"I'm pretty sure that thing I just tripped over ain't natural.":

By Christopher C. Kinneer, Lawrence C. Todd, Paul C. Burnett, Courtney Hurst and Allison Bohn

Abstract

Hunting strategies in high altitude environments often involved the systematic construction of blinds and drive walls to funnel game animals (mule deer [*Odocoileus hemionus*], elk [*Cervus canadensis*], and bighorn sheep [*Ovis canadensis*]) towards predetermined kill locations. These systems are positioned to take advantage of natural landscape attributes.

Figure 1. Overview of Wyoming Project area

To date many of these systems have been recorded in Colorado and Wyoming (see Benedict and Frison). During the 2004 field season new hunting structures were identified in three valleys of the Greybull River watershed. Structures overlooking the Pickett Creek valley situated on open ridges and saddles (~3075-3200 m elevation) consist of stone walls, blinds, and an anomalous platform. A single enclosure was recorded on an ice-core rock glacier (~2500 m elevation) above the Wood River valley and a second isolated structure was documented near Jack Creek (~2900 m elevation). A prehistoric age for these structures is suggested by lichen bridging among the individual, dry-laid, stones. As with other such systems, no artifacts are associated with these structures.

The discovery of these structures extends the use of game procurement systems to this portion of the Absaroka Mountains and ultimately broadens the knowledge base associated with prehistoric use of the greater Yellowstone ecosystem. Additionally, the data gathered from these structures has the potential to expose predictable topographic signatures with value for understanding high elevation prehistoric hunting strategies in mountain environments. This topographic signature can be analyzed with a GIS. Future Investigations of high potential areas are facilitated through the use of a GIS and the SwitchBack least-cost trail mapping application.

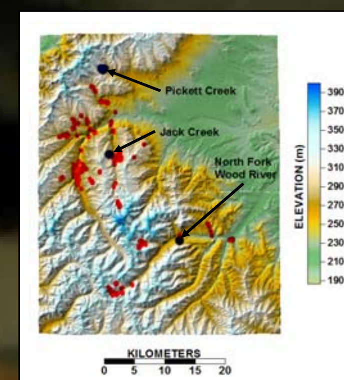

Figure 2. Overview of the Greybull River watershed. black dots indicate sites with structures. Red dots indicate concentrations of lithic material recorded during the 2002-2004 field seasons.

Temp. #	Field Designation	UTM East	UTM North	Elevation NAD83	Max. Length (m)	Max. Width (m)	Max. Height (m)	Y-Axis Ratio	X-Axis Ratio	# of Cobbles	Average Size of Cobbles in cm
PT001.01	wall 1	630322	4894363	3223	15.44	1.23	0.45	0.08	0.37	247	40-50 (max. 80)
PT001.02	wall 2	630356	4894327	3217	7	1.6	0.4	0.23	0.25	150	25-30 (max. 45)
PT001.03	wall 3	630510	4894178	3205	4	4	0.9	1	0.23	n/a (pltfm)	45-50
PT001.04	wall 4	630508	4894222	3207	4	1.7	0.9	0.43	0.53		40-50 (max. 100)
PT001.05	wall 5	630809	4894380	3103	36.6	0.9	0.75	0.025	0.83	391	30-50 (max. 150)
WR007.1	blind 1	643192	4865764	2536	7.8	6.1	1	0.78	0.16	350	20 (max. 70)
JC042.1	blind 1	631554	4880058	2878	6	4.5	1.5	0.75	0.93		

Figure 3. Structures Data.

WOOD RIVER STRUCTURE (48PA2838)

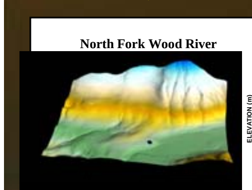

Figure 4. Digital Elevation Model showing the location of the Wood River Site (48PA2838).

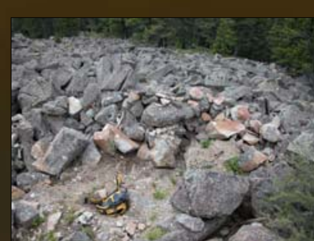

Figure 5. Overview of the the Wood River blind. Pack marks the floor and interior walls. Talus slope in the background.

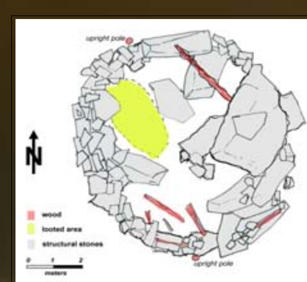

Figure 6. Planview of Wood River structure.

Figure 7. View from below the structure looking south.

Figure 8. Interior of blind showing the integration of wood elements as transverse cross-beams.

Figure 9. View looking north from the Wood River blind.

While structurally, the site conforms with some known bighorn sheep trapping facilities, its location makes inferences of its use difficult. The eastern wall, composed partially of large in situ stone, is higher and could have served as a jump point into the stone-walled containment. However, the approach to the eastern (as well as all other) sides of the structure is difficult due to the talus slope, which presents a very broken surface composed of medium to large pieces of angular stone interspersed with gaps and holes up to a meter in depth and would not seem to be the most suitable route for driving animals into a trap. Perhaps drifted and crusted snow would make access possible, but this is purely speculative. A preliminary examination of the surrounding slopes revealed no indications of either driveline features or hunting blinds and the downslope timbered area has not been surveyed for perishable structural features. A number of nearby lithic scatters along the Wood River and Jojo Creek (e.g., 48PA48) are potential candidates for processing/camp sites that could have been associated with this feature.

JACK CREEK STRUCTURE (48PA2795)

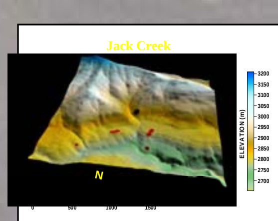

Figure 10. Digital Elevation Model of the Jack Creek Site (48PA2795).

Figure 11. Jack Creek blind looking southeast.

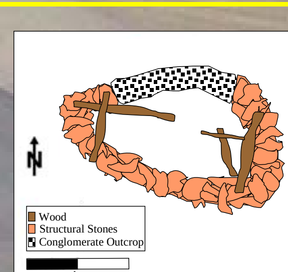

Figure 12. Planview of Jack Creek Structure.

Figure 13. Jack Creek blind looking northeast.

Figure 14. Structure incorporates a conglomerate outcrop (far right side).

Figure 15. Interior of blind showing the integration of wood elements.

Figure 16. Wooden elements from this structure exhibit regular angular cut marks.

The Jack Creek structure (JC042) is a semi-circular enclosure overlooking the Jack Creek Valley. The structure is quite substantial, and construction would have involved hauling significant quantities of stone from the surrounding area. The structure is well known to the local inhabitants, who often refer to it as an eagle trap. Morris (1990) describes eagle traps as enclosed stone structures that concealed hunters while they waited for prey. A small mammal would be tied to a string and displayed in an area that was open to the sky. A hawk or eagle would presumably swoop down to the bait. The hunter would then grab the raptor and pull it into the trap (Morris 1990: 201). While this specific function is not supported by direct evidence it remains a generally acceptable designation. Further investigations of this structure will include probing for materials suitable for carbon dating.

PICKETT CREEK STRUCTURES (48PA2820)

Anomalous Structures: The Pickett Creek platform structure (Figure 21-22) and the Wood River and Jack Creek circular structures (above) are difficult to assign specific functions. Frison has labeled similar circular structures in the area as "Shaman Huts"(Frison 1991). However, other interpretations focus on identification of the functional purpose for these structures (e.g.., the Eagle Trap) The interpretations of these structures should remain flexible. Pickett Creek Wall 3 is unlike any other structure in the literature and any suggestions or ideas about its function are welcomed.

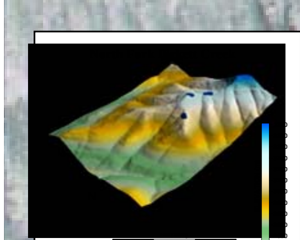

Figure 17. Digital Elevation Model of the Pickett Creek Site (48PA2820).

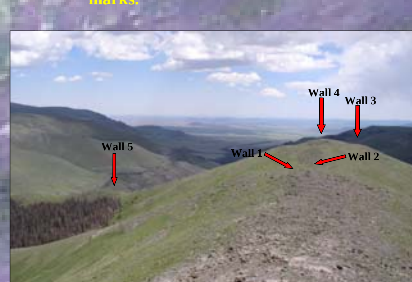

Figure 18. Pickett Creek site overview looking east. The narrow saddle (middle right) in conjunction with the wall structures served as a natural funnel for directing the movements of game animals.

Figure 21. Wall 3 looking southeast. Anomalous platform.

Figure 22. Wall 3 looking west. This structure is a three sided platform. A low wall was constructed on the western edge potentially serving as a blind.

Figure 23. Wall 4 looking west. Probable blind, positioned above main saddle.

Figure 24. Wall 4 from the base of the upper saddle. Red line indicates wall.

Figure 19. Wall 1 looking north. This is most complete of the Pickett Creek structures.

Figure 20. Wall 2 looking north. Red line indicates wall.

Figure 25. Wall 5 looking north, viewed from the saddle below wall 4. Red line indicates wall.

Figure 26. Wall 5 looking north, viewed from the lower saddle. The way in which this structure was used unclear.

Figure 27. Wall 5 looking south. Yellow line indicates wall.

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Hunting Structures in the Absaroka Mountains of Northwestern Wyoming

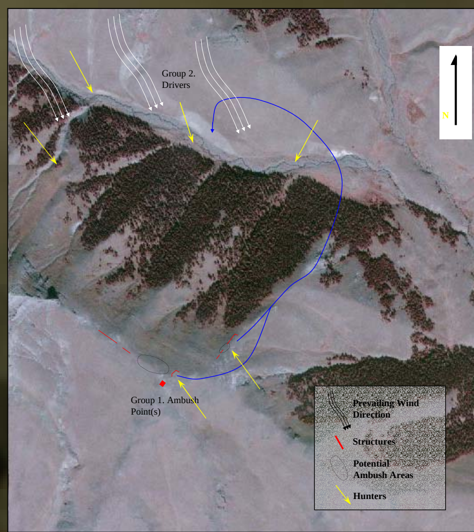

Figure 28. Planview of the Pickett Creek site showing the locations of the walls and the locations of the hunters.

Operation of the Drive System

Ostensibly, the locations of these structures are situated to take advantage of prevailing ground level winds (see Figure 28). Upon observing game animals in the trees or above the treeline but below the primary and secondary ridge of the northern slope, hunters could have intercepted game by placing themselves behind the animals to the south and east. From these upper vantage points the hunters could have remained hidden. A second set of hunters would be necessary to drive the game towards the ambush area. These drivers would have moved around to the north and west of the animals, allowing their scent to be carried downwind. Ethnographically, these types of hunting systems are most effective if the prey animals move slowly towards the kill location, giving the hunters more time to prepare and aim their shots (Benedict 1996: 2-3). Ideally, the game animals would forage upslope and upon reaching the walls would continue along them towards the kill location(s). Too much noise or disturbance by the drivers would increase the chances that the prey animals would bolt, giving the hunters less time to execute an effective ambush. The addition of late-lying crusted snow banks may have added significantly to the overall length and efficacy of the wall structures.

Qualitative Dating

These walls are not yet definitively associated with prehistoric or historic Native Americans. However, there are qualitative data suggesting that humans, hunting without the aid of horses and guns, may have constructed these walls. First, the placement and orientation of the walls are not suited to containing animals. In their present condition they can hardly be said to have functioned as pens or corrals. Instead they are well suited to directing the travel of animals to a predetermined point on the landscape. Structures like these do not resemble those constructed by ranchers or sheepherders to corral animals. Finally, lichen bridging among the dry-laid stones proves that the walls were not constructed in the very recent past (i.e., within the last 100 years). It is estimated that only very small numbers of Europeans entered this portion of the Absarokas before the 1870's. Dating of the lichens and carbon materials, if available, are expected to place the ages of the walls well before a significant European presence. Additionally, it is suggested that this portion of the Absarokas became a hunting refuge for proto-historic and historic aboriginal hunters as Europeans and eastern aboriginal groups moved west; ethnographic accounts support this hypothesis (see Hughes 2000).

Structure Data:

-Dimensions: length, width, height and shape quantification (Figure 1)

-Materials: quantify the number of stone and wooden elements; average sizes of stones and dimensions of wooden elements

-In-Place Elements: the number of unmovable elements incorporated into structures

-Viewshed: quantifies an individual structure, accomplished with polar coordinates

-Direction and Orientation

-Associations: relationships among structures and the physical environment (i.e. do structures incorporate tree islands or other vegetation?)

Building a Predictable Topographic Signature

Variables include, but are not limited to:

Landscape Data:

-Slope: measured at each feature and at intervals in cardinal directions

-Aspect: directions of major landforms

-Elevation: points recorded on major landforms

-Geologic Substrate: prevalent bedrock; typically the predominant building material

-Depositional Environment: dominant depositional process occurring on site

-Water Source: nearest sources of water, both intermittent and permanent

-Wind: prevailing ground-level wind; direction and speed

-Temperature: annual temperature regime

-Vegetation Communities: particularly plant species used as forage by game

-Wet and Dry Precipitation: regional and micro-environmental precipitation patterns, including snow field data

-Modern Game: movement patterns, game trail locations, bedding areas and pellet count data (Figure 6; below)

Generating Comparable Data Sets: Current information available for game drives and hunting structures are variable with respect to landscape and structural data points. One goal of this presentation is to suggest a standardization of recording procedures. Behavioral attributes may be inferred from comparisons of labor investments in construction of walls and blinds. Labor investments are quantifiable if dimensional attributes and construction materials are recorded in a standardized manner. A prototype **Prehistoric Structure Data Collection Form** accompanies this presentation.

Investigation Method…Using SwitchBack and ArcGIS

1. The creation of landscape attribute maps for game drives can be accomplished by combining data gathered from multiple game drive sites and their surrounding locations. The number and type of landscape attribute maps to be used is part of an evolving process. This presentation includes a preliminary test based on the Pickett Creek Structures (48PA2820) and a limited number of potentially diagnostic attributes.

2. The landscape attribute maps are then layered using a GIS. Analysis of the attribute maps reveals points of intersection corresponding to the location(s) of the structures. Additionally, some variables like wind direction may be considered but cannot be included as map layers.

3. These layer maps can then be recreated for new areas that have not been investigated.

4. Analysis of these new areas will yield points/areas of intersection similar to those of the test case(s). These areas must then be "ground-truthed."

5. The results of the field investigations with respect to the new areas will be analyzed and new hypothesis generated based on agreement or disagreement with the initial proposition.

6. Thus ground-truthing will allow the synthetic models to be refined.

***More importantly the landscape attributes that prove to be diagnostic can be interpreted as having relevance to the hunting areas chosen by prehistoric hunters.**

SwitchBack

SwitchBack trails can be used to identify potential corridors of movement for both game animals and humans. Additionally, the Switchback model allows researchers to investigate the least-cost corridors that link hunting sites and residential camps. These corridors may elucidate general landscape use patterns with respect to processing and transporting game resources from a kill point, to secondary butchering locations, and ultimately to the point of consumption.

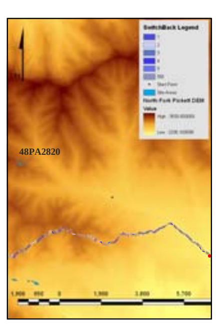

Figure 29. Trail corridor east-west along the north fork of Pickett Creek.

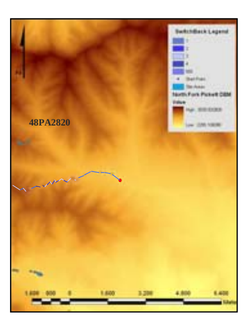

Figure 30. Trail corridor east-west along the north fork of Pickett Creek.

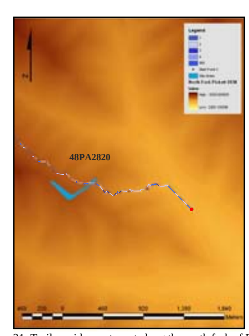

Figure 31. Trail corridor east-west along the north fork of Pickett Creek. SwitchBack intersects the lower bench near wall 5 (*see* Figure 25-27).

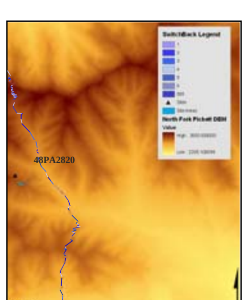

Figure 32. Trail corridor north-south from the sites located in Piney Creek.

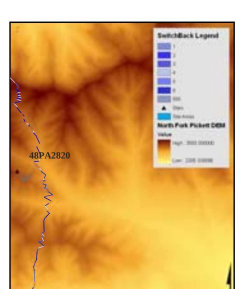

Figure 34. Trail corridor north-south from the sites located in Piney Creek.

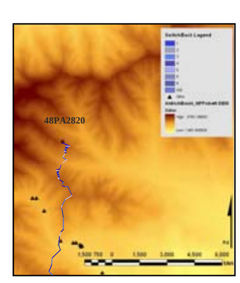

Figure 35. Trail corridor north-south to the sites located in Piney Creek. These corridors will be investigated next summer.

SwitchBack VB Program (created by Peter Barry, Courtney Hurst)

<<Program Available End of Summer 2005 at Greybull.org>>

Basics:

SwitchBack is a Visual Basic (VB) 6.0 program which defines the least-cost path (based on percent grade) from a user-defined start point in a user defined cardinal direction (N-S, S-N, W-E or E-W), thus forcing consideration of grades greater than overall least-grade. The result of the program is a trail that is the least-cost path in a user defined direction.

How it Works:

Switchback analyzes gradient with a set of different rules than that of a least-cost algorithm. Originally, the rules were based on acceptable trail grades as cited in "trail-building" literature and we had seven grade classes (based on percent mean grade). Now SwitchBack has 14 grade classes, ranging from Grade1 (0-5%), continuing in increments of 5%, to Grade14 (65 -100%), and Grade555 (greater than 100%). This was done in an effort to increase the grade detail captured by the trails created by the program.

The program limits grade consideration to three directions: 1.straight ahead (cardinal direction of interest as defined by the user) and 45 degrees left and right of the cardinal direction of interest. By accepting higher grades and limiting the area of interest we hoped to create a more direct trail than other methods that use a least-cost path analysis. SwitchBack analyzes the grade in the three directions cardinal axis, compares them, and chooses the lesser grade as optimum. The program then assigns the chosen cell a grade class based on the definition above, and writes it to a trail onto a congruent raster map for a distance of one to three cells, depending on the grade of the trail corridor. The variable distance "walked" for each SwitchBack iteration allows for longer sections across steeper grades, in essence leveling out grades and making the trail corridor less extreme in the steeper sections. The process is repeated until the end of the DEM is reached in the cardinal direction. The result is a complete trail written to the congruent raster map from the start point to the end/edge of the DEM.

User Methodology:

ArcGIS

1. Define a start point
2. Rasterize the start point using ArcToolbox
   (setting the extent of the start point equal to the DEM of interest)
3. Rasterize the DEM of interest
4. Convert both rasters to ASCII files

SwitchBack

1. Input the ASCII files of both the DEM and the start point
2. Choose direction of interest
3. Define DEM size 10 meter or 30 meter
4. Run the Program

Back to ArcGIS

1. Convert the trail ASCII file into a raster using ArcToolbox
2. View your trail

ArcGIS Models

The following figures illustrate some of the landscape attributes that can be used to identify areas with high potential for the occurrence of hunting related structures. So far…these include slope, aspect, viewshed and an image illustrating a layered map. Future analytical goals include adding additional attributes and a process of removing "background noise" through area calculations and the omission of benches and saddles that are completely inaccessible.

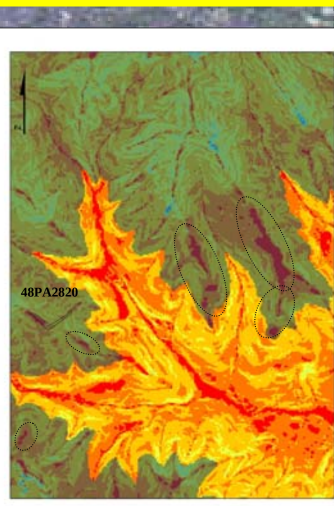

Figure 36. Slope map of the area Pickett Creek valley. Purple areas indicate the areas above 3000 m with 0-10 degree slopes. Dashed circles indicate potential areas to be investigated next summer.

Figure 37. Aspect map of the Pickett Creek area. Site 48PA2820 is indicated in light blue. Areas in red/orange indicate areas of maximum extent of large vegetation cover (e.g. tree stands).

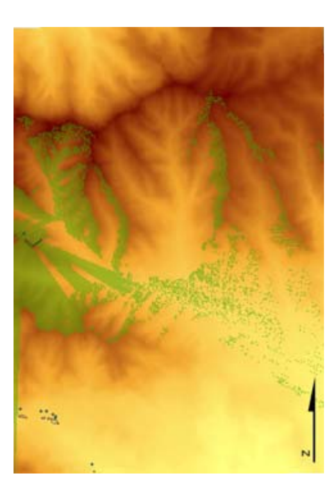

Figure 38. Viewshed map of the Pickett Creek area. Preliminary viewshed analysis of the area surrounding the hunting structures.

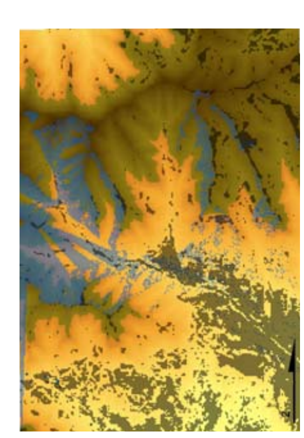

Figure 38. Layer map of the Pickett Creek area incorporating the slope and viewshed data. What in the heck does it all mean?

Results and Discussion:

The structures identified in the Greybull River watershed raise more questions than answers with respect to hunting strategies and patterns in this portion of the Absarokas. The Pickett Creek complex appears to be similar, at least in some respects, to drive systems recorded by Frison and Benedict. The specific ways in which drives were used probably changed through time. It is likely that strategies for controlling the direction of game animals were altered as local conditions changed. Next years field work will focus on ground-truthing potential areas. Additionally, the blind at the Pickett Creek site will be investigated with goal of obtaining charcoal samples for radio carbon dating.

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References:

Benedict, James B.

1981 The Fourth of July Valley: Glacial Geology and Archeology of the Timberline Ecotone. *Center for Mountain Archaeology, Research Report* No. 2. Ward, Colorado.

1985 Arapaho Pass: Glacial Geology and Archeology at the Crest of the Colorado Front Range. *Center for Mountain Archaeology, Research Report* No. 3. Ward, Colorado.

1996 The Game Drives of Rocky Mountain National Park. *Center for Mountain Archaeology, Research Report* No. 7. Ward, Colorado.

Frison, George C.

1991 *Prehistoric Hunters of the High Plains.* 2nd ed. San Diego: Academic Press.

2004 *Survival by Hunting.* Berkeley: University of California Press.

Hughes, Susan S.

2000 The Sheepeater Myth of Northwestern Wyoming. *Plains Anthropologist*, 45(171): 63-84

Morris, Elizabeth A.

1990 Prehistoric game drive systems in the Rocky Mountains and High Plains areas of Colorado. In *Hunters of the Recent Past.* Pg. 195-204. eds. L. B Davis and B. O. K. Reeves. London: Unwin Hyman.

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