Archaeologists as Landscape Modifiers: Monitoring Ecological Impacts of Excavation in an Alpine Environment, Absaroka Range, Wyoming

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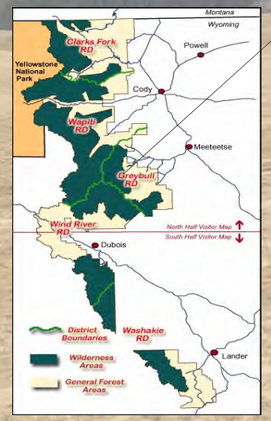
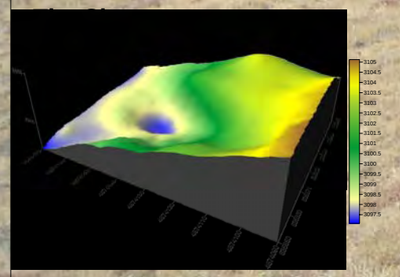
Abstract: As traditionally practiced, archaeology is seen as a discipline focused on issues that often involve prehistoric human impacts on their environment. Present day archaeologists are becoming more diversified in their interests on ecological impacts at a number of temporal and spatial scales. As part of a more general trend toward conservation oriented archaeology, this concern for evaluating impacts is being extended to methods of extracting or observing artifacts in situ. Particularly in areas of fragile ecology, conservation archaeology is becoming more relevant in order to preserve the landscape integrity of the site and artifacts for future research, further improving the intrinsic value of the area for generations to come. Excavation of sensitive sites such as those in the Jack Creek drainage of the Absaroka Range, Wyoming, has focused on monitoring human impacts on sites in the area in terms of both the bio-physical and cultural actions, including archaeological research itself. By observing sod deposition, traffic-related erosion, and floral and faunal disturbances caused by test excavations and its human drivers, a case study of ecological impacts around an excavation unit is described. Two 1x2m test units of 48PA2874 served as an experiment in monitoring ecological interruptions due to archaeological investigation.

Introduction: The Absaroka Mountain Range of Northwestern Wyoming has seen thousands of years of human occupation ranging from hints of Paleoindian influence up to and beyond the post-Contact period with Western civilizations. This alpine landscape networked by a confluence of several drainage systems has been used by modern humans living by the hunter-gatherer ecology. In more recent times, the Absarokas have been host to humans living by other means such as hunters and trappers, ranchers and farmers, modern-day recreationists, as well as a handful of professor-led student archaeologists seeking to gain knowledge about fieldwork and its affects on the environment. During the CSU field school session of 2006 as with previous sessions, special care was taken to lessen researcher impacts particularly around the area of archaeological study, site 48PA2874 with its two 1x2 excavation units 1 m in depth, 13 auger holes, and several rodent burrow/mound excavations. The site itself lies on a high mountain plateau covered by a sediment slump, a product of a mass wasting event that appears to be Late Pleistocene in age.

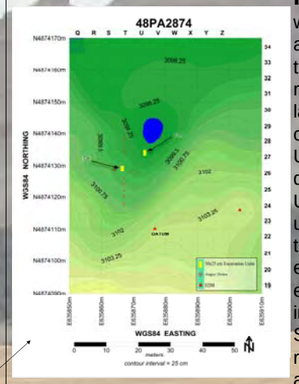
Why? Many may ask why we should consider archaeological impacts on the ecology of a site, despite a common professional interest in preserving cultural remains. Two approaches can be taken into thought when assessing the environmental impacts of archaeology: including the surrounding environment and its integrity as an "artifact" in analyzing a site, and considering the recreational and conservation efforts involving a landscape while treating the local archaeology as a benefit to the people who enjoy its integrity. The main objective of this study was to present methods of low impact archaeology concerning excavation, researcher land-use, and biotic disturbances as well. The information provided by this study will be compiled to prevent ecological impacts in future sessions, further building on a symphysis between recreation ecology, conservation biology, and archaeology.



The boundaries of the Shoshone National Forest, Northwestern Wyoming.



The high plain landscape involving site 48PA2874 is, as previously stated, the result of a late Pleistocene wasting event that covered the landscape at the time with thick sediment deposit. The site itself specifically centers itself around an ephemeral sag pond that dried up prior to the 2006 summer session. The vegetative cover includes plains grasses such as blue grama (*Boutela chondrosum gracius*) and mountain sorrel (*Oxyria digyna*) among others, stunted from the higher elevation and colder climate. Pocket gophers (*Thomomys talpoides*) also call the site their home and frequently involve cultural remains from the surrounding sites in their burrows as researchers found from the mound/burrow excavations.



Topographic inset of 48PA2874.

Part I Methods: Both 25 cm sub-units in T26 were segmented into 2x2 plots in order to remove and record the integrity of the first sod layer (5 cm thick) in excavation. In the U27 excavation unit, researchers attempted to remove the first sod layer in 4x4 units for comparison. The lower biotic capacity and steep gradation of slope throughout U27 caused the extracted soil to become more dilapidated as removal progressed. The sub-unit U27-16 was more successfully extracted into 3x3 units. All sod segments were placed in order as they lay in situ on a tarp for the extent of six-day excavation. 13 auger holes were dug at varying elevations and consistencies of sediments indicative of the ephemeral pond landscape. Sediments were also extracted and sifted from rodent mounds/burrows that riddled the project area.

Before and During Excavation:

Part II Methods: The sifted dirt extracted from T26 and U27 was backfilled on the sixth day of excavation and the remnants of the sod squares were replaced as close to their original positions on the soil as possible. The auger hole dirt was also replaced, but usually on the day it was extracted, hopefully retaining more moisture than the excavation unit's soil. Dirt sifted from the rodent mounds within the site area were sampled for continued research off-site and the remainder was replaced into the mounds and burrows. Artifacts found by these various excavation methods were also taken out of the strata for further data collection after their 3-dimensional location in the landscape was recorded. Since the artifacts could not be returned to their original location, they were taken out of the ecosystem.

Kris Keeling placing the final sod segment back into excavation unit U27.

Assessment:

- Approximately 4 m^2 of the 21,500 m^2 site, or .019% of the project area, was effected by the two excavation units. On average, the top layer of sod from the units lost 50% of its structural integrity and biotic capacity. The 2x2 sod segmenting in T26 faired better than both the 3x3 and 4x4 segmenting in U27 because of the greater compacted volume of soil in the extraction process. Due to the higher moisture content created by the sag pond in U27, the backfilled dirt and sod were hypothesized to recover more quickly than the dry, loose dirt returned to T26 that could potentially leech moisture at its heightened level of incline.
- Researcher-impacts around the site led to trampling of vegetation and soil within areas of high traffic, particularly around the EDM and the excavation units. It is expected that these areas will recover completely given time and less human usage. The ground cover underneath the sod tarps appeared more green and moisturized from its prolonged cover, trampled by the weight but recoverable.
- The 13 auger hole mounds appeared much like the disturbed earth in T26, dry and lacking much vegetative cover. Given the small amount of soil disrupted on the surface averaging at 65.22 cm in circumference, however, they are also expected to make a full recovery.

After Excavation:

Conclusion: Effective monitoring of archaeological sites requires a level of ecological stability in order to efficiently document artifacts as accurately within their spatial context as possible. Taking precautions with the biotic/abiotic components that effect the symbiotic relationship between site and ecosystem will enable researchers to return for future work, and for non-researchers to appreciate archaeology within its original "habitat." Humans from the past or present are also within the ecosystem and should be considered an important variable in controlling the preservation of a site.

September 8, 2006: Pictures taken 73 days after backfilling and sod replacement occurred. Vegetative cover appears to be recovering slowly, but improvement in noticeable since the last day of excavation on June 27, 2006.

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Acknowledgements: Special thanks to the Dr. Larry Todd and the 2006 GRSLE crew, my mom for fully supporting an archaeologist student, and Justin Maul for his outstanding help with Adobe Photoshop.