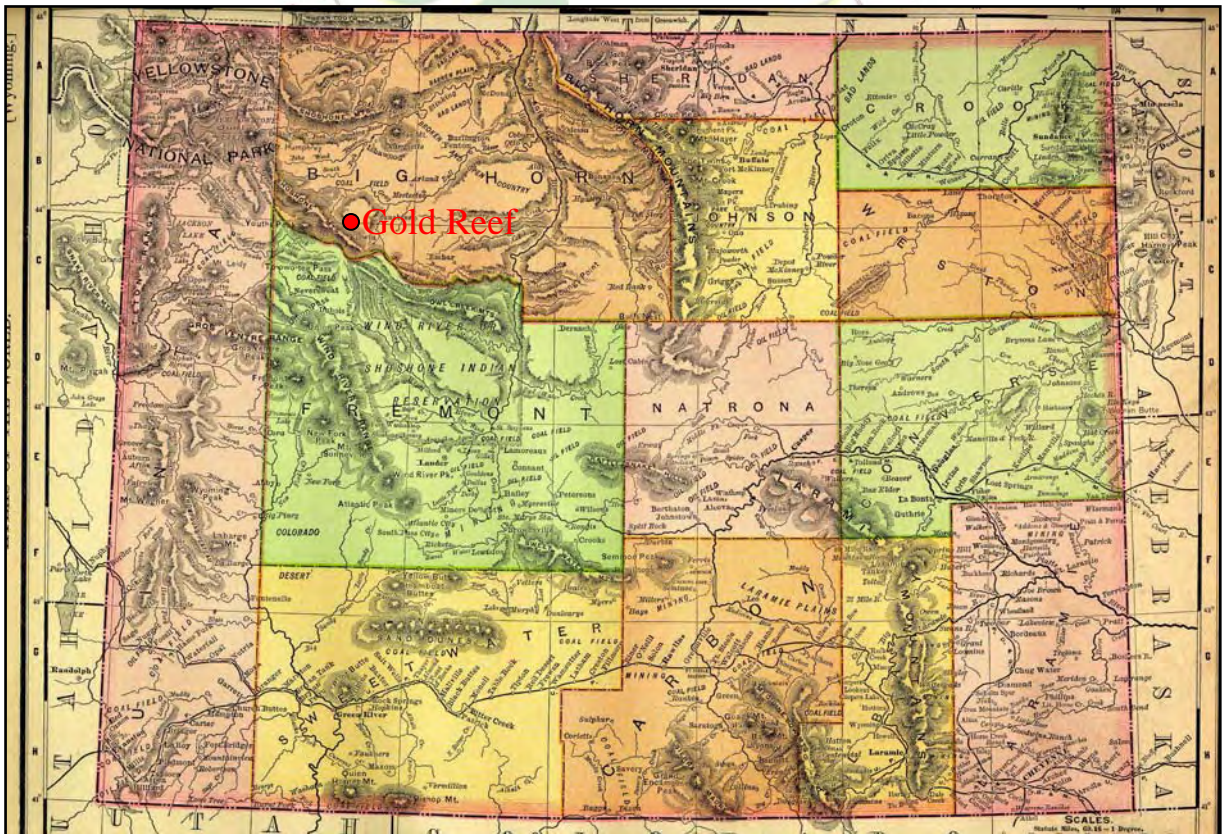


# Gold Reef: Taphonomy of a High-Altitude Historic Site

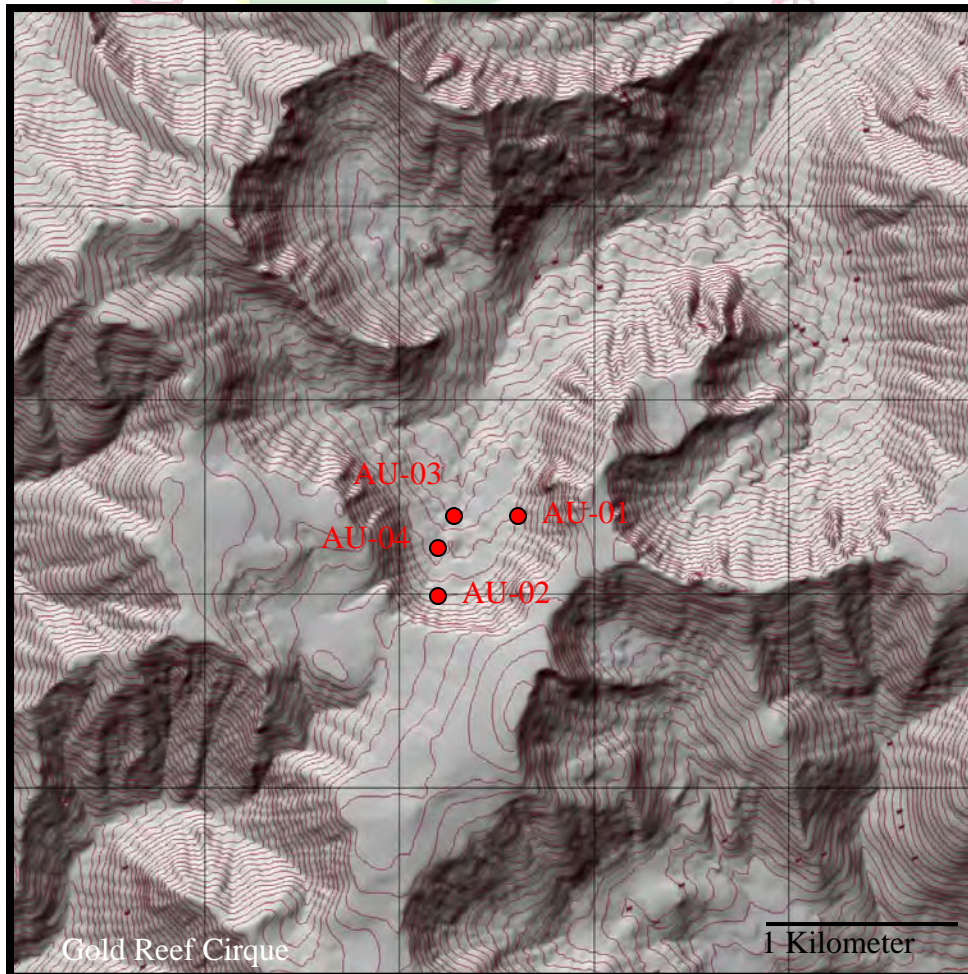
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## Introduction

The study of the Gold Reef Mining District comprised one part of the Greybull River Impact Zone project. One of the goals of “GRIZ” is to analyze human use of the Grey Bull River drainage during pre-historic and historic periods. The mining activities at Gold Reef are the largest industrial development so far studied in the project area.



The Gold Reef district dates from the end of the American West's great mining era with mining activities conducted at the site from approximately 1895 to 1912. The district is located in a cirque at the head of Jack Creek in the Absaroka Mountains of northwestern Wyoming at an elevation of approximately 3400 meters. The district is a typical small-scale late frontier mining operation consisting of four separate sites (AU-01 – AU-04). Data recovered from these sites will assist in researching similar sites in the Rocky Mountain region. The Gold Reef district also has the potential to yield useful information about rates of taphonomic processes at high-altitude sites. The district has been abandoned for 90 years and a detailed analysis of the taphonomic processes affecting the sites may provide baseline data for retrodicting the possible environmental and cultural impacts on earlier sites.



## Methods

The Gold Reef district was recorded utilizing 5 meter spacing transects across the cirque. Within the four delineated sites artifact distributions were further refined utilizing 70 cm spaced transects. All artifacts discovered were recorded in the field utilizing Excel spreadsheets on PDAs and the locations were recorded using Garmin Rino 110 hand-held GPS units (WAAS enabled). The majority of artifacts within site boundaries were then more accurately located utilizing an Ashtech Locus GPS system with ~1cm accuracy. The accuracy of these recording methods will allow a detailed reconstruction of historic land-use patterns and the taphonomic processes that have affected the archaeological record in the district.



# Geomorphology

The cirque occupied by Gold Reef is extremely geomorphically active. In a period of less than a century numerous geological processes have affected the site. The mouth of Adit-1 is located in an isolated rock-face in the talus slope of the mountain flank. Talus creep has started to reclaim the cleared platform in front of the adit. In the process the talus has already buried several large pieces of equipment in the old black-smithing area.



The original road to the adit entrance has entirely disappeared and its route can only be inferred from loose posts ascending toward the mine.



Numerous debris flows have occurred on the site before and after occupation. A rough sequence of events can be deduced from the presence of artifacts on some flows and partially buried artifacts and equipment occurring in in other flows. Slope-wash and other erosional processes have also had a less dramatic effect on the sites having moved artifacts down into adjoining drainages.

## Environment

The structures at Gold Reef have been strongly impacted by two primary environmental factors: snowfall and wind. Snowfall figures are not available for the Gold Reef cirque. However, snowfall data is available for the ghost town of Kirwin located 11.5 km to the south at an elevation of 2811 m. The peak snowfall of 96.5cm listed at Kirwin would apply a snowload of between 7 to 30 metric tons to the roof of cabin 2 depending on the moisture content of the snowfall. Since Gold Reef is 600 meters higher than Kirwin snowfall at the site is likely to be higher and certainly survives further into the summer than at Kirwin. The heavy snowfall and slowly degrading integrity of the log structures is the likely cause of the collapse of cabin 2 and may have contributed the structural failure of other features.



Data on the wind velocity within the Gold Reef cirque is not available. Due to the isolated conditions of the cirque it was not considered appropriate to extrapolate wind velocity from weather stations in the area. Estimates from area residents indicate winds in excess of 60 mph during portions of the year. High wind gusts are the most likely explanation for the removal and re-depositing of roof sections from the magazine 30 m down slope.

## Physical Decay

The USDA Forest Products Laboratory climate index of wood decay hazards is not applicable to mountainous regions due to the variable climatic conditions present in these regions. However, certain predictions about the condition and future of the wooden features of the Gold Reef sites can be made. The location of the log structures of



Gold Reef above timberline has largely protected them from the actions of wood devouring insects. Also, the generally cool temperatures at the site have tended to retard the growth of fungi commonly associated with the

decay of wooden structures. This has resulted in generally excellent preservation of organic materials at the sites. However, the general slow deterioration of the strength of structural members combined with the effects of the more extreme climatic processes has resulted in the failure of many of the features. Without stabilization efforts it is only a matter of time before these features disappear.

## Biological Activities



Rodent Damaged  
Dynamite boxes



Rodents

Animal activity has greatly affected the organic components of the sites at Gold Reef. Rodent damage is present on many of the leather and wood objects present at the sites. Illustrating this point is the dramatic damage inflicted on two dynamite boxes in the entrance of adit 2. Other damage is evident in cabin 1 where flannel appears to have



Horse cribbing.

incorporated in the interior chinking of the walls, but only a few isolated fragments remain in place. These few remaining fragments show abundant evidence of damage from rodents seeking nesting materials. Finally,

## Recreational Use

Human activities have taken a toll on the site since its abandonment. The most disturbing action taken by recreational users is the willful destruction of portions of the cabins. Two modern fire-pits are located on site AU-01. Timberline lies approximately 1 mile from



Modern Hearth.

and the presence of nails, charred milled lumber and other construction artifacts verify that the wood utilized in these features were all structural elements of the structures on the site. Several collectors' piles are also present on the site along with redistributed pieces of mining equipment. Collection activities are also

indicated by the complete absence of intact artifacts considered desirable by collectors (bottles, drill steels, etc.) Recent users of the site have also greatly altered the distribution of artifacts within the standing cabin. Logs from the neighboring collapsed cabin have been moved inside cabin 1 around the fire-pit and the floor assemblage shows abundant signs of trampling and mixing.



Interior Cabin 1.



Modern hearth, inside Cabin 1.



## Management Recommendations

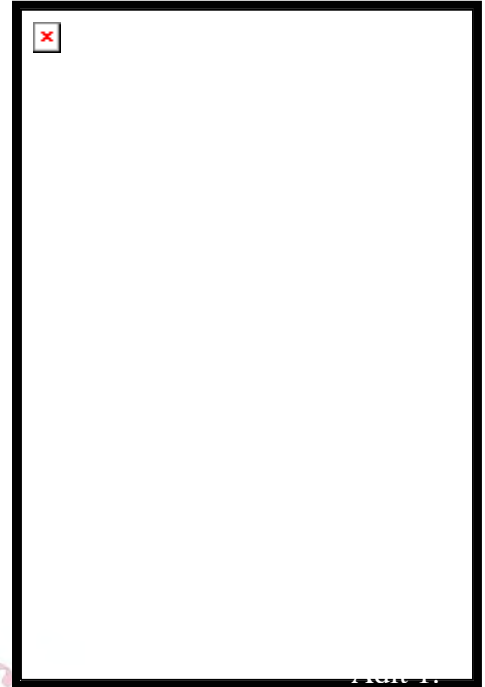
Although a number of the processes involved in the taphonomic development of the Gold Reef sites are not amenable or appropriate for management, the human disturbances of the site can be addressed to some extent. In addition stabilization work should be conducted to preserve the remaining architectural features existing in the cirque. Recommendations for further development of the site include:

- Placement of hitching posts outside site boundaries.
- Addition of interpretive signs explaining area history, geomorphology and the ecology of the cirque.
- Development of an exhibit on Gold Reef at the local museum in Meeteetse.
- Creation of brochures/interpretive guides for self-guided tours.
- Stabilization of the standing cabin at AU-01 including a professional assessment of further stabilization requirements.
- Periodic monitoring by Forest Service employees or volunteers.



Gold Reef Cirque

Gold Reef provides many opportunities for the future. The examination of the taphonomic processes operating at the site maybe applicable to understanding similar processes at high-altitude sites throughout the Rocky Mountain region. A comparison of Gold Reef to similar small-scale mining sites has the potential to reveal patterns of historic land-use at the dawn of the 20<sup>th</sup> century. Finally, Gold Reef is an important part of the local history of the Meeteetse area and deserves to be preserved for the education and enjoyment of future generations.



Site Overview



Crew Photo.

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## Preliminary Bibliography

Aschmann, Homer

1969 The Natural History of a Mine. *Economic Geography*. 46(2):172-189.

Bell, Peter

1996 The fabric and structure of Australian mining settlements. In *Social Approaches to an Industrial Past*. Ed. Bernard Knapp, Vincent Pigott, and Eugenia Herbert. Routledge, London. P. 17-38.

Brack, M.L.

2003 *The Copper Gulch Storm Water Reclamation Project – A Cultural Resources Assessment of 470 Acres in the Glove Hills, Gila County, Arizona*. Desert Archaeology, Inc. Technical Report No. 2003-06.

Buckles, Nancy B. and William G.

1980 *The University of Southern Colorado Historical Archaeology Manual*. Unpublished manuscript.

Buckles, William G. and Nancy B.

1984 *Colorado Historical Archaeology Context*. Colorado Historical Society, Denver.

Clark, Hyla M.

1977 *The Tin Can Book*. New American Library, Bergenfield.

Conlin, Joseph R.

1985 *Bacon, Beans and Galantines: Food and Foodways on the Western Mining Frontier*. University of Nevada Press, Reno.

Dessamae, Lorrain

1968 An Archaeologist's Guide to Nineteenth Century American Glass. *Historical Archaeology*. 2:35-44.

Dunrud, Richard C.

1962 *Volcanic Rocks of the Jack Creek Area Southeastern Absaroka Range Park County, Wyoming*. Unpublished thesis, University of Wyoming.

Ehrenhard, John E.

1973 The Rustic Hotel, Fort Laramie National Historic Site, Wyoming 1876-1890. *Historical Archaeology*. 7:11-29.

Fell, James E.

1978 *Ores to Metals: The Rocky Mountain Smelting Industry*. University of Nebraska Press, Lincoln.

Fennega, Franklin

1967 Post-1800 Mining Camps. *Historical Archaeology*. 1:80-82.

Firebaugh, Gail S.

- 1989 An Archaeologist's Guide to the Historical Evolution of Glass Bottle Technology. *Southwestern Lore*, Sept. p49.

Gregvine, Helen

- 1987 *The Collector's Encyclopedia of Granite Ware: Colors, Shapes, and Values*. Collector's Books, Paducah.

Hausel, Dan

- 1980 *Gold Districts of Wyoming*. The Geological Survey of Wyoming. Report of Investigations No. 23, Laramie.

- 1986 Form, distribution and geology of gold, platinum, palladium, and silver in Wyoming. Geological Survey of Wyoming, Laramie.

Hardesty, Donald L.

- 1990 Evaluating Site Significance in Historical Mining Districts. *Historical Archaeology*. 24(4):42-51.

- 1997 Power and industrial mining community in the American West. In *Social Approaches to an Industrial Past*. Ed. Bernard Knapp, Vincent Pigott, and Eugenia Herbert. Routledge, London. p 81-96.

Hattori, Eugene M. and Maria A Thompson

- 1987 Using Dendrochronology for Historical Reconstruction in the Cortez Mining District, North Central Nevada. *Historical Archaeology*. 21(2):60-73.

Heavey, E.H.

- 1936 *Early Day Mining Activities at Kirwin*. Cody Enterprise, March 11, 1936. Page 2

Hewett, D.F.

- 1913 *The Ore Deposits of Kirwin Wyoming*. Bulletin 540, Contributions to Economic Geology, 1912, Part I. U.S. Geological Survey. Bulletin 540-C. Washington, Government Printing Office.

Hoover, Herbert C.

- 1909 *Principles of Mining: Valuation, Organization, and Administration*. First Edition. McGraw-Hill Book Company, Inc. New York.

International Textbook Company

- ???? *Mining Engineering, vol. 7*. International Textbook Company, London.

- 1899 *A Treatise on Metal Mining, Vol. 4*. Burr Printing House, New York.

Israel, Fred L. (ed.)

1991 (1897) *Sears, Roebuck and Co. Catalogue*. Chelsea House Publishers, Philadelphia.

Killick, David

1998 On the value of mixed methods in studying mining communities. In *Social Approaches to an Industrial Past*. Ed. Bernard Knapp, Vincent Pigott, and Eugenia Herbert. Routledge, London. p279-290.

Kimball, Russell

1914 *Plat of the claim of the Gold Rim Mining and Milling Company known as the Father Heldman, Golden Crest, Oro Fino, Old Abe, Sugg, Anaconda, and Mammoth Lodes in Gold Reef (unorganized) Mining District, Park County, Wyoming*. Mineral Survey No. 479, Shoshone Land District.

Lakes, Arthur

1906 *Prospecting for Gold and Silver in North America*. Third Edition. International Textbook Company, Scranton.

Lehner, Lois

1988 *Lehner's Encyclopedia of U.S. Marks on Pottery, Porcelain, and Clay*. Collector Books, Paducah.

Martin, Andy

1989 *Blasting Cap Tin Catalog*. Tucson.

Miller, George L. and Catherine Sullivan

1984 Machine-Made Glass Containers and the End of Production of Mouth-Blown Bottles – 20<sup>th</sup> Century. *Historical Archaeology*. 18(2):83-96.

Mogensen, Paul, and Ed Hunter

2001 *A Concise History of Mine Hoisting from its earliest beginnings through Winfield Scott Stratton's Independence Hoist*. Mining History and Technology Series, Volume 1. Western Museum of Mining and Industry, Colorado Springs.

Mrozowski, Steven A.

1990 The Dialectics of Historical Archaeology in a Post-Processual World. *Historical Archaeology*. 27(2):106-111.

Mutel, Cornelia F. and John C. Emerick

1992 *From Grassland to Glacier: The Natural History of Colorado and the Surrounding Region*. Johnson Books, Boulder.

Newman, T. Stell

1969 A Dating Key for Post-Eighteenth Century Bottles. *Historical Archaeology*. 4:70-75.

Pfaffenberger, Bryan

1997 Mining communities, *chaines operatoires* and sociotechnical systems. In *Social Approaches to an Industrial Past*. Ed. Bernard Knapp, Vincent Pigott, and Eugenia Herbert. Routledge, London. p291-300.

Polak, Michael

2002 *Bottles: Identification and Price Guide*. Fourth Edition. Krause Publications, Iola.

Ritter, Dale and Craig Kochel and Jerry Miller

2003 *Process Geomorphology*. Fourth edition. Mc-Graw Hill, Boston.

Rock, James T.

1984 Cans in the Countryside. *Historical Archaeology*. 18(2):97-111.

Sagstetter, Beth and Bill

1998 *The Mining Camps Speak: A New Way to Explore the Ghost Towns of the American West*. BenchMark Publishing of Colorado, Denver.

Schiffer, Michael B.

1990 *Formation Processes of the Archaeological Record*. University of Utah Press, Salt Lake.

Schmitt, Dave N. and Charles D. Zeier

1991 Not by Bones Alone: Exploring Household Composition and Socioeconomic Status in an Isolated Historic Mining Community. *Historical Archaeology* 27(4):20-38.

Schackel, Paul A. and Barbara J. Little

1992 Post-Processual Approaches to Meanings and Uses of Material Culture in Historical Archaeology. *Historical Archaeology*. 26(3):5-11.

Smith, Duane

1975 *Colorado Mining*. University of New Mexico Press, Albuquerque

1993 *Rocky Mountain West: Colorado, Wyoming and Montana 1859-1915*. University of New Mexico Press, Albuquerque.

Staski, Edward

1984 Just What can a 19<sup>th</sup> Century Bottle Tell Us? *Historical Archaeology*. 18(1):38-51.

Toulouse, Julian H.

1970 High on the Hawg: Or How the Western Miner Lived, as Told by Bottles He Left Behind. – ca. 1850-1890. *Historical Archaeology*. 4:59-59.

Twitty, Eric

2002 *Blown to Bits in the Mine: A History of Mining and Explosives in the United States*. Western Reflections Publishing Company, Ouray.

Waters, Michael R.

1997 *Principles of Geoarchaeology: A North American Perspective*. University of Arizona Press, Tucson.

Weslager, C.

1972 *The Log Cabin in America*. Rutgers University Press, New Brunswick.

Wilson, Rex L.

1981 *Bottles on the Western Frontier*. University of Arizona Press, Tucson.

Wilson, William H.

1954 *A preliminary study of the Kirwin Mining District, Park County, Wyoming*. Unpublished Geological Engineer's thesis, University of Utah.

1960 *Petrology of the Wood River Area Southern Absaroka Mountains, Park County Wyoming*. Unpublished Ph.D. dissertation. University of Utah.

1964 *The Kirwin Mineralized Area, Park County, Wyoming*. Preliminary Report No. 2, The Geological Survey of Wyoming, Laramie.

Woods, Lawrence M.

1997 *Wyoming's Big Horn Basin to 1901: A Late Frontier*. Arthur H. Clark Co, Spokane.

Young, Otis E.

1970 *Western Mining: An Informal Account of Precious-Metals Prospecting, Placering, Lode Mining, and Milling on the American Frontier from Spanish Times to 1893*. University of Oklahoma Press.

1976 *Black Powder and Hand Steel: Miners and Machines on the Old Western Frontier*. University of Oklahoma Press.

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