CSU Field School 2004 Participants
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Bates, Chad (Colorado State University), **Larry C. Todd** (Colorado State University), **Paul C. Burnett** (Colorado State University), **Allison D. Bohn** (Colorado State University) and **Jefferey Johnston** (Colorado State University)

Fire Cracked Rock Appearance Replication

Fire cracked rock (FCR) is common in archaeological sites of the Bighorn Basin, Wyoming. Heating of rocks and creating FCR is a side effect of cooking and boiling water by different prehistoric groups. Several experiments were conducted in order to determine the morphological properties of thermally fractured rocks. The goal of the experiment was to create FCR in a controlled environment, recording temperatures every two minutes. The experiment was designed to replicate the morphological characteristics of FCR seen in the field and to determine how much the materials have been utilized. The extent of utilization of quartzite cobbles can be seen in the amount of fracturing and thermal alteration observed on the material. The rocks were heated in an excavated fire pit, approximately 30 cm deep with the experimental cobbles of the same size, approximately 15 to 20 cm. The materials were then flash cooled in a separate pit filled with room temperature water. It is from this process that some of the thermal fractures form and create diagnostic material. Crazing is the small fractures that run throughout the material and weaken the materials integrity as a result of the heating process. The experiment revealed that not only do the cobbles become FCR in the water bath with rapid cooling, but also fractures when the crazed material is discarded. Even with the smallest amount of force exerted, cobbles can be fractured into many small pieces. Another part of the experiment was testing the rigidity of the cobbles by dropping a crazed cobble from approximately one meter high onto another rock, and resulted in creation of FCR. With most of the quartzite, impact modulation from animals or discarding the material would create diagnostic FCR.

Bohn, Allison D. (Colorado State University), **Lawrence Todd** (Colorado State University) and **Paul Burnett** (Colorado State University)

Variability of Archaeological Volcanic Glass Distribution from the Central Absaroka Range, Wyoming

Three years of research, 2002-2004, have been conducted by students and faculty from Colorado State University on a variety of human impacts on the Greybull River drainage system in the Absaroka Range of Northwestern Wyoming. As part of the GRSLE Project (Greybull River Sustainable Landscape Ecology), archaeological surveys have been primarily concentrated in the Washakie Wilderness area of the Shoshone National Forest. Pleistocene glacial erosion and subsequent erosion has exposed an underlying volcanic substrate throughout the study area. However, no archaeologically significant source of volcanic glass (obsidian) is known within the study area. Research focused on the distribution of obsidian within and between over 150 sites has revealed a variety of patterns. The in-field, noncollection documentation strategy used at these sites assesses a number of archaeological attributes including raw material type, colors, and length. Obsidian composes approximately 10% of the raw material in the "average" flaked stone assemblages. Deviations from this norm and the distributional patterns are multi-scalar, exhibiting variability both spatially, between watersheds, and temporally, based on chronological dating of sites. The maximum size of obsidian artifacts is, on average, smaller than artifacts of locally derived cherts suggesting prehistoric curation prior to discard. Source characterization of this assemblage is necessary to further examine the significance to prehistoric landuse and mobility patterns in a regional context.

Burnett, Paul (Colorado State University)
Horizontal Seriation of an Archaeological Landscape Using GIS: A Case Study from the Absaroka Mountains of Northern Wyoming

A landscape of surface archaeology has been recently documented the central Absaroka Mountains of northern Wyoming by Colorado State University fieldschool participants and volunteers. An intensive documentation protocol including individual artifact GPS proveniences and descriptions resulted in the generation of one dataset containing over 20,000 lines of individual artifact data, including over one-hundred diagnostic projectile points from the Paleoindian to Late Prehistoric time periods.

A GIS was used to horizontally seriate this landscape assemblage into artifact clusters based upon inter-artifact proximity. These clusters often contain diagnostic projectile points from only one time period and are inferred to have been produced, for the most part, during single occupations. Artifact and raw material diversity within these clusters is assumed to reflect the patterning of limited behavioral events. This new method of horizontal seriation is easily replicable and invigorates the research of surface lithic scatters. The cluster data from the Absaroka case study are used to interpret the chronology of hunter-gatherer land use in and around this montane ecosystem.

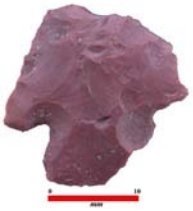
Hjermstad, Alisa (Colorado State University), **Larry C. Todd** (Colorado State University) and **Paul C. Burnett** (Colorado State University)
An Analysis of Plant Species and Usages in the Absaroka Mountains: Park County, Wyoming

For thousands of years, the headwaters of the Greybull River, located in northwestern Wyoming in the Absaroka Mountains, has provided a subsistence base for hunter-gatherer groups. In 2002, a systematic analysis was conducted on various plant communities and archaeological site locations. This coupled dataset provides a clearer picture of the overall vegetative landscape to examine the specific uses for the plants known for prehistoric use and to monitor the resources in the area. Plant ecologists from Colorado State University noted that during the 20 day field school they did not find a single invasive plant. A Modified Whittaker sample frame was used to collect both percent coverage and total speciation for a series of subplots located within the 50 by 20 meter sampling frame. The Modified Whittaker was shown by Stohlgren and others (1995:1998) to capture more data on rare and exotic rangeland plant species, independent frequency data and more accurate species area curves. Sites varied from river level willow covered areas to sage grasslands to areas of high elevation. A basic model for potential floral availability variation and use (both in terms of direct human use and a forage for game animals) adds to the potential for interpreting the types of activities hunter-gatherer groups would have performed in the area.

Johnston, Jefferey Michael (Colorado State University), **Paul Burnett** (Colorado State University), **Allison D. Bohn** (Colorado State University), **Chad R. Bates** (Colorado State University), **Bruno Romero** (Colorado State University), **J. M Lindsey** (Colorado State University), Naomi Ollie (Colorado State University), and Alisa Hjermstad (Colorado State University)

Inter-Observer Variances in Coding Lithic Artifacts

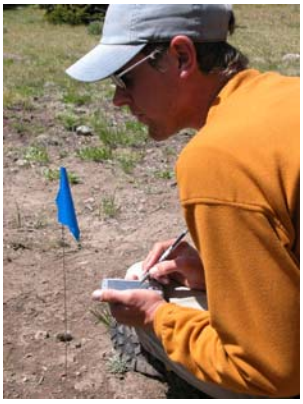
When archaeological sites are recorded there is inter-observer variability in flaked stone documentation. This variability can potentially alter our interpretation of the archaeological record. Through proper training and experience this may be minimized, but different people will still perceive things in different ways. With a controlled experiment where multiple archaeologists code the same set of flaked stone, the amount of variability may be quantified and analyzed to determine the possible affect on our interpretation of the archaeological record. To test this, eight archaeologists of varying levels of experience coded 25 artifacts of varying types, materials, and colors. To describe artifact attributes, a system of coding was used differentiating lithic characteristics such as artifact type, material, colors, sizes, and any other attributes observed. The artifacts recorded were a surface scatter spread across a meadow near Piney Creek in the Absaroka mountain range in Wyoming. The artifacts were photographed but not collected. Four of the archaeologists were archaeological field school students on day 36 and 37 of a 40-day field school. The rest were graduate students who had already completed a field school and most had years of archaeological experience. The amount of inter-observer variance was significant in most categories including artifact type, lithic material, colors, and sizes. With this amount of variance it is possible to observe how our interpretation of the archaeological record can be affected.



Kinneer, Christopher C. (Colorado State University), **Paul Burnett** (Colorado State University) and **Lawrence C. Todd** (Colorado State University)

"I'm pretty sure that thing I just tripped over ain't natural." Hunting Structures in the Absaroka Mountains of Northwestern Wyoming [P3]

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. 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 (about 3075-3200 m elevation) consist of stone walls, blinds, and an anomalous platform. A single enclosure was recorded on an ice-core rock glacier (about 2500 m elevation) above the Wood River valley and a second isolated structure was documented near Jack Creek (about 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 expose a predictable topographic signature with value for understanding high elevation prehistoric hunting strategies in mountain environments.



Melsen, Lindsay (Colorado State University)
Game Movements, TEK, and Archaeological Site Locations [P3]

Most of the archaeological sites found along the Greybull River drainage system in northwestern Wyoming are prehistoric lithic scatters. Given the site settings are at elevations ranging from 2400-3400m, it is probable that many of these sites are related to hunting related activities rather than the exploitation of plants. Supposing that game animals have roughly similar movements now as they have prehistorically, it is possible to find out where hunting activities may have taken place in the past based on information from current game animal movement. A wide variety of data, including informal interviews with present-day hunters, game harvest records, and documentation of contemporary hunting camp locations have been collected to evaluate the correlation between present day and prehistoric hunting-related sites. These data are valuable to understanding human behavior patterns and human movement patterns concerning hunting activities of both the past and present. Traditional Ecological Knowledge (TEK) of present-day hunters is key to this study because present-day hunters understand both game animal movement patterns and the logic involved with game hunting, both of which are useful pieces of information in analyzing behavior patterns of prehistoric peoples.

Ollie, Naomi (Colorado State University), **Lawrence Todd** (Colorado State University), **Allison Bohn** (Colorado State University) and **Paul Burnett** (Colorado State University)
Prehistoric Lithic Material Distribution along the Upper Greybull River: An Inter-Basin Comparison, Park County, Wyoming

The Greybull River travels northeast from the Absaroka Mountain Range through the Washakie Wilderness of Wyoming covering an area of diverse natural resources. Distinct environmental variations are observed throughout the drainage systems over elevations ranging from 2280 meters to 3705 meters. Eocene volcanic activity has also contributed to a dynamic landscape of weakly consolidated volcanic bedrock prone to mass wasting which creates and exposes geologic resources. Complimenting this rich landscape is a long history of human occupation. On-going archaeological and ecological research conducted by Colorado State University during non-collection pedestrian surveys in the 2002-2004 field seasons has provided opportunity to explore these occupations in association with the natural landscape. Data gathered from over 150 sites along eight different tributary drainages of the Greybull River identifies both local and non-local materials used to make and reshape stone tools. Using the database, each drainage system is examined based on dominate lithic material used, primary materials used for specific tools, and the overall diversity of resources and their distribution to provide a large-scale, non-site comparison of basin aggregate samples. Identifying differences and commonalities between archaeological occupations broadens our picture of this still largely unknown area allowing for issues such as chronological variation and prehistoric mobility to be addressed.

Romero, Bruno (Colorado State University), **Paul Burnett** (Colorado State University) and **Lawrence Todd** (Colorado State University)

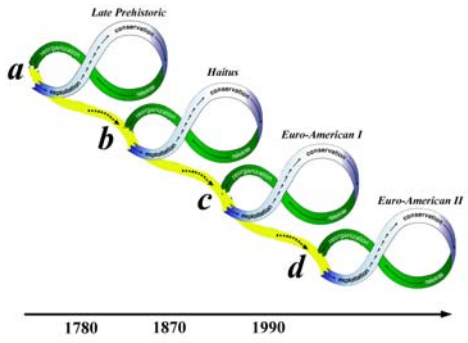
Basin and Range Settlement and Subsistence Strategies in Northwestern Wyoming [P3**]**

Lithic assemblages in montane settings of the Absaroka Mountains commonly include toolstone extracted from a variety of ecological settings – from the obsidian sources to the west to the Bighorn Basin to the east. A large raw material source in the Absarokas includes larges amounts of chert that outcrops above 3400 m (Dollar Mountain). Several other toolstone sources are locally available, yet the lithic scatters commonly include raw materials from other areas. In-field data collection in the Absaroka Range and the Bighorn basin has allowed for comparison between the raw material and artifact patterning between these two settings. High elevations of the Absarokas were probably used during the warmer months. In contrast, the Bighorn Basin contains lithic scatters and campsites in areas far from permanent water, where food and water resources would likely dwindle with the heat of the summer months. Although seasonality cannot be directly assessed from the artifacts on the sampled sites, their placement and the content of their raw material assemblages indicates that groups moved between these basin and range environments seasonally, as opposed to occupying either of these areas exclusively. Furthermore, the artifact assemblages of the two areas indicate differences in food production that are tied to the two different ecosystems. The basin sites tend to contain large percentages of fire-cracked rock, in contrast to the flaked-stone dominated assemblages of the higher country. Taken together, these patterns indicate that prehistoric hunter-gatherers of northern Wyoming seasonally traversed both basins and ranges, as opposed to using one area exclusively.

Todd, Lawrence (Colorado State University), **Paul Burnett** (Colorado State University) and **Allison Bohn** (Colorado State University)

Greybull River Sustainable Landscape Ecology (GRSLE) 2004: Archaeological Panarchy in Northwestern Wyoming [8]

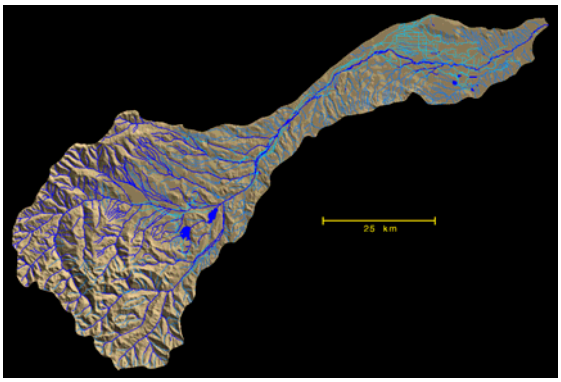
Archaeology provides an unique disciplinary space from which to investigate long-term, multi-scalar adaptive cycles as modeled by panarchy theory (Gunderson and Holling 2001). Although most archaeological applications of this approach have dealt with complex societies, recent investigations (2002-2004) along the upper Greybull River drainage in northwestern Wyoming's Greater Yellowstone Ecosystem illustrate the utility of non-linear adaptive cycles to conceptualize the interactions between cultural, biological, and physical processes in hunter-gatherer studies. A general model of four distinct cycles of cultural use of the higher elevations zones over the last 500 years is described as an illustration of the utility of panarchy models to integrate research into prehistoric land use with community planning and alternative futures studies.



Todd, Lawrence (Colorado State University), **Paul Burnett** (Colorado State University), **Allison Bohn** (Colorado State University) and **Oskar Burger** (University of New Mexico)

Recreation Ecology, Heritage Resource Management, and Environmental Monitoring: The GRSLE Project, Northwestern Wyoming [P3]

Archaeology has a history of including an "applied" component. Usually, however, this applied archaeology has been in the rather narrowly defined realm of cultural resource management or sometimes even the more narrowly operationalized "salvage" activities. We offer examples of a broader applicability of archaeology as a discipline with a great deal to contribute to monitoring environmental status and trends, with a more central role in assessment of a wider array of both biotic and abiotic resources. Using examples from the Greybull River drainage in northwestern Wyoming, we argue that basic attributes needed to adequately monitor archaeological resources requires a range on non-archaeological data sets that are tightly coupled with observations on the archaeological record. For example, evaluation of archaeological site sensitivity to recreational impacts in Wilderness areas requires reliable information on ground surface visibility. Therefore, effective archaeological monitoring must be bundled with repeated assessments of vegetation cover, species diversity, and invasive species. As a first step in such a long-term, trans-disciplinary monitoring program, which is a fundamental stage in the development of any effective adaptive management plan, we have conducted survey and in-field analysis focusing primarily on trail systems within the Shoshone National Forest, including backcountry survey in the Washakie wilderness. These baseline data are used as a springboard for discussion of archaeology's potential role as a "keystone discipline" in environmental monitoring and stewardship programs.



Todd, Lawrence (Colorado State University) and **Andrew Mueller** (Colorado State University)

Mining the Margins: Archaeology of Remote, High Elevation Mineral Extraction Endeavors in the Absaroka Mountains, Wyoming [P3]

Mineral extraction has drawn humans to high elevations in Wyoming's Absaroka Mountains for millennia. Examples of both high elevation chert resources (Dollar Mountain quarries; above 3200 m), and late 19th century gold and silver mining operations in a comparable elevational range are described. Issues of subsistence, energetic expenditures, and environmental constraints operating on exploitation of resources in the human hypoxic zone are highlighted. Emphasis is placed on 1) blurring the boundary between historic and prehistoric archaeological investigations; 2) refining views of the role of high elevations in human adaptive cycles, and 3) applying lessons from mineral extraction studies to other aspects of changing resource structures in mountainous areas.