Abstract
Little is known of hunter-gatherer land-use patterns in the mountains of northwestern Wyoming. During what time periods were these montane watersheds used heavily? When was the occupation of this high country relatively light? How were these watersheds used differently throughout the Holocene? Sixty days of in-field research in the upper Greybull and adjacent watersheds has provided us with data to begin answering these questions. Over 170 projectile points documented throughout these watersheds are used here to explore the variability in land use in the Holocene. The Paleoindian occupation of this area appears limited, followed by a slight increase during the Early Archaic. Middle Archaic occupation was also very light. These watersheds experienced the highest prehistoric occupation during the Late Archaic time period, when sites were occupied from the valley floors to the high cirques and passes. The Late Prehistoric occupation was also substantial, but was limited to the lower valleys. This spatial chronology of land-use must now be compared to the archaeological record of northwestern Wyoming in exploration of a more regional pattern.

Introduction
Over 15,000 lithic artifacts have been documented during 60 days of field research in the montane Greybull, Jack Creek, and N. Fork of the Wood River watersheds in the summers of 2002 and 2003. The location of every artifact was recorded using either a handheld or sub-centimeter GPS or a sub-centimeter total station (Figure 1).

The extent of data recorded per artifact varied between around 35 potential observations for projectile points to only marking the location of artifacts with a GPS. Digital calipers were used for measuring artifact dimensions. Data were entered into PDAs, which were then merged to the provenience data after the survey.

This paper focuses on the amount and distribution of projectile points per time period (Figures 2 and 3), using a sample of 151 diagnostic projectile points (of 170 total).

Chronology
The Late Prehistoric (ca. 1500-200 B.P.) points in the Greybull area are easily comparable to those found throughout the northern plains and surrounding areas (Figure 2: a-y). Most of these are Plains Side-Notched points that post-date 600 B.P. (Figure 2: a-r). The Late Prehistoric occupation appears very light from ca. 600 to 1500 B.P. (Figure 2:s-v). One Rose Spring point (ca. 1200 B.P.) has been documented (Figure 2: z).

Around 50% of the points are Late Archaic (ca. 3200-1500 B.P.; Figure 3). Few of these are associated with known complexes (e.g. Figure 2: af-bh). Pelican Lake (ca. 3200-1900), a recognized northwestern Plains complex, was documented in two of the montane watersheds (Figure 2: bf-bg).

The Middle Archaic (ca. 5500-3200 B.P.) occupation was very light, with only three projectile points documented (Figure 2: bu-bw). Several of the unidentified Archaic points may be Middle Archaic (e.g. Figure 2: bl-bn).

Early Archaic (ca. 7600-5500 B.P.) points found in low density throughout these watersheds mark the earliest period of significant occupation (Figure 2: bx-ch). Several of the unspecified Archaic points may be Early Archaic (e.g. Figure 2: bo-bs).

The Paleoindian occupation (pre-7600 B.P.) was light to questionable, with only one base fragment exhibiting Paleoindian characteristics (Figure 2: ci).
Figure 2. Selected Late Prehistoric (a-y), Late Prehistoric or Late Archaic (z-ae), Late Archaic (af-bh), Middle Archaic (bu-bw), Unspecified Archaic (bi-bt), Early Archaic (bx-ch), and Paleoindian (ci) points from the 2002 and 2003 GRIZ survey.
Raw Material Use
Obsidian knapping was common in the upper Greybull and adjacent montane watersheds mainly during the Late Prehistoric time period (Figure 4), although it does occur in low amounts within Late Archaic artifact clusters. The Greybull watershed may have been used by Late Prehistoric people whose range included part of the northwestern plains and obsidian sources to the west. This pattern of raw material use distinguishes the Late Prehistoric from the earlier Archaic (ca. 1500-7600 B.P.) patterns.

Late Archaic (ca. 3200-1500 B.P.) groups also used obsidian, but the relative abundance of obsidian in Late Archaic clusters is consistently less than in the Late Prehistoric clusters. As this is the earliest time period yet associated with obsidian use in the Greybull area, patterned subsistence strategies involving obsidian procurement may have developed in the Late Archaic and intensified in the Late Prehistoric.

The Late Archaic also marks the earliest period of intense use of locally available lithic raw materials. This continued into the Late Prehistoric. The above patterns may be biased by the large sample sizes for these two time periods, because artifact diversity is commonly correlated with assemblage size.

Early Archaic groups appear to have used mostly nonlocal material, with the exception of the large Dollar Mountain Chert source in the upper N. Fork Wood River. In the middle Jack Creek area, an Early Archaic lithic cluster contains only nonlocal chert and quartzite, while an adjacent multicomponent Late Archaic and Late Prehistoric cluster contains large amounts of silicified siltstone, among other local materials, probably derived from adjacent hillslopes.

Spatial Chronology
The distance between each projectile point and the bottom of the montane watershed was calculated using a digitizer on a digital 7.5 minute USGS map. Trails were followed in the digitizing process when they followed major streams or led directly to the bottom of the watershed. Streams were followed when trails were not available. These distances were divided by the distance from the base to the top of each montane watershed to produce a percent scale, which is useful for interbasin comparisons (Figures 5 and 6).

Figure 4: Material type variability for the diagnostic projectile point assemblage.

Figure 5. The mean and range distance up the watersheds where diagnostic projectile points were documented. Distances were converted to percent distance up the watershed (with 100% being the top of the drainage basin) for comparative purposes.

Figure 6. Number of projectile points documented in the different sections of the watersheds. Distances are in percent and were rounded to the nearest 10%.

The spatial distribution of the 151 diagnostic points in four montane drainage basins may be influenced by changes in land use patterns through the Holocene. Late Prehistoric points were documented in the middle and lower parts of these watersheds, while Archaic material was documented in the middle and upper montane watersheds (Figures 5, 6, and 7). The one possible Paleoindian base was documented in the middle of the Greybull montane watershed.

We have not equally sampled all parts of the watersheds in our research area, and have over-sampled the middle reaches. Still, general trends in projectile point distributions suggest that land use patterns were different in the Archaic versus Late Prehistoric occupations.

The absence of Late Prehistoric projectile points in the upper 50% of the montane watersheds is especially striking, because artifacts are more likely to become buried with time, and the most recent diagnostics from the upper half of the watersheds predate the Late Prehistoric (pre-1500 B.P.). Conversely, the absence of material earlier than Late Prehistoric in the lower half of the watershed may be more the result of deposition.
than of prehistoric human behavior. Most surveys in the lower half of the watersheds have been conducted on terraces adjacent to major watershed drainages whose surfaces likely post-date the Archaic occupation.

Figure 7. The distribution of projectile points documented in the montane Greybull and surrounding watersheds. The areas of most intense surveying correlate with the dense point clusters.
Intrasite Distribution of Projectile Points

Site JC003 (Figures 8 and 9) is a good example of the high amount of projectile points documented around 40% up the montane watersheds. The site is a palimpsest of Late Prehistoric and Late Archaic occupations, but cluster analysis may allow a horizontal seriation.
JC003 was recorded in 9 days with crews varying from 12 to 4 people, generating around 3870 lines of data.

One cluster in the northwest corner of the site (Figure 8) contains several Late Prehistoric projectile points that may represent the stylistic variability of projectile points carried by one group.

Most of the projectile points documented adjacent to the major streams are base fragments. These are interpreted as waste from tool maintenance activities.

Large palimpsest surface clusters and scatters such as JC003 occur throughout the flat lands in the middle of the Greybull and Jack Creek montane watersheds.

By analyzing attributes of diagnostic lithic clusters (i.e. those with a diagnostic projectile point), it may be possible to recognize both trends and idiosyncrasies in the prehistoric raw material economies – potentially allowing nondiagnostic clusters to be dated on the basis of raw material attributes.

Conclusions

- The middle sections of the Greybull and Jack Creek watersheds were used by groups during all major prehistoric time periods (i.e. Late Prehistoric, Late Archaic, Middle Archaic, and Early Archaic, and Paleoindian).
- Late Prehistoric material has not been documented in the upper half of these watersheds. Most points from this time period (post-1500 B.P.) are post-600 B.P. styles, suggesting more intense use of the lower montane country around the Little Ice Age than in the period from ca. 1500-600 B.P. containing the Medieval Warm Period (Figure 10).
- pre-1500 B.P. surfaces in the lower montane watersheds have not been sufficiently sampled to discuss the occupation of this country during the Archaic and Paleoindian time periods.
- Late Archaic material occurs throughout the middle and upper watersheds. These groups also had a familiarity with small local lithic sources (e.g. silicified siltstone and wood, chalcedony, and chert). Both of these patterns are consistent with a significant, patterned mountain adaptation from ca. 3200-1500 B.P.
- The Middle Archaic occupation appears limited and has only been documented in the middle reaches of the watersheds.
- Early Archaic material occurs in the upper half of the Jack Creek, Greybull River, and Wood River watersheds. Knowledge of small local sources has not yet been demonstrated for Early Archaic material – with the exception of the large Dollar Mountain Chert source. These occupations may have been spurred by the altithermal climatic event (Figure 10).
- Only one possible Paleoindian point has been documented among the 151 diagnostic projectile points.
- By documenting the provenience of all artifacts recorded in our survey area, temporally diagnostic artifacts can be associated with adjacent lithic material that was likely produced during the same time period. Although temporal overlap within a cluster cannot be discounted, most clusters containing diagnostic artifacts contain only those from one time period.

Figure 9: Site JC003 setting. See Figure 5 for location. Note the homogeneity of the topography and vegetation.

Figure 10: Oxygen isotope (i.e. temperature) data from the GRIP and GISP2 ice cores, Greenland, for the last 10,000 calendar years as compared to the sequence of occupations in the upper Greybull and adjacent watersheds. Isotopic data provided by the National Snow and Ice Data Center, University of Colorado, and the National Geophysical Data Center Boulder, CO.
• Performing this type of rigorous in-field analysis facilitates research of the settlement and subsistence strategies of prehistoric groups, including an analysis of raw material economies, without destroying the context of the subject matter through collection or excavation.