ranking (2019: Figure 6).

Percentages of obsidian from Yellowstone Park, Beartooth Mountains, Absaroka Mountains, and the mostly Middle Archaic assemblage from 48PA551, which has an unusually high percentage of a single, often rarely used source – Lava Creek.

SOURCE AREA	GEOCHEMICAL SOURCE	Absarokas (N=1090)[1]	48PA551 (N=23)	Beartooths (N=360)[2]	Yellowstone (N=2045)[3]
Yellowstone Park	Obsidian Cliff	66.1	34.8	83.0	62.6
	Lava Creek Tuff	1.8	56.5	0.0	1.1
	Park Point	0.1	0.0	0.0	6.6
	Conant Creek	0.4	0.0	0.0	1.3
	Cougar Creek	0.0	0.0	0.0	6.6
Absarokas	Cougar Pass	4.9	0.0	0.0	0.0
Jackson Hole Area	Teton Pass/Fish Creek	9.5	0.0	1.0	3.4
	Crescent H	3.5	0.0	0.0	1.5
	Phillips Pass	0.3	0.0	0.0	0.0
	West Gros Ventre Butte	0.2	0.0	0.0	0.1
East Idaho	Bear Gulch	5.9	4.3	9.0	8.1
	Malad	3.9	0.0	3.0	0.3
	Pack Saddle Creek	0.6	0.0	0.0	1.4
	Big Southern Butte	0.1	0.0	0.0	0.1
	Browns Bench	0.1	0.0	0.5	0.0
West Idaho	Timber Butte	0.1	0.0	0.0	0.0
	Owhyee	0.0	0.0	0.5	0.0
Utah	Wild Horse Canyon	0.7	0.0	0.0	0.0
Other	Unknown	1.0	4.3	3.0	1.9

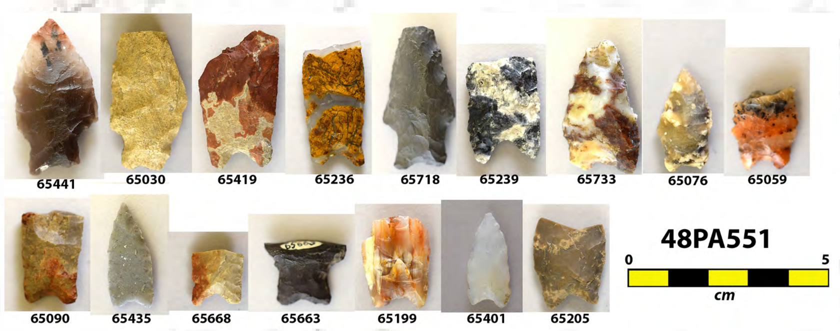
[1] Absaroka data from Reckin and Todd 2019 plus more recent GRSLE source data
[2] Data from Reckin and Todd 2019
[3] Data from MacDonald et al. 2019

Broad lithic raw material grouping for sample of projectile points recently re-recorded from 48PA551 showing the importance of the Middle Archaic occupation within the site and that obsidian, while more prevalent than in other regional sites, is still not the predominant raw material.

General Morphological Age	Obsidian N	Obsidian %	Quartzites N	Quartzites %	Likely Absaroka N	Likely Absaroka %	Cherts N	Cherts %	TOTAL
Late Prehistoric	2	25.0	1	12.5	4	50.0	1	12.5	8
Unknown Archaic	4	6.5	12	19.4	28	45.2	18	29.0	62
Late Archaic	0	0.0	0	0.0	3	42.9	4	57.1	7
Middle Archaic	17	9.0	36	19.0	75	39.7	61	32.3	189
Early Archaic	0	0.0	0	0.0	1	100.0	0	0.0	1
Paleoindian	0	0.0	0	0.0	1	50.0	1	50.0	2
TOTAL	23	8.6	49	18.2	112	41.6	85	31.6	269

Using the same broad lithic raw material groupings as at 48PA551, the general time period and raw material breakdown for the larger GRSLE projectile point sample highlights the relative abundance of obsidian points at 48PA551. Also of the 3 Middle Archaic points with source data from the GRSLE core project area, all are from Obsidian Cliff.

General Morphological Age	Obsidian N	Obsidian %	Quartzites N	Quartzites %	Likely Absaroka N	Likely Absaroka %	Cherts N	Cherts %	TOTAL
Late Prehistoric	146	23.7	44	7.1	116	18.8	310	50.3	616
Unknown Archaic	6	4.3	24	17.3	54	38.8	55	39.6	139
Late Archaic	28	8.4	42	12.6	71	21.3	192	57.7	333
Middle Archaic	6	3.5	20	11.8	84	49.4	60	35.3	170
Early Archaic	0	0.0	7	8.2	23	27.1	55	64.7	85
Paleoindian	1	1.7	25	41.7	11	18.3	23	38.3	60
TOTAL	187	13.3	162	11.5	359	25.6	695	49.5	1403

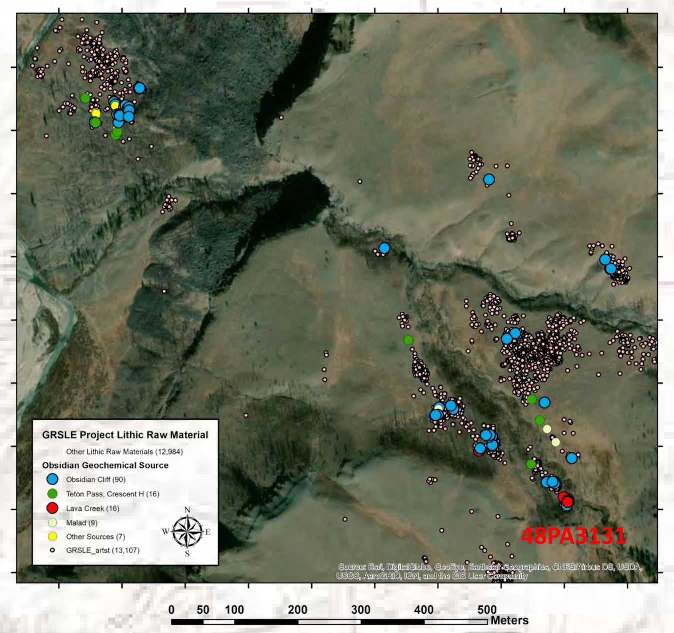


The most common raw materials for Middle Archaic projectile points at 48PA551 are chalcedony, petrified wood both of which are likely from sources either in the Absarokas south of the site, or from the Yellowstone Plateau to the west. Many of these raw materials are locally available in the mountains south and west of the site.

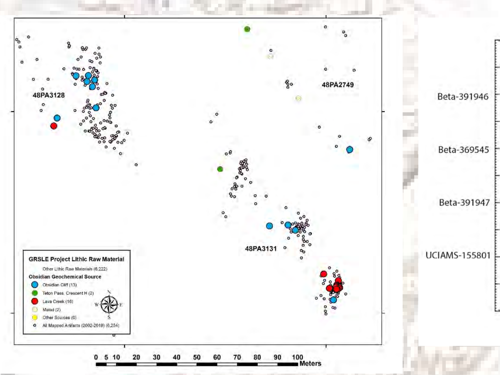
- Using obsidian sourcing to investigate spatiotemporal variability in evidences of stone tool technologies presents opportunities to undertaken contextually informed analyses at multiple scales.
- 48PA511 data present an unusual percentage of a relatively rarely used Yellowstone source – Lava Creek – and highlights the utility of regional models to identify anomalous lithic source profiles.
- Examination of other Lava Creek rich sites, although a very small sample, suggests that use of this sources is not tightly coupled with obvious chrono-technological variables and suggests additional inter and intra-site research directions.

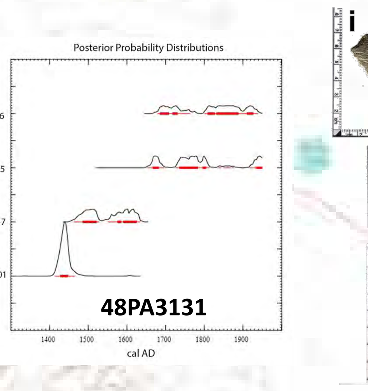
While rare, several other sites with relatively high Lava Creek obsidian have been recorded in the central Absarokas – one of these, 48PA3131 has an even higher Lava Creek footprint than 48PA551.

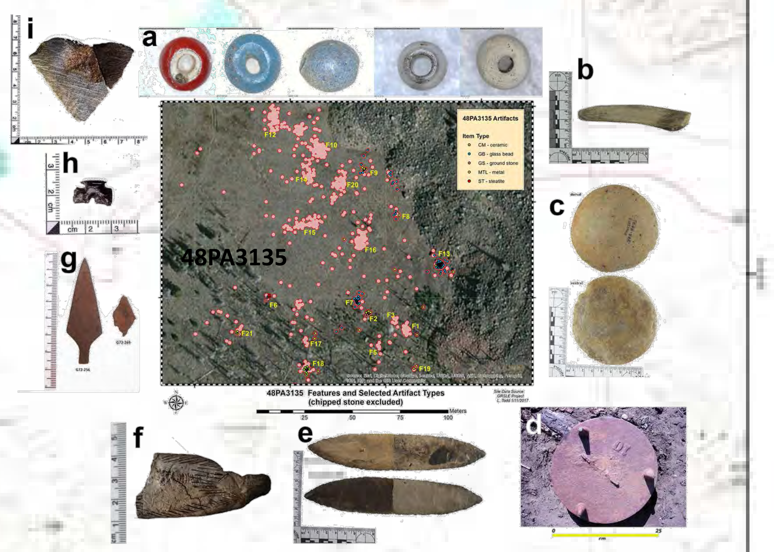
SITE	Lava Creek N	Lava Creek %OB	Obsidian Cliff N	Obsidian Cliff %OB	Teton Pass N	Teton Pass %OB	Crescent H N	Crescent H %OB	Malad N	Malad %OB	Unknown N	Unknown %OB	TOTAL OB	TOTAL CS
48PA3131	15	71.4	5	23.8	1	4.8	0	0.0	0	0.0	0	0.0	21	6077
48PA2772	2	16.7	6	50.0	3	25.0	1	8.3	0	0.0	0	0.0	12	6336
48FR7075	2	8.3	20	83.3	1	4.2	0	0.0	0	0.0	1	4.2	24	1780
48PA3128	1	6.3	13	81.3	1	6.3	0	0.0	1	6.3	0	0.0	16	1186



Lava Creek obsidian pieces are common at Late Prehistoric site 48PA3131 (lower right, above). As with 48PA551, the high percentage of obsidian from this source is anomalous at both the local and regional scale.



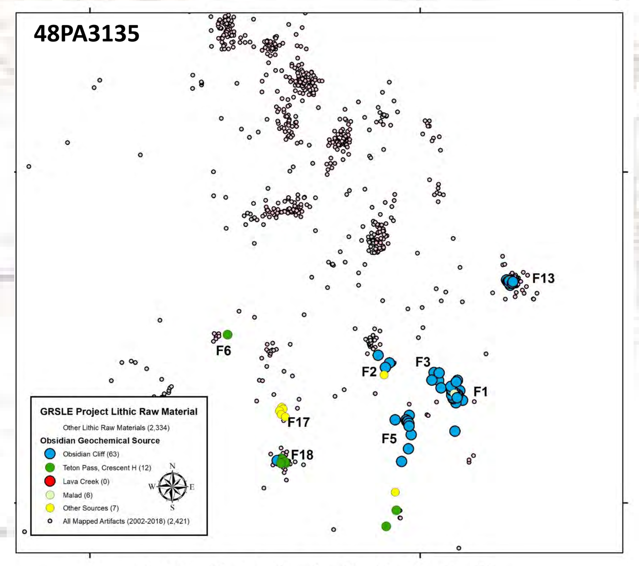




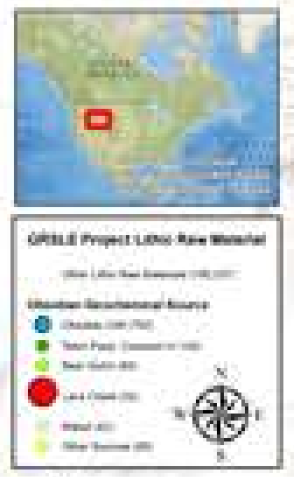
Both the assemblage, which includes tri-notched points and ceramics, and the radiocarbon dates from 48PA3131 indicate a Late Prehistoric, potentially Historic, use of the site. As with the Middle Archaic use of Lava Creek, 48PA3131 represents an unusual obsidian source pattern at both the local and regional scales and suggests that that for these site, perhaps neither geographic positioning or age are the key variables in obsidian source use.

A final example of examining smaller scale source information is provided by a site neighboring 48PA3131, 48PA3135, which is roughly comparable in age, but also shows some striking patterns in sources represented at different areas of the site. Unfortunately, provenience data are not available for the48PA551 projectile point sample, and we cannot assess the degree to which the Obsidian Cliff and Lava Creek materials represented there show any intra-site patterning. Hopefully, the upcoming field program will provide information so that 48PA551 can be studied at a site-level scale in addition to a regional scale.

SOURCE AREA	GEOCHEMICAL SOURCE	F1 N=31	F2 N=4	F3 N=5	F5 N=10	F6 N=1	F13 N=11	F17 N=5	F18 N=14
Yellowstone Park	Obsidian Cliff	96.8	75.0	100.0	100.0	0.0	100.0	0.0	7.1
	Lava Creek Tuff	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Park Point	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Conant Creek	0.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0
	Cougar Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Absarokas	Cougar Pass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jackson Hole Area	Teton Pass/Fish Creek	0.0	0.0	0.0	0.0	100.0	0.0	0.0	57.1
	Crescent H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Phillips Pass	0.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0
	West Gros Ventre Butte	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East Idaho	Bear Gulch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Malad	3.2	0.0	0.0	0.0	0.0	0.0	0.0	35.7
	Pack Saddle Creek	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Big Southern Butte	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Browns Bench	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West Idaho	Timber Butte	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Owhyee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Utah	Wild Horse Canyon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	Unknown	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0



The 48PA551 and 48PA3131 cases provide examples of additional, finer-grained source interaction data can both be used in development of regional patterns studies and to highlight site-specific differences. To give a final illustration of the utility of working between both regional, and finer-grained scales, data on obsidian sources associated with individual hearth features at site 48PA3135 (located only a few hundred meters from 48PA3131) are shown above.



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Acknowledgements

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