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An Analysis Of Obsidian Artifacts from the Black Mountain Redoubt (48FR6463): A Late Archaic to Late Prehistoric Shoshone Campsite in Northwestern Wyoming

Mary Margaret Hagen Erlick

Utah State University

AN ANALYSIS OF OBSIDIAN ARTIFACTS FROM THE BLACK MOUNTAIN REDOUBT (48FR6463): A LATE ARCHAIC TO LATE PREHISTORIC SHOSHONE CAMPSITE IN NORTHWESTERN WYOMING

By

Mary Margaret Hagen Erlick

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The Black Mountain Redoubt is a small Late Archaic through Late Prehistoric campsite in northwestern Wyoming associated with a series of communal bighorn sheep hunting traps. A diverse tools assemblage along with several house features indicates a wide range of activities specifically associated with bighorn sheep hunting. We use a 100 percent analysis of the obsidian formal tool and debitage assemblage as a test of obsidian conveyance in western Wyoming. Obsidian artifacts come from the five major regional sources but are dominated by Obsidian Cliff materials in keeping with the Yellowstone Plateau conveyance zone. In contrast, obsidian from Malad, Idaho is rare. There is no difference in the outcomes of the source analysis when comparing formal tools and debitage indicating that previous interpretations of regional obsidian conveyance are robust. The analysis also provides an opportunity to examine the technological differences in which artifacts from different sources enter the site's archaeological record. Obsidian formal tools are limited to projectile points and bifaces. Obsidian debitage analysis indicates that these materials enter the archaeological record in many forms that are not specific to source. The key difference between sources in the obsidian debitage assemblage is artifact size, but contrary to expectations artifacts from the closest sources are not necessarily the largest in the assemblage. This analysis highlights the potential of detailed obsidian source analysis from a single site that integrates both formal tools and debitage into a comprehensive interpretation of obsidian technological organization.

Keywords: Obsidian, XRF Analysis, Technological Organization, Yellowstone

Setting the Scene

Figure 1 shows the study area location in northwestern Wyoming and key local archaeological sites (1. Black Mountain Redoubt (48FR6463); 2 and 3. Black Mountain Sheep Traps; 4. Wiggins Fork Sheep Trap; 5. Helen Lookingbill Site; 6. Bull Elk Pass Sheep Trap; 7. Indian Point Eagle Trap). The Inset map show the location of key regional obsidian sources (A. Obsidian Cliff; B. Teton Pass and Crescent H; C. Bear Gulch, Idaho; D. Malad, Idaho).
Figure 2 is an overview of the project area: the Black Mountain Sheep Trap and the Black Mountain redoubt from Bear Creek looking northwest. Figure 3 is the diagram by George Frison that explains the two sheep traps collectively known as the Black Mountain Complex. Figure 4 is a photograph of trap 1. "Trap 1 has drive line that lead to a holding catch-pen, while another [trap, trap 2] has drive lines that lead to a holding pen with fences converging off one side of the holding pen into the [smaller] catch-pen" (Frison 1990). Dendrochronology has put the date, based on when the tree initiated growth, to the first trap sometime at or after AD 1820. However, the second trap dates just prior to AD 1760. After dating these two sheep traps, George Frison placed the age of the Black Mountain Complex' between 1770 to 1820.

What we have here is a nice example of two proto-historic sheep traps. Coupled with the Wiggins sheep trap to the northwest that dates to 1790. Fast forwarding to June 2008 when Matt Rowe scrambled up about 20-40 feet to get up to the top of Black Mountain finding this archaeological site. Then in 2011 Finley, Boyle, and Rowe conducted a field school which did the initial recording on that same archaeological site which Finley then dubbed the Black Mountain Redoubt site. Redoubt means: a temporary or supplementary fortification, typically square or polygonal and without flanking defenses. And the way this site sits at the top of the butte one must scramble to get up to the top, so it is protected on all sides. Thus, the name redoubt was appropriate.

Finley returned with another crew in 2012 with an idea. Do as close to a 100% surface collection as possible (collecting both diagnostic and formal tools as well as obsidian debitage) to test this proto-historic site against his obsidian conveyance zone theory. (Finley et.al 2015)

Goals and Questions

Significance

The Black Mountain Redoubt is important because domestic campsites associated with bighorn sheep traps are rare in the archaeological record during the Contact period within Greater Yellowstone Area. It is also important because it contains a sequence of Elko, Rose Springs, and Desert Series projectile points that indicates continuity of site occupation from the Late Archaic through Late Prehistoric eras, and possibly extending into the Historic period based on proximity to the Black Mountain Sheep Trap. complex

Research Questions

First, does this proto-historic site fit into the greater Yellowstone area (GYA) obsidian conveyance zone? And second, do informal tools and debitage enter into the archaeological record through different pathways than those of formal tools?

Methods

So, what we have is a small but significant obsidian assemblage that we used a combined method of portable XRF technology and a lithic attribute analysis to provide the answers to our two research questions.

The Yellowstone Plateau and Wyoming Basin Obsidian Conveyance Zone Theory

Before we know if the artifacts found at the Black Mountain Redoubt site fit into the 2015 Finley et. al obsidian conveyance zone for the Yellowstone plateau, we first need to know what the theory behind the obsidian conveyance zone is. This model proposed by Finley, Boyle, and Harvey in 2015 suggests that Obsidian Cliff and Malad, Idaho obsidian sources anchor the Yellowstone Plateau and Wyoming Basin obsidian conveyance zones, respectively. The Yellowstone Plateau is oriented on a northwest-southeast trajectory towards the Bitterroot Range of central Idaho, and the Wyoming Basin is oriented west-east to the northern reaches of the Great Salt Lake and eastern Snake River Plain.

These patterns hold for the last 3,000-5,000 years, which the authors interpreted as support for a growing body of information concerning long-term cultural continuity of ancestral Shoshone throughout the interior of western North America.

Expectations

We expect Malad, Idaho obsidian to be rare at this site. Instead, it will be dominated by Obsidian Cliff, Teton Pass, and Bear Gulch sources. If materials from the Malad, Idaho source are present, we expect them to occur in the form of discarded, curated formal tools or small debitage originating from the maintenance of curated formal tools.

Results

Figure 6 is the Strontium to Yttrium Biplot showing the grouping of the six primary identified obsidian sources. Ellipses represent the 95% confidence interval of group membership based on the key element concentrations. Each of these groups is very distinct both through analysis by element as well as geographically. Teton Pass and Crescent H are often grouped together under a Jackson Hole header but are in fact two chemically distinct separate obsidian sources.

Figure 7 shows how the total artifacts are distributed throughout the site. The 100 percent source analysis of obsidian debitage provides us with the unique opportunity to examine the spatial distribution of sourced artifacts across the site surface. A total of 300 tools and obsidian flakes were mapped. This is only a fraction of the surface artifact assemblage, since an additional 367 artifacts were chert and quartzite flakes. The artifacts occur in six discrete activity areas across the butte.

As you can see in Figure 8, most Obsidian Cliff materials are clustered near the northern most activity area, which includes two of the house features. Although some Obsidian Cliff materials are clustered to the south of the main part of the site, the remainder is scattered across the surface. Otherwise, there is no notable concentration of sources in any of the activity areas as you can see with the figure on the right. Of note is that the nine artifacts from the Malad, Idaho source show no preferential concentration and are distributed across most of the activity areas as seen in Figure 9.

Projectile Points and Other Formal Tools

Projectile points are the most common formal tool; there are 50 of them in this assemblage. The projectile point assemblage is typical of Late Archaic through Late Prehistoric sites in the Greater Yellowstone Area. Figure 10 shows Late Archaic Corner Notched (b, c, e, f, and k-p) and Rose Springs Corner Notched (a, d, and h-j) projectile points from the surface of the Black Mountain Redoubt site. Figure 11 shows the Desert Series projectile points from the surface of the site.

Late Archaic artifacts are represented by Elko series projectile points that include both shallow corner-notched artifacts (Figure 4 b, c, e, f) along with those having deeper notches with prominent shoulders or barbed corners (Figure 10 k-p). Late Prehistoric points include Rose Springs Corner Notched (Figure 10 a, d, h-j) and Desert Side Notched (Figure 11 a-k) types. While the distribution of diagnostic projectile points provides some potential insights into the age associations of individual activity areas as seen Figure 12, there is enough overlap of Late

Archaic and Late Prehistoric types across the areas to render this kind of interpretation of a surface assemblage inconclusive.

This study, because there is a 100% XRF analysis of the formal tool and flake assemblage, provides one of the first fine-grained analyses of an obsidian assemblage that allows the coupling of source analysis and obsidian technological organization. Specifically, we can address the ways in which obsidian from the key regional sources entered the sites archaeological record. First, from the table you can see that obsidian tools only enter the site record as projectile points and bifaces (Table 1). Most obsidian projectile points and bifaces are from the Crescent H source followed by Bear Gulch, Idaho and Obsidian Cliff. The dominance of chert and quartzite in scrapers and other formal tools indicates either the preference of these raw materials for hard- use tools or the unsuitability of obsidian for these kinds of tasks. No projectile points or formal tools are from the Malad, Idaho source, although the single identified obsidian core comes from that source.

Debitage

Obsidian debitage is present in many forms on the site, but flakes and shatter are most common. The combination of mostly flat and beveled platforms, a low percentage of cortex, and nearly 75% of the assemblage having fewer than three dorsal flake scars indicates that obsidian was brought to the site in various forms that included prepared tools and cores. Debitage from Obsidian Cliff dominates the assemblage, and these flakes tend to be small, with almost no cortex, and are among the flakes with the highest number of dorsal flake scars. This information, combined with the relatively close spatial distribution of Obsidian Cliff artifacts indicates that artifacts from this source entered the site in a relatively limited form and may have been produced from only a few tool maintenance events.

In contrast, the nine Malad, Idaho artifacts entered the site as a single tabular core and a variety of debitage forms ranging from angular debris to complete flakes produced from core reduction or tool maintenance. Based on these results, the Malad, Idaho obsidian does not appear to be treated differently in material assemblages. In fact, a size comparison of the sourced artifacts (as shown in figure 13) indicates that, contrary to expectations based on distance to source, Obsidian Cliff artifacts are the smallest overall in the assemblage. Figure 14, a fall-off curve, illustrates the trend in artifact size based on the straight-line distance from site to source for the five obsidian sources identified at the Black Mountain Redoubt. Although the size fall-off curve indicates the decrease in artifact size with distance, the overall small size of Obsidian Cliff artifacts compared with Malad, suggests that size with distance-to-source comparisons may be irrelevant when considering obsidian assemblages.

Conclusion

Our findings provide support for the Yellowstone Plateau obsidian conveyance zone in that Obsidian Cliff materials are common while Malad, Idaho materials, the anchor of the Wyoming Basin obsidian conveyance zone, are rare in the whole assemblage. But most importantly, this analysis provides a first opportunity to compare a sourced tool and debitage assemblage. Obsidian only enters the curated tool assemblage as projectile points and bifaces, which are mostly from local obsidian sources originating in Jackson Hole, Wyoming. The only identified obsidian core at the site was sourced to Malad, Idaho, which is an important insight into the form in which obsidian artifacts enter a site-specific archaeological record. In contrast with the curated tool assemblage, obsidian debitage enters the site in many forms. There is no clear relationship between distance to source and artifact size, which may speak to the way in which Obsidian Cliff and Malad, Idaho materials enter the archaeological record of the Black Mountain Redoubt. Obsidian Cliff artifacts are smaller compared with those from all other sources and are concentrated in a small area on the site, which indicates it may have entered the site in a limited number of forms.

Finally, the comparative analysis of the obsidian formal tool and debitage assemblages indicates no significant difference in the way that materials from specific obsidian sources entered the site's archaeological record lending support for existing obsidian conveyance model (Finley et al. 2015). While interpretations of regional obsidian conveyance and their importance in understanding cultural continuity require additional site-specific tests, our results suggest that a combined focus on formal tools and debitage yields robust and promising results.

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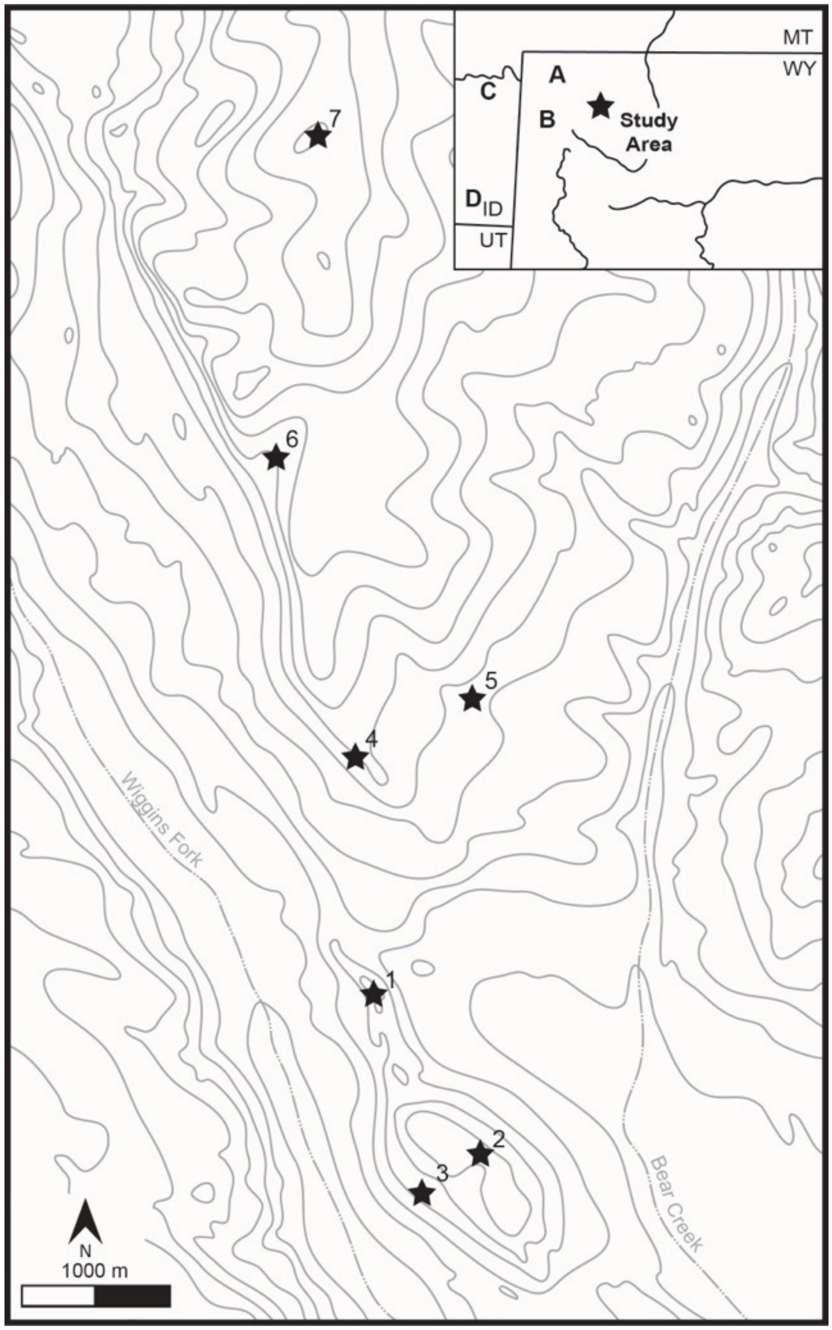

Figure 1. The study area location in northwestern Wyoming and key local archaeological sites (1. Black Mountain Redoubt (48FR6463); 2 and 3. Black Mountain Sheep Traps; 4. Wiggins Fork Sheep Trap; 5. Helen Lookingbill Site; 6. Bull Elk Pass Sheep Trap; 7. Indian Point Eagle Trap). Inset map indicates the location of key regional obsidian sources (A. Obsidian Cliff; B. Teton Pass and Crescent H; C. Bear Gulch, Idaho; D. Malad, Idaho).

Figure 2. Photograph overview of the Black Mountain Sheep Trap and the Black Mountain redoubt from Bear Creek looking northwest.

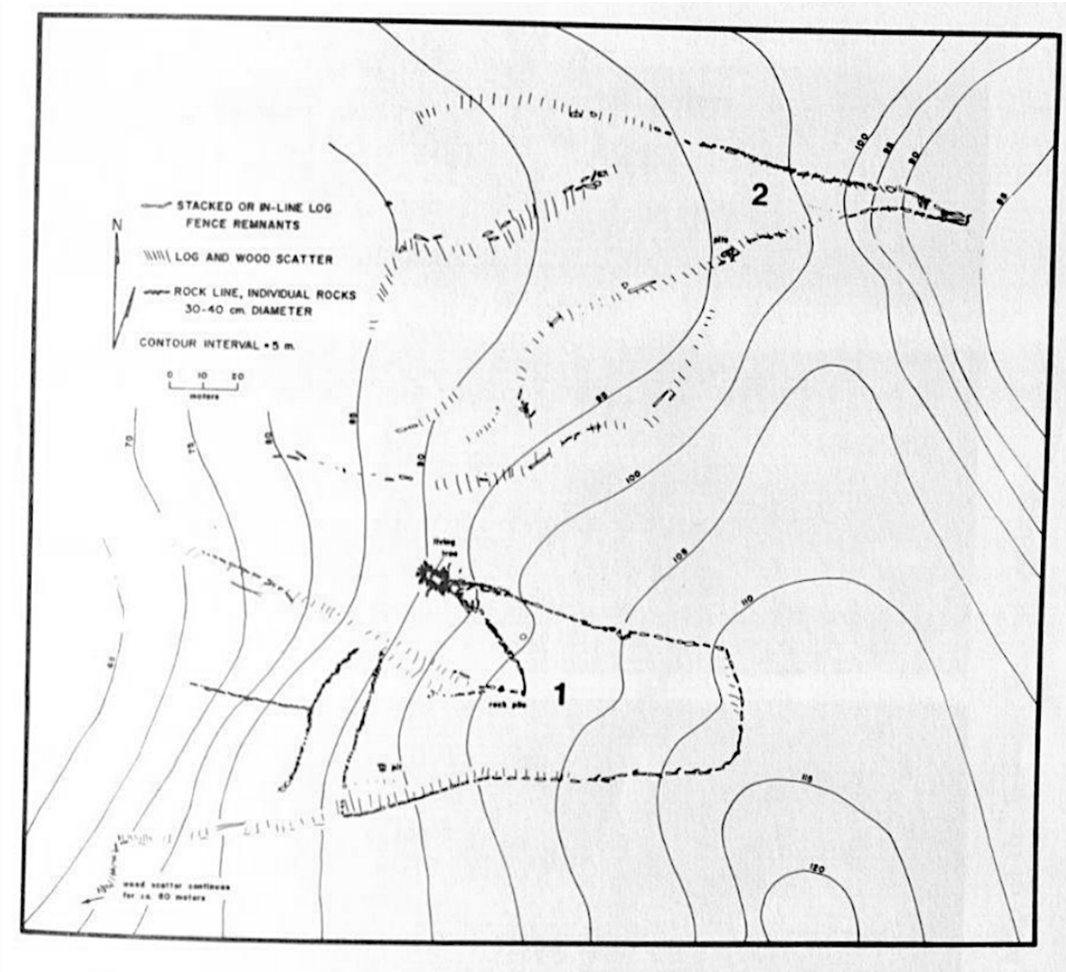

Figure 3. Map of the Black Mountain sheep trapping complex. (Frison 1990:223)

Figure 4. Catch-pen at the Black Mountain sheep trap. (Frison 1990:224)

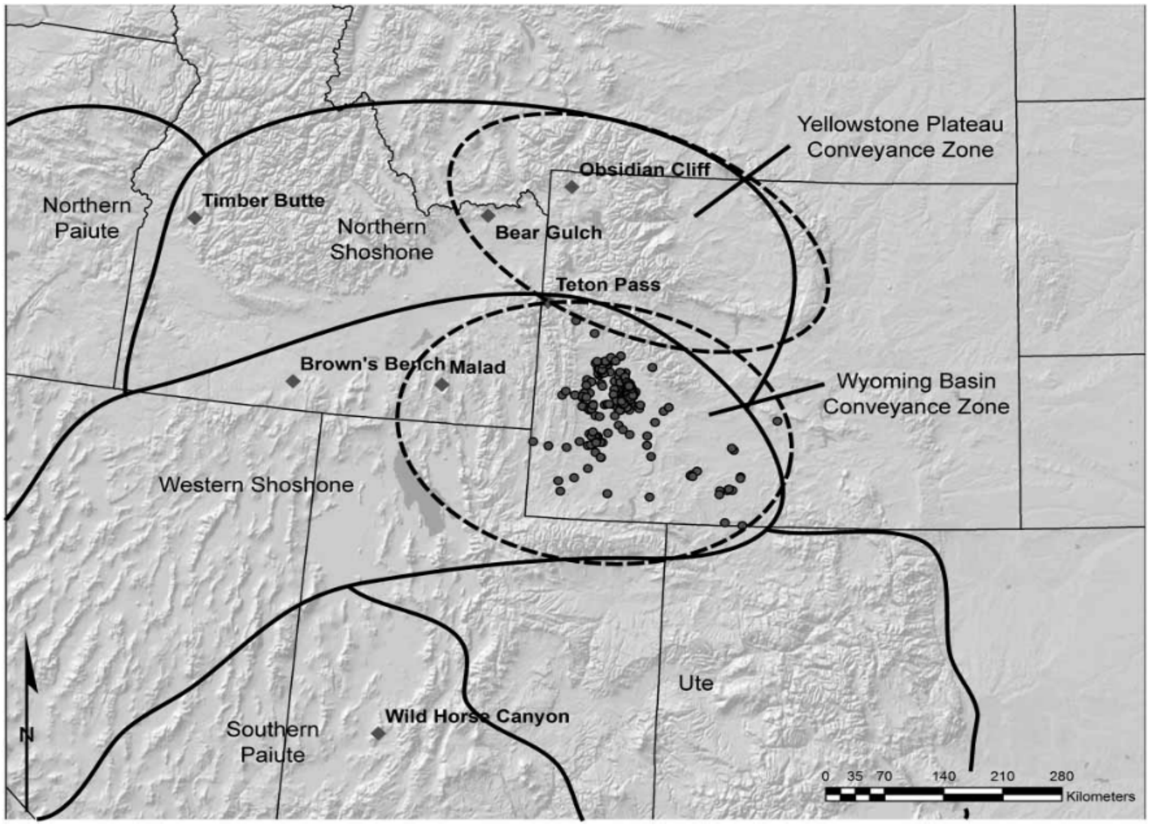

Figure 5. Shade relief map depicting the Wyoming Basin and Yellowstone Plateau obsidian conveyance zones in relation to Western and Northern Shoshone ranges. (Finley et al. 2015)

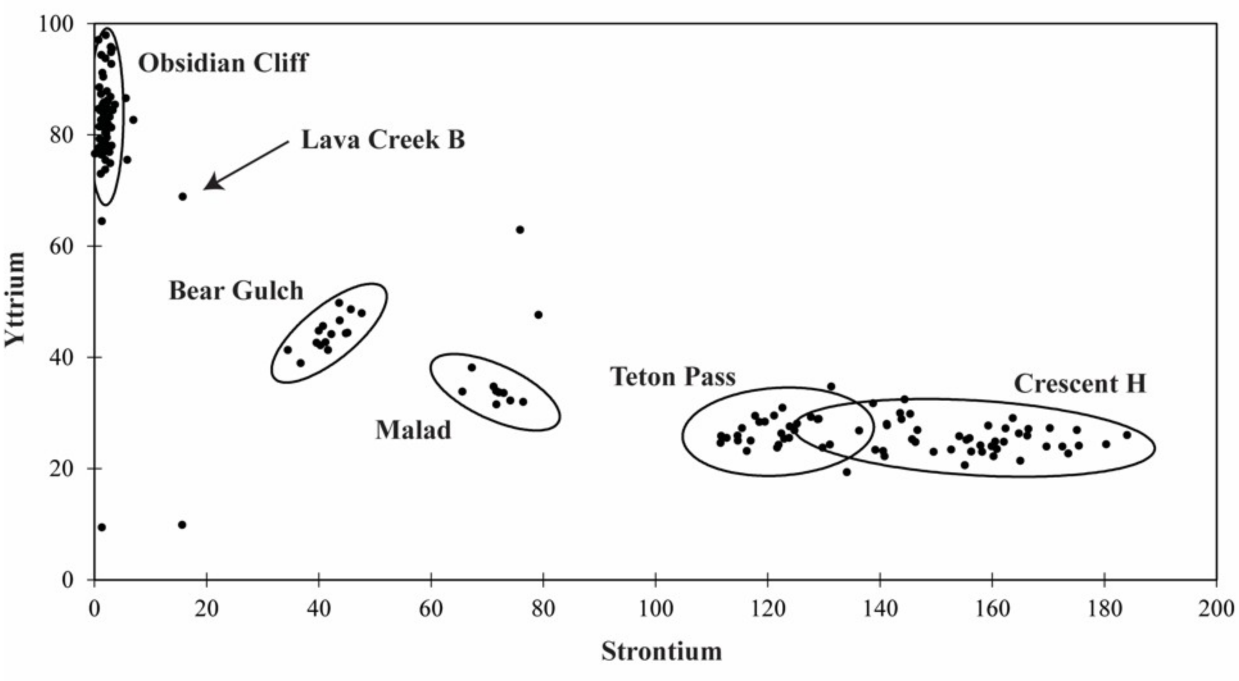

Figure 6. Sr:Y Biplot showing the grouping of the five primary identified obsidian sources. Ellipses represent the 95% confidence interval of group membership based on the key element concentrations.

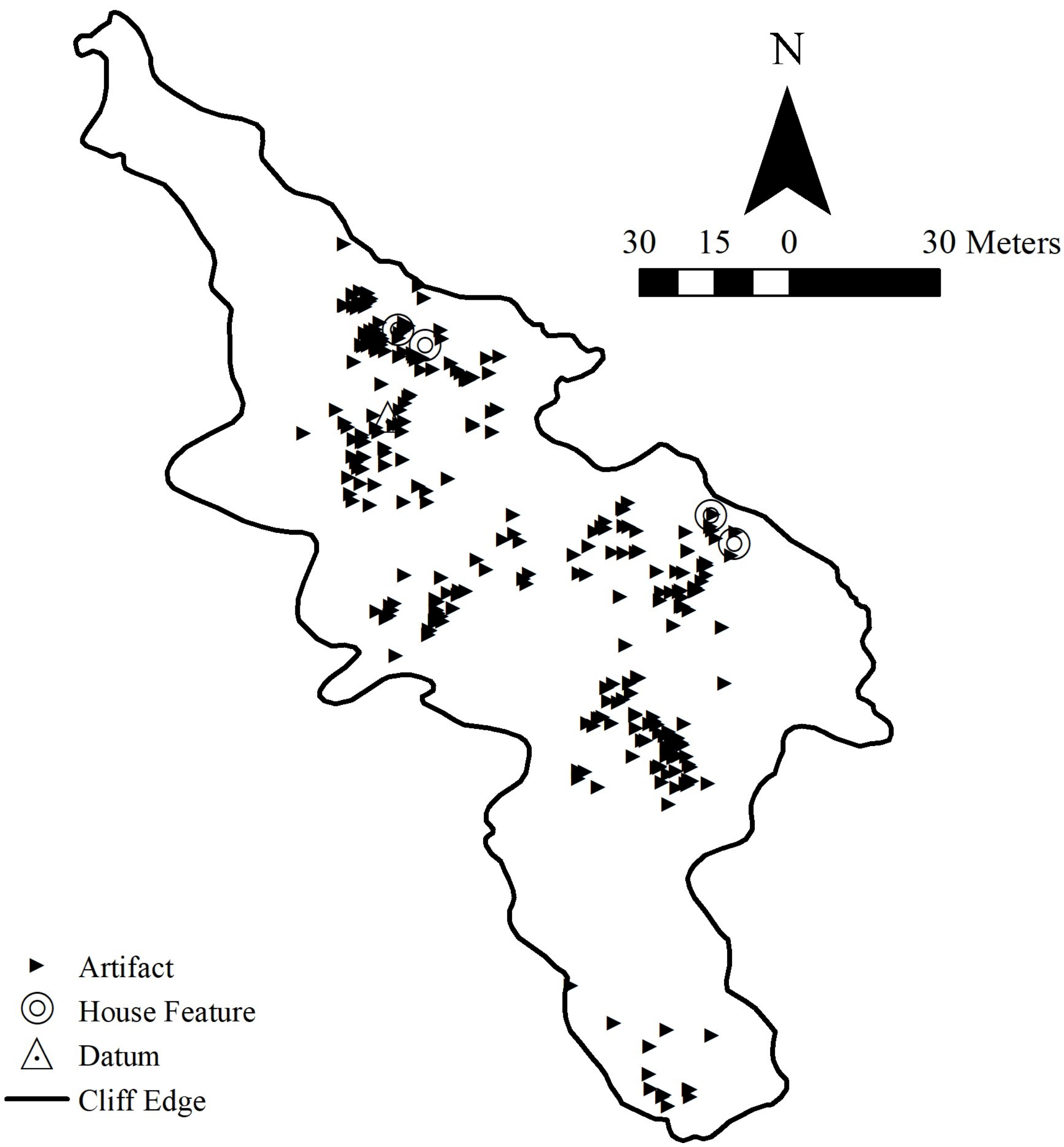

Figure 7. Site planview map of the Black Mountain Redoubt showing the distributions of all artifacts.

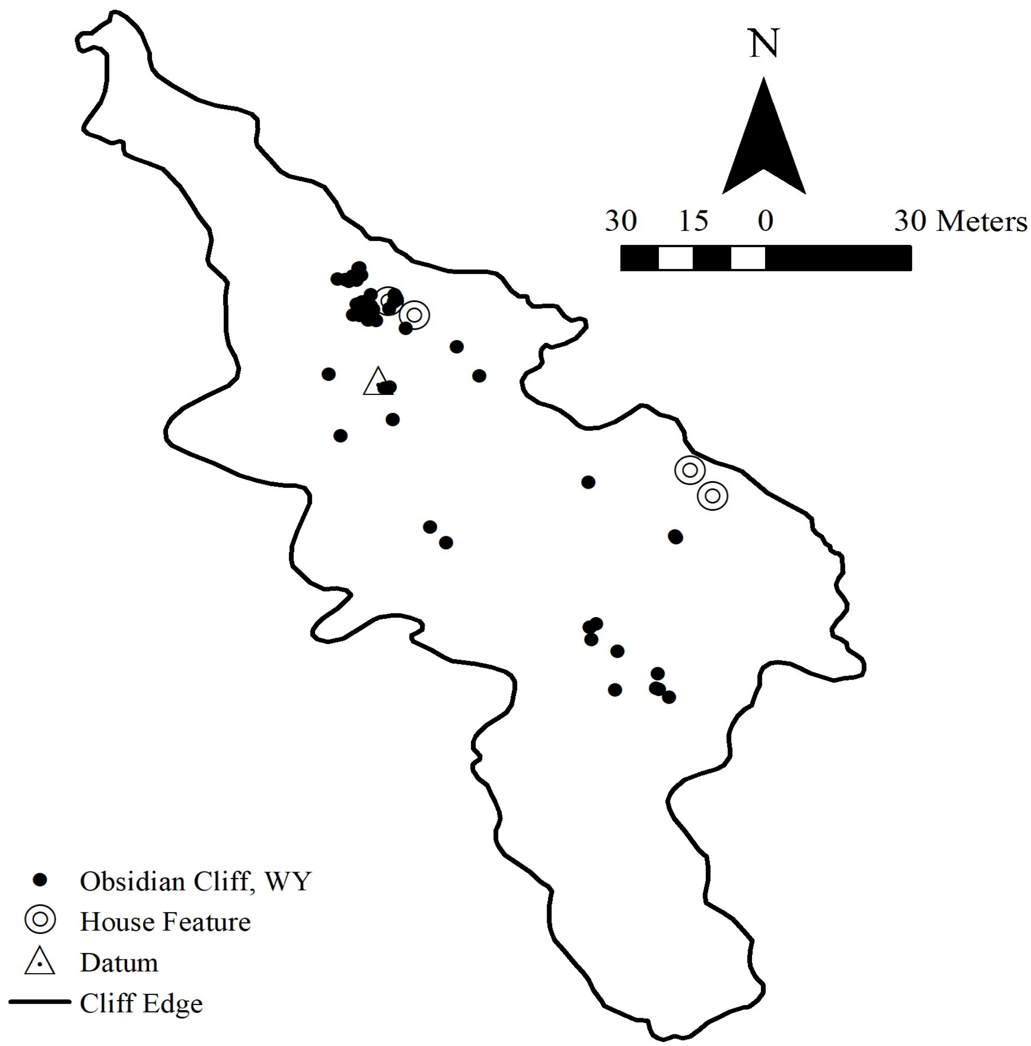

Figure 8. Site planview map of the Black Mountain Redoubt showing the distributions of all artifacts sourced to Obsidian Cliff.

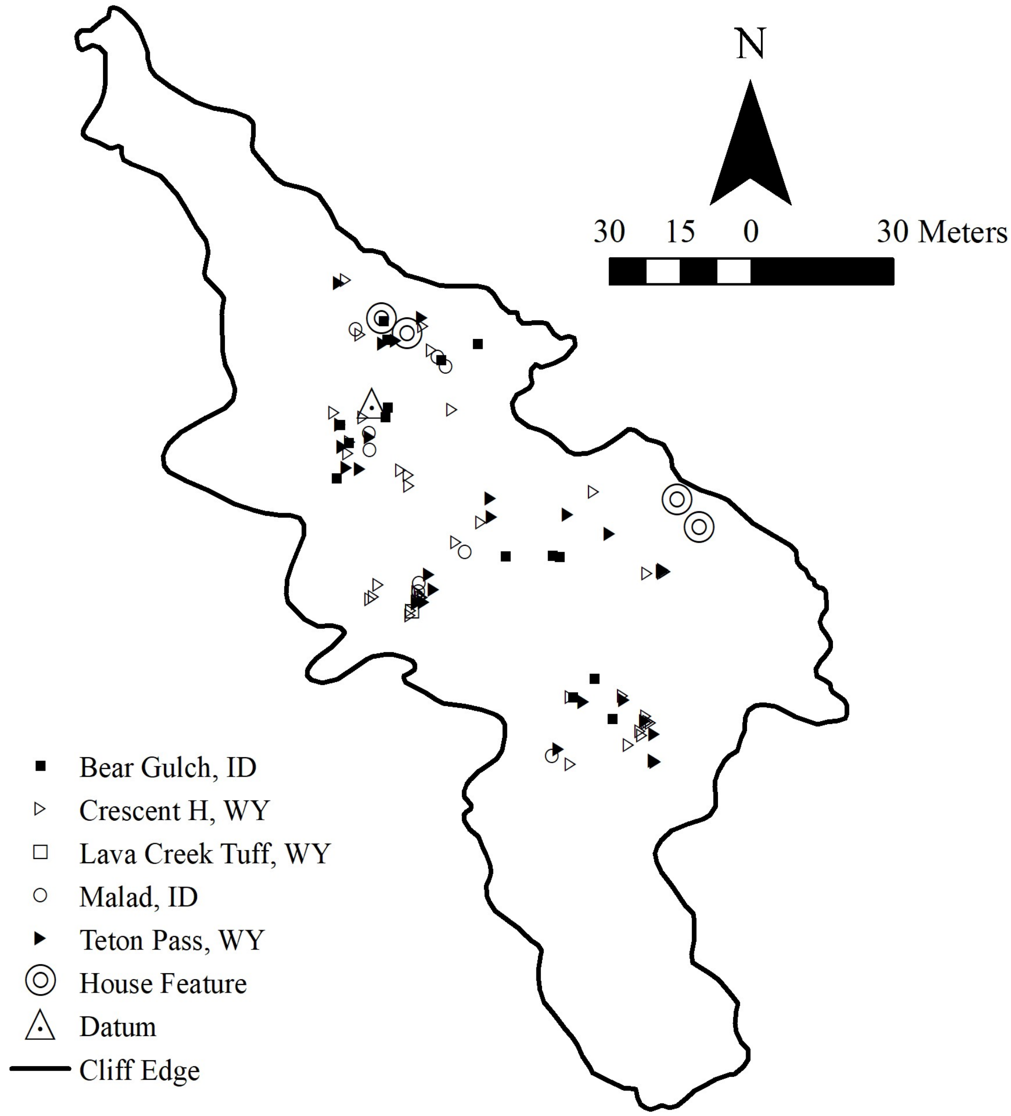

Figure 9. Site planview map of the Black Mountain Redoubt showing the distributions of all artifacts sourced to Teton Pass, Crescent H, Bear Gulch, and Malad (D.).

Figure 10. Late Archaic Corner Notched (b, c, e, f, and k-p) and Rose Springs Corner Notched (a, d, and h-j) projectile points from the surface of the Black Mountain Redoubt.

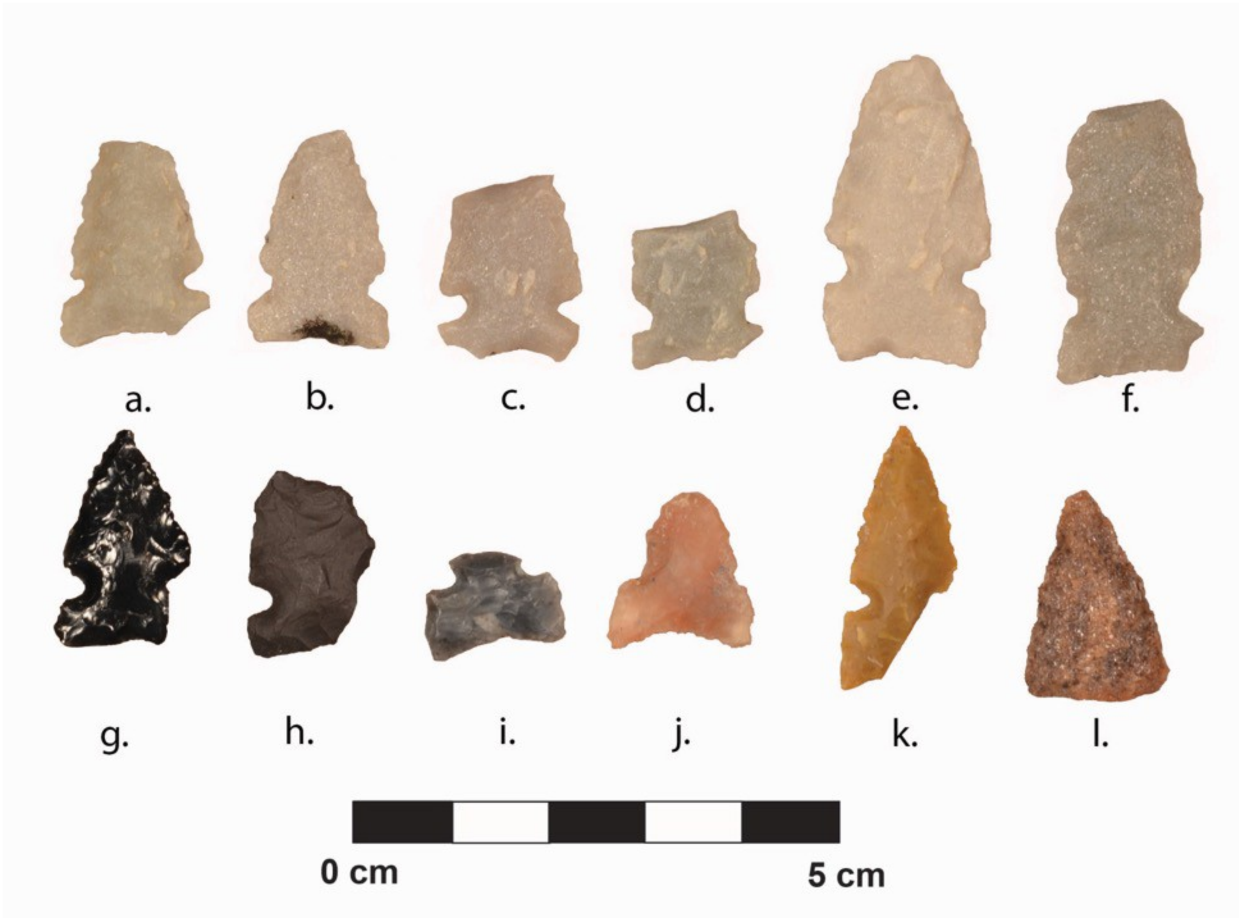

Figure 11. Desert Series projectile points from the surface of the Black Mountain Redoubt.

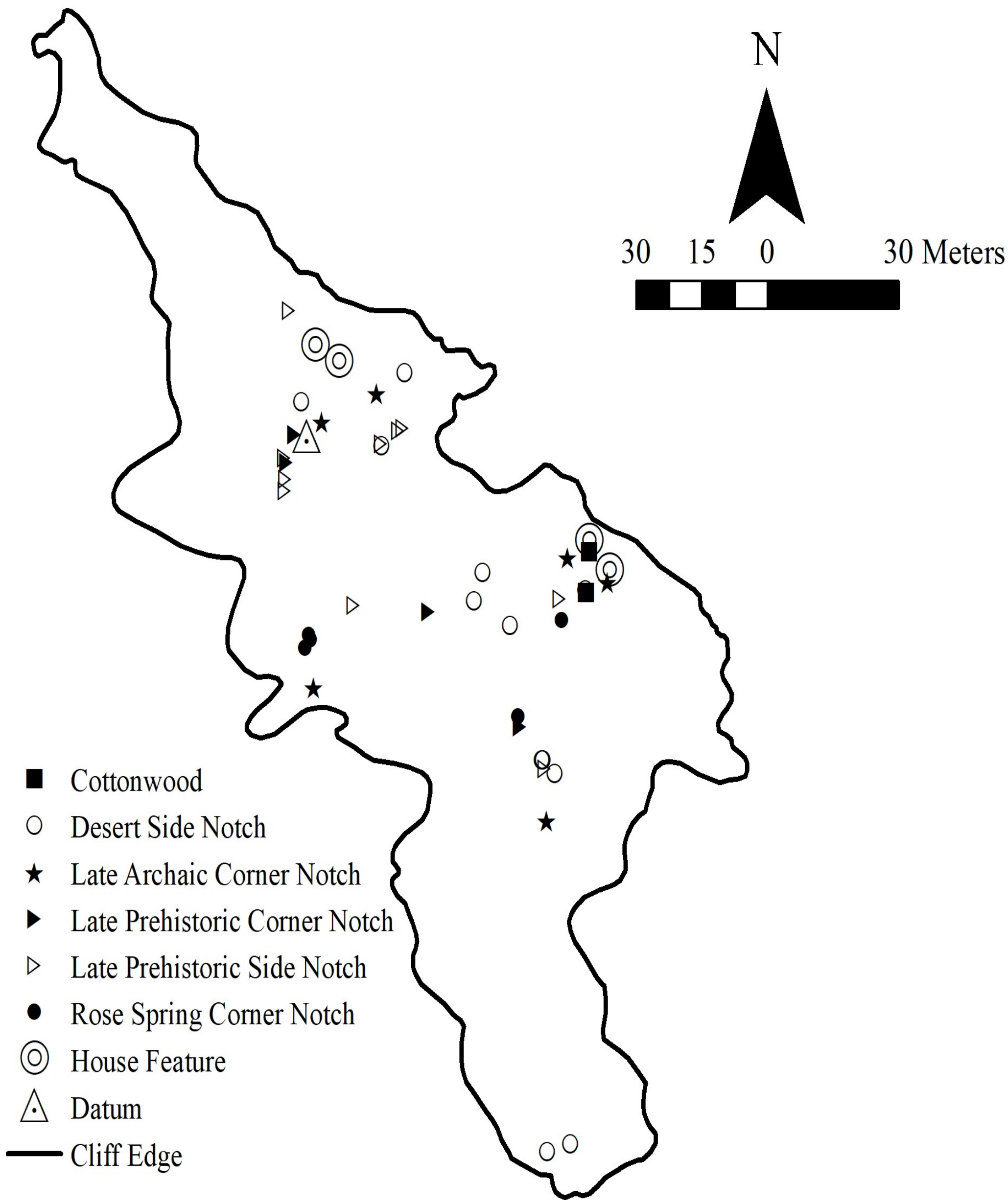

Figure 12. Site planview map of the Black Mountain Redoubt showing the distributions of typed projectile points.

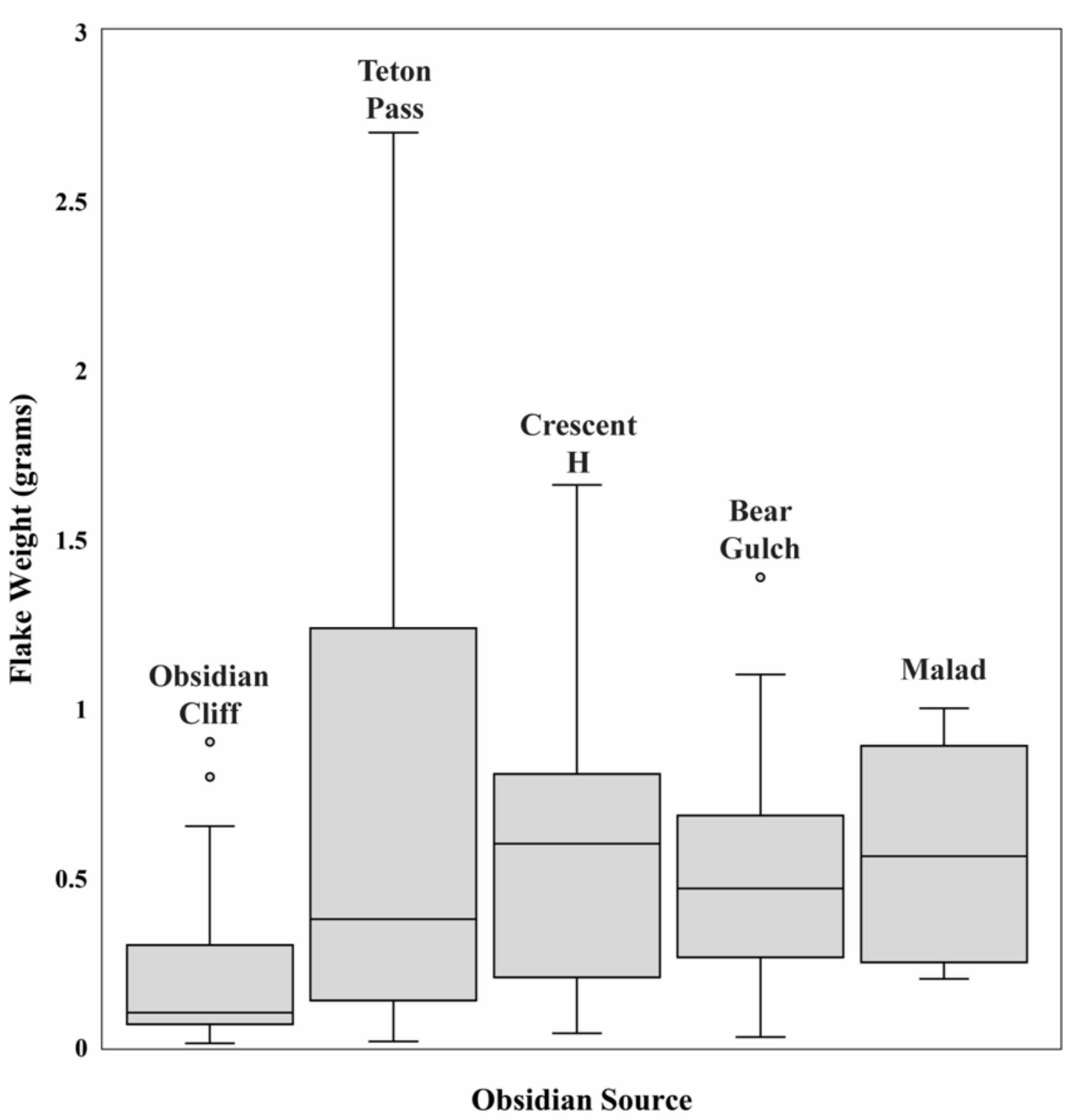

Figure 13. Box-and-Whisker plot illustrating the key differences in debitage weight based on obsidian source based on median values and interquartile ranges.

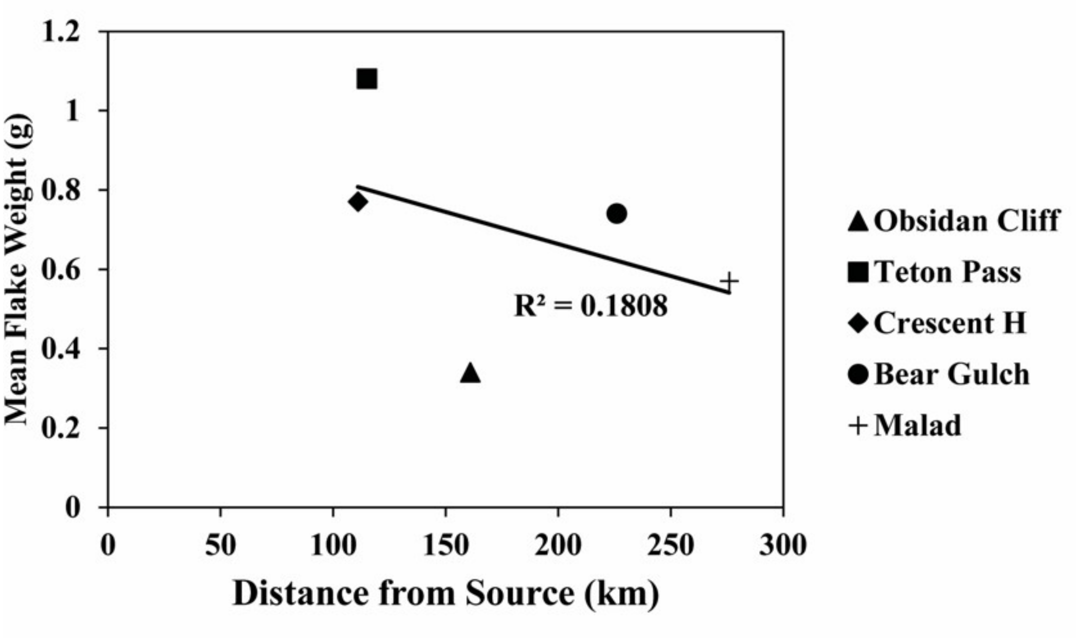

Figure 14. Fall-off curve illustrating the trend in artifact size based on the straight-line distance from site to source for the five obsidian sources identified at the Black Mountain Redoubt.

Table 1. Contingency Table Illustrating the Frequency of Obsidian Sources by Major Artifact Type

Tool Type	Projectile Point	Biface	Flake	Total
Obsidian Cliff	2	1	57	60
	(5)	(2)	(53)	
Teton Pass	0	1	27	28
	(2)	(1)	(25)	
Crescent H	7	4	33	44
	(4)	(1)	(38)	
Lava Creek B	0	0	1	1
	(0)	(0)	(1)	
Bear Gulch	4	0	11	15
	(1)	(1)	(13)	
Malad	0	0	9	9
	(1)	(0)	(8)	
Unknown	1	0	3	4
	(0)	(0)	(4)	
Total	14	6	140	161