Introduction:
The Eocene volcanic that form the Absaroka Mountains in northwestern Wyoming present a dynamic substrate upon which the archaeological record has been deposited. One of the more dramatic components of this landscape is the prevalence of mass wasting events (slumps, landslides, flows, etc.) that form and reform the landscape. Site 48PA2874 is located on one of these massively altered surfaces. The site is adjacent to a sag pond formed by a Pleistocene mass wasting event known as a slump. A slump is the downward and outward sliding of a mass material, with some backward rotation of the land surface at the top of the slide, which is unstrained depressions, swamps, and small ponds may collect. This can be caused by earthquake shocks (which are common in the tectonically active Absarokans), freezing and thawing, and, through a process called slumping, sediments and soil move downslope.

Methods:
Two 1 x 2 m test excavations were begun at site 48PA2874 in 2006. These were labeled U27, which was at the edge of a dried up sag pond, and T26, which was higher up slope from the sag pond. These tests were chosen to better understand depositional processes that occur at the site, and to get a range of soil profiles and samples that reflect human occupation as well as the formation of the site as we see it today. As the excavation began, the sediments were removed in 50 x 50 cm quadrants going down 5 cm at each level. Sediment was screened through a 1/8" mesh screen. It soon became apparent that the U27 unit was much easier to dig than the T26 unit and, to get it as far down as possible, we proceeded to excavate it 1 x 1 square meters, going down 5 cm at each level. The T26 unit went much slower, due to the large clasts deposited as a result of the original slump event, and we did not get down as far as it was much more cluttered with large rocks. Sediments were screened for artifacts and when possible artifacts were mapped in place. A total of eight soil samples were taken from the units at different levels. Sediment analysis was done on each of the eight samples to get a percent sand, silt, and clay with the help of the Soil and Crop Science department of Colorado State University. A profile of each unit was also assessed and recorded as to determine the depositional processes of sediment within the area. Once the excavations were complete the test pits were photographed and filed back in.

Results:
Just by looking at the excavation units we can come up with evidence for the slump model. You’ll notice that in the U27 unit (Figure 1) the soil is darker and there are no large rocks, the side walls are smooth and the U27-17-12 U27-17-13 U27-17-11 U27-17-14 U27-17-10 Sediment and landform units as well as the T26 unit, which had many large rocks and the darker soil with a depth of at least 1.5 m, and much lower artifact frequency. These alpine sag ponds as effective sediment traps provide a unique opportunity for incorporating cultural materials into an otherwise shallow, high elevation archaeological record.

Impotance of sediment analysis:
Sediment analysis can be used to reconstruct paleo-environments, and can help understand the processes that are involved in the formation and destruction of archaeological sites. In this case, we use sediment analysis to see where and how artifacts get deposited in the slump. Sediments are the most abundant resource of any excavation, and they give us some kind of evidence of past environments and they allow us to reconstruct site development, history, and climatic-morphogenetic environments. It also helps us determine site-specific human activities and interpret human-land relationships (Hassan, 1978: 197). The unit on the side of the sag pond, which often contains year-round water, but in summer 2006, dried up completely, had darker soil with a depth of at least 1.5 m, and much lower artifact frequency. For example, when we look at the unfilled side of a sag pond we can see the large rocks and the lighter brown colored soil originating from the original mass wasting event.

Acknowledgments:
I’d like to thank LGT, JMB, and the entire 2006 field school, without whom none of this would have been possible. Also I would like to recognize the Soil and Crop Science Department of Colorado State University and the University of Utah, who successfully performed the sediment analysis after my many failed attempts with another method.

References:
Hassan, Fekri A. 1993 Sediments in Archaeology: Methods and Implications for Paleoecological and Cultural Analysis. Journal of Field Archaeology. V. 5 No. 2: pp. 197-213

Figure 1

Figure 2

Wyoming Landslide Map Abbreviations:

Landslides
blt block slide (rock or earth)
df debris flow
f flow (earth or debris-laden earth)
ref residual flow (earth or debris-laden earth)
ms multiple slump (bedrock, debris, or earth)
rf rock fall
rs rock slide
s slump
sft slumpflow complex

Sediment and landform units
a flow
Q Quaternary talus

Sample # %clay %silt %sand hydrometer
U27-17-12 31.52209 32.97323 35.50468 clay loam
U27-17-13 35.30909 32.46675 32.22415 clay loam
U27-17-14 34.04937 28.7617 37.18892 clay loam
U27-17-11 20.19513 34.04898 45.75588 35.90076 clay loam
U27-17-10 19.50983 38.16964 42.32054 loam
U27-17-9 35.69371 26.70977 37.69632 clay loam
U27-17-11 34.04869 46.75860 17.19461 clay loam
U27-17-12 35.47847 38.51621 25.96846 silt loam
U27-17-13 31.74302 34.52461 33.73237 loam
U27-17-14 30.27107 11.79529 47.93292 loam

Landslide map and abbreviations can be found at:

http://www.wrds.uwyo.edu/wrds/wsgs/hazards/landslides/lshome.html

Sediments in a slump: depositional dynamics in and around alpine sag ponds

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Abstract:
One of primary landscape altering features of northwestern Wyoming’s Absaroka mountains are numerous mass wasting events representing many temporal and spatial scales. During the 2005 and 2006 field seasons, a high elevation (3100m) archaeological site (48PA2874) on one such feature investigated human landuse patterns relating to features of the terrain created by a late Pleistocene or early Holocene Holocene landscape altering event. The slump produced a hummocky surface with several depressions that allowed for ponds and streams to develop as snow melted and rains came in the summer months. These ponds became a focus of human occupation after this event since the surface assemblage contains several Paleoindian points, and sediment analysis gives us good evidence for the slump model as the formational process of the landscape.

The unit on the side of the sag pond, which often contains year-round water, but in summer 2006, dried up completely, had darker soil with a depth of at least 1.5 m, and much lower artifact frequency. These alpine sag ponds as effective sediment traps provide a unique opportunity for incorporating cultural materials into an otherwise shallow, high elevation archaeological record.