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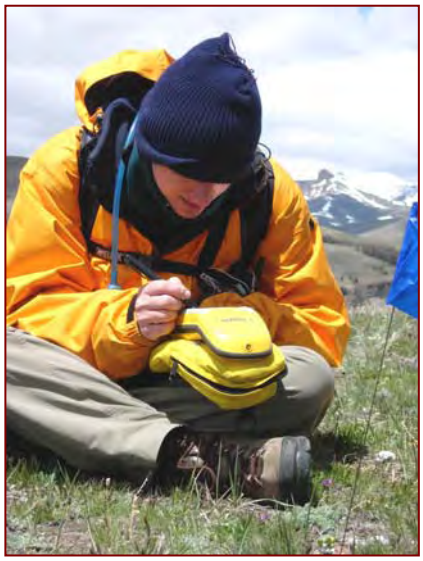
SYMPOSIUM: *Transdisciplinary Research, Experiential Learning, and Archaeological Investigations along the Upper Greybull River Drainage, Northwestern Wyoming*

ABSTRACTS

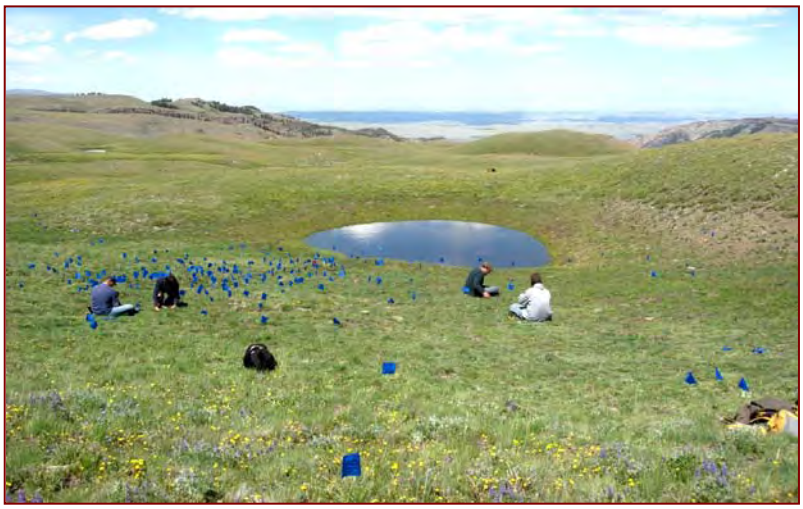
Bechberger, J., M Reiser, L. Todd, and B. Roth. **Archaeology in the 21st Century: A Mobile, Web-based Unit for In-field Site Documentation**



During the 2005 field season Colorado State University field tested IMA (INFRA Mobile Application), a mobile database developed by the USDA Forest Service for GIS data acquisition in conjunction with Trimble GeoXT GPS system. IMA is a scaled down version of INFRA, a nrelational database used by the Forest Service to track and manage cultural, biological, and natural resources. The benefits of IMA include the ability to pull up site records in the field, monitor impacts on archaeological resources, and enter data directly onto forms linked to land units. IMA provides researchers, resource managers, and project planners with an immediate awareness of archaeological sites in a project area. Downloading site information directly to the national INFRA database eliminates the redundancy of work (filling out paper in the field, transferring it to computer, sending it to the agency) and provides consistency in documentation. The use of a web-based interface and mobile application frees both the contractor and Forest Service employees to focus efforts on other issues, such as public outreach, research, and resource management. Illustrations of in-field use of the IMA system as part of an archaeological research survey are presented.

Bechberger, J. L. Todd, A. Bohn, M. Reiser, N. Ollie, and C. Hurst. **Indications of Ephemeral Paleoindian Occupation in the Upper Greybull Watershed**

Colorado State University's (CSU) Greybull River Sustainable Landscape Ecology (GRSLE) project has conducted four seasons of archaeological research in the Absaroka Mountains of northwest Wyoming. Despite the regional presence of well-known Paleoindian sites (Mummy Cave, Horner, Colby, Medicine Lodge Creek, Helen Lookingbill), surprisingly few artifacts associated with terminal Pleistocene-early Holocene occupations have been



located in the upper Greybull project area. Three summers of field work near Dollar Mountain, Meadow Creek, and Venus Creek yielded just two Paleoindian projectile points, compared to five discovered in a single field season on Jack Creek and Francs Fork. The internal variation and seeming incongruity with established regional patterns demonstrates a need for further investigation of Paleoindian landuse in the upper Greybull watershed. To distinguish local contrasts in artifact distribution, topographic characteristics influencing human landuse, such as elevation, aspect, slope, view shed, and resource availability are evaluated using GIS software. The results, when put in a regional context, contribute to the broader understanding of Paleoindian exploitation of montane environments, particularly in the upper Greybull drainage basin.

Bohn, A. and L. Todd. **Through the Volcanic Glass: Obsidian Artifacts as Proxy for Investigating Land Use Dynamics in the Upper Greybull River Drainage**

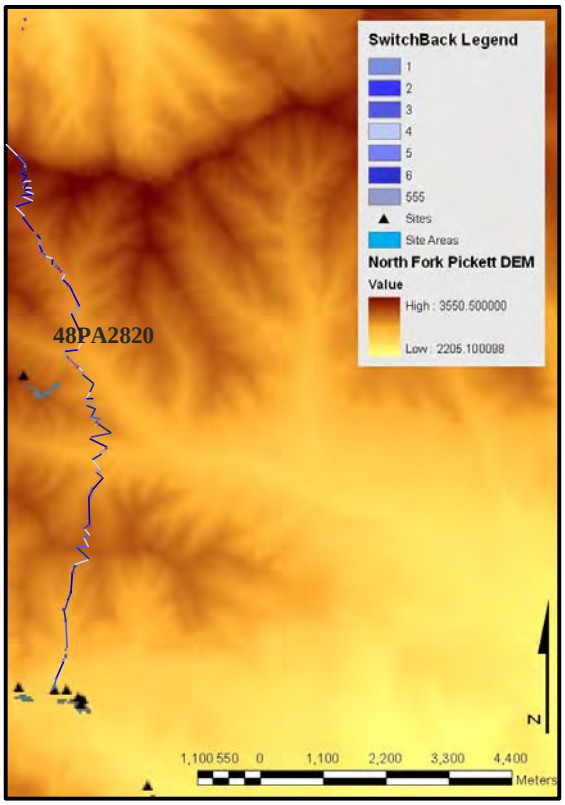
The Greybull River Sustainable Landscape Ecology (GRSLE) project investigates human ecology in the Absaroka Mountains and Greater Yellowstone Ecosystem. Research from four field seasons, 2002-2005, in the Shoshone National Forest has documented over 40,000 flaked stone artifacts on nearly 200 sites. The database is composed of scattered surface observations and mostly palimpsest sites. As a high quality and relatively rare lithic material in the study area, the incorporation of obsidian in tool kits reflects broad social and ecological interactions distinct from extraction of local materials. Preliminary results from obsidian source characterization, coupled with lithic analysis, suggest dynamic spatial and temporal patterns throughout the diverse sites recorded in the Upper Greybull drainage. The closest obsidian source to the study area is at Obsidian Cliff in Yellowstone and most of the GRSLE sample has been associated with this outcrop. Some samples were traced to distant outcrops as far as southwestern Utah. Obsidian artifacts consistently comprise 10% of GRSLE flaked stone assemblage. The maximum obsidian artifact size is, on average, smaller than artifacts of locally derived cherts supporting prehistoric curation prior to discard. Distribution of obsidian artifacts within this research area is indicative of prehistoric land use processes that were patchy and discontinuous. Further, the variability in the GRSLE obsidian assemblage suggests that behavioral and environmental change was episodic. The relationship of land use patterns between the Greybull River drainage and the surrounding region further elucidates the complexity of prehistoric landscapes.

Cheshire, A, J. Long, Z. Miller, and S. Hutchinson. **Game Trails and Site Locations: Is There a Connection?**

Prehistoric use of the mountains included big game hunting. A number of factors such predator density, forest cover, snow depth, etc influence game movement patterns and hence human hunting strategies. While these have varied considerably, and cannot be taken as being of direct relevance to understanding prehistoric game

movements, another factor-local topography-provides a nearly constant influence of game movements. This project explores contemporary game trails' proximity to archaeological sites in order to better understand game movement patterns in relation to local topography. This was accomplished by sampling the landscape around sites using a series of east to west transects. These transects were positioned to encounter areas of high topographical diversity defined by high ridges to the west and a creek at the east end of an area previously surveyed for archaeological sites. Each game trail intersected by a transect was waypointed with GPS, as well as recording the orientation of travel. After walking several of these transects, it was seen that game trails are most frequently found on difficult terrain such as steep hillsides or along waterways, while the flat open areas where archaeological sites are found generally do not contain game trails.

Hurst, C, P. Barry, C. Kinneer, and L. Todd. **SwitchBack: A Geographic Information Systems (GIS) Model for Past Human Movement Across a Northwestern Wyoming Landscape.**



SwitchBack is a Microsoft Visual Basic 6.0 computer program created by Peter Barry and Courtney Hurst of Colorado State University (CSU). Designed to model potential hiking trail corridors within a user defined Digital Elevation Model (DEM) landscape, SwitchBack locates the least-cost path, based on gradient, from a user-designated start point in a user-defined direction (NS, SN, WE, EW). Finding application in recreation planning and fire management, SwitchBack has now been applied to archaeology as a potential method to model human movement across the landscape. Since 2002, CSU has conducted research through the Greybull River Sustainable Landscape Ecology (GRSLE) project, locating and describing 96 previously unrecorded archaeological sites in the Shoshone National Forest of northwestern Wyoming. The site location information was used in conjunction with SwitchBack and ArcGIS 9.0 to create trail corridors from each individual site in four directions. These trails were assessed on their "corridor path" proximity to the other archaeological sites at buffer distances of 50, 100, 150 and 200 meters. In addition, 160 random trails were created from 40 random points for comparison with corridors initiated from the archaeological sites. The random trails were then evaluated for their "corridor path" proximity to the archaeological sites. Comparing the trail proximity results from the two start point types, archaeological and random, gives a measure of the ability of SwitchBack to simulate past human movement across the landscape beyond that of random chance.

Hutchinson, S and L. Todd. **The Ecological Impacts of Archaeological Field Research on the Central Absaroka Mountain Range, WY**

Since 2002, the CSU field school has been conducting research within the Upper Greybull Watershed. Not only is it important to note the impact locals and tourists have on the area but also to document the researcher impact as well. This project continues and adds to the similar research from 2003, creating a potential database of the field team's impact on the environment. An impact database will be useful in assessing each year's camp location to avoid possible overuse or even reveal patterns of advantageous features. By recording tent locations, tent dimensions, door direction, cars, defecation areas, interconnecting trails and other researcher site modifications, a comprehensive reconstruction of campsites over the 40-day period are provided. It will be also useful for determining any violations of wilderness safety or hazards created that future researchers can avoid. Awareness of the researcher impact is an important factor to consider, especially when returning to an area multiple times; by observing and recording this year's data, the potential use for future sessions can contribute to the greater understanding of researcher impacts on remote settings.

Kinneer, C., J.D. Kennedy, and L. Todd**. Counting Rocks!: Generating a Baseline for Human Energy Investment in the Construction of High Altitude Stone Structures**

Field investigations in the Absaroka Mountains of northwestern Wyoming during the 2004 and 2005 field seasons have identified numerous sets of dry-laid stone structures. These structures occur in a variety of landscape settings in the tributary valleys near the head waters of the Greybull River and include valley floors, steep slopes, and upland ridges within an elevation range of ~2500-3200 m. Structure types include walls, alignments, blinds, platforms, and an enclosure that the local residents refer to as an eagle trap. Although the precise function of these structures is unknown, a wealth of information is contained within the attributes of structures themselves. One goal of this research involves the production of a baseline index of energy in the form of "labor-hours" invested during construction of high altitude stone structures. To this end, field investigations collected size and frequency data on the individual lithic elements incorporated into each structure. A comparative data set is drawn from replicative

construction activities performed in settings that approximate those of the stone structures identified in the Greybull project area. Proximally, these data allow individual walls and sets of walls to be compared at the inter- and intra-site level. Additionally, inferential relationships can be identified with respect to structure types and time invested in construction activities. Ultimately these relationships can be used to compare similar structures and sites throughout the region.

Long, J. **Evaluating Inter-Observer Variability in Field Coding of Chipped Stone**

For the last several years, survey along the Greybull River drainage in the Greater Yellowstone Ecosystem in Northwestern Wyoming has undertaken in-field analysis of over 30,000 stone tools and debitage. Since this is part of a non-collection project, assessing the level of accuracy of the lithic coding data is essential. These data will help determine which aspects of lithic coding need to be emphasized during future training sessions and which hold the highest interpretive validity. Data for this assessment were collected by having 15 members of the 2005 field crew code 25 lithic pieces individually, then in teams of two in a field lab setting. The second set of lithic data consisted of 11 artifacts located across a site surface. These artifacts were coded individually by the crew members. An experienced field researcher coded all the lithic material for a set of control data. The results indicated a discontinuity between material types and colors of artifacts coded. There were slight variations between measurements of the lithic material coded. The more complex artifacts had the most variability. In conclusion, variability exists in the data collected and must be taken into account during analysis and interpretation. These data will be valuable in training the crew for subsequent field sessions.

Miller, Z, S. Hutchinson, and L. Todd. **Historic Seasonal Pastoralist Occupation in the Absarokas of Wyoming: A Study of Jack Creek Cow Camp**

Seasonal use of an historic pastoralist settlement in Wyoming's Shoshone National Forest allows a study of human ecological impacts as well as chronology. In turn, this research will generate greater understanding of the cattle ranching dimension as it relates to the archaeology of the Greater Yellowstone ecosystem. Local ranchers currently use the Jack Creek site and thus subject to periodic alterations to fit modern needs. This study of human

modifications to the cow camp using methodologies that include an overview map of the site encompassing current structures, remnants of past structures, and evidence of other human made ecological impacts. In addition, site temporal associations are reached through 1) Dendrochronology 2) Manufacturer marking analysis from related historical artifacts as observed within the camp's dumpsite. Site analysis includes observations of corral fence lines, reuse of available historic construction materials, which, in addition to in situ or collected prehistoric artifact analysis, will further assist in the assessment of impacts both immediate and peripheral to the site. Because such a site, its structures, and related historical artifacts are irreplaceable and valuable resources that archaeologically quantify aspects of Wyoming history, they require historic protection. Subsequently, such management and monitoring subsequently will provide invaluable educational opportunities.

Ollie, N, L. Todd, M. Reiser, and J. Bechberger. **Wasting Away on the Sunny Side of the Mountain: Depositional Dynamics and Archaeological Exposure**

In a high elevation region of the Absaroka Mountains, both cultural and environmental processes have influenced the modern landscape and archaeological site formation. Four years of archaeological survey have produced a growing record now ranging from Paleo-Indian to historic. While these surveys have been extensive and intensive in the collection of both archaeological and contextual surface data, a subsurface aspect had not been obtainable due to the nondestructive focus of the surveys. In the field season of 2004, an eroding creek bank was found to have exposed additional cultural layers beneath a previously documented surface site, allowing for inferences on the three-dimensional aspect of the site. The site's surface element contains diagnostic projectile points associated with the late Archaic. Radiocarbon dating of an in-situ hearth 1 meter below the surface on the exposure dates to 1070 RCYP +.42 (pooled mean of two samples statistically the same at 95% confidence level). Due to the preservation of 8,000 years of archaeology on neighboring land surfaces, there is a notion of some geologic stability within the region. Observation and analysis of the subsurface exposure however, has significantly influenced this perception. While the Absaroka Range has been identified as a rapidly changing environment, this is not simply a story of fast burial. Documentation and monitoring of this new component has not only given insight to the complexities of archaeological formation, but also provides a model for processes of deposition and erosion as part of the archaeological context.

Parks, E, M. Reiser, and L. Todd**. A Growing Picture: The "Ghost Forests" of Jack Creek Wyoming**

Integration of archaeological patterns with paleoecological data is often difficult. As part of the Greybull River Sustainable Ecology project (GRSLE) in northwestern Wyoming, we have begun documentation of a series of stumps and fallen tress, which seen to represent "ghost forests" providing evidence of Little Ice Age vegetation. Recording the lengths, diameters, and orientation of the trees and plotting them as GIS layers will assist in building a better picture of forest dynamics during the later parts of the Late Prehistoric Period. Because many of these ghost forests overlay archaeological sites, understanding the relationships between past forest boundaries and prehistoric site placement is crucial. By collecting and dating charcoal from the trees, in conjunction with dendrochronological and dendroecological research, we can get an idea of the fire activity on the sites and how this activity may impact sites preservation. Environmental research of the ghost forest along the Jack Creek Drainage area contributes to regional archaeological research, promotes a dialog with the local community about long-term human/environmental interactions, and provides a database for monitoring future changes.

Reiser, M, L. Todd, J. Bechberger, and E. Parks. **In the Shadow of Ghost Trees: Applying Forest Ecology to Archaeological Interpretations**

Forest boundaries shift both gradually and abruptly over time as a result of such varied forces as fire, climate, pestilence, grazing, and human land use. Small scale shifts in timberline or forest boundaries can be hard to discern from the paleoecological record, yet humans, like other mammals, likely exploited the ecological diversity along forest edges. Understanding the interplay between the forest and human adaptive strategies is a critical tool for interpreting past lifeways. As part of the Greybull River Sustainable Ecology project (GRSLE) in northwestern Wyoming, students from Colorado State University located the remnants of a lodge-pole pine forest in what is now open grassland and recorded the spatial and observable characteristics of those "ghost trees." This information, combined with local dendrochronological data, fire history, and regional paleoclimatic fluctuations was superimposed with geospatial data and orthographic photographs to provide a visual representation of a changing prehistoric environment. These depictions of past forest landscapes, when incorporated into the archaeological record, offer insights into not only how humans interacted with their woody neighbors but also how climate more generally may have influenced mobility and foraging patterns prehistorically.

Tedrow, M. **Analysis of Secondary Deposition of the Material Culture in the Greybull River Drainage**

As part of the GRSLE 2005 project, archaeological surveys were conducted throughout the Absaroka Mountains within the Greater Yellowstone Ecosystem. The study area was centered in the Shoshoni National Forest on lands with open public access. While surveying previously unrecorded areas, lithic artifacts were discovered in distinct concentrations, set apart from the normal scatter on the landscape. This deliberate accumulation of artifacts is referred to as "collector's piles" and are thought to be indicative of recent artifact collector activities. . These piles included both locally available and exotic materials, and modified and unmodified lithic materials. The analysis of collector's piles found within the larger archaeological landscape helps understand how recent human disturbance affects landscapes. Material type, color, dimensions and aesthetic appeal appear to be the prominent influencing collection decisions. Most piles contained large amounts of cherts, since this material is widely available and stands out against the natural landscape. The lithic artifacts were of materials containing large amounts of light colors, mainly shades of white, red, and brown. Although size ranges vary, no artifacts found within the collector's piles were less than 3 cm. Although legal restrictions to dissuade people from collecting artifacts are in place on National Forest lands, the abundance of collector's piles and the amount of artifacts located within these piles show that additional management is required to keep artifacts within their context.

Teeter, S, Z. Koski, and C. Burke**. Relocation and Monitoring: Past Weapons of Mass Destruction**

During the 2003 field season of the Colorado State archaeological field school, 57 projectile points were located while mapping surface scatters in the Greybull Drainage of the Greater Yellowstone Ecosystem. Students of the 2005 field season made an effort to relocate 55 of these projectile points in order to gain insight into factors contributing to the success of surface artifact relocation. Recreational GPS units (Garmin rino110) were used to relocate the projectile points based on previously recorded UTM coordinates with 44.5 percent recovery rate. Fourteen previously un-recorded projectile points were located as well. Thus far the success of recovery has been attributed to several aspects; 1) GPS accuracy, which is dependent on factors such as satellite reception, 2) Instability of the active soil layer, 3) Eyesight and other human survey variables, 4) Vegetation cover, 5) Weather, and 6) Collectors removing the original projectile points.

Todd, L. and A. Bohn. **Experiential Learning, Local Stewardship, and Archaeological Investigations along the Upper Greybull River Drainage, Northwestern Wyoming**

For the last four years, participants in Colorado State University's archaeological field school in western Park County, Wyoming documented nearly 200 previously unrecorded prehistoric sites and completed in-field coding of over 40,000 pieces of chipped stone at elevations between 2200-3300 m within the Shoshone National Forest. In addition to providing basic data on an archaeologically little known portion of the rugged Absaroka Mountain range, this non-collection survey project seeks to both refine archaeological survey methodology and improve techniques for monitoring archaeological site condition. The project also emphasizes 1) introducing university students to a range of environmental field research issues and approaches 2) providing members of the local community with information on the research, prehistory of the area, and relevance of protection of heritage resources through both presentations and workshops, and 3) exploring approaches to assist land management agencies in promoting long-term stewardship of heritage resources. A central focus of the project has been drainage scale investigations of multiple data sets to better understand long-term landscape dynamics.

For additional information on GRSLE, see www.greybull.org