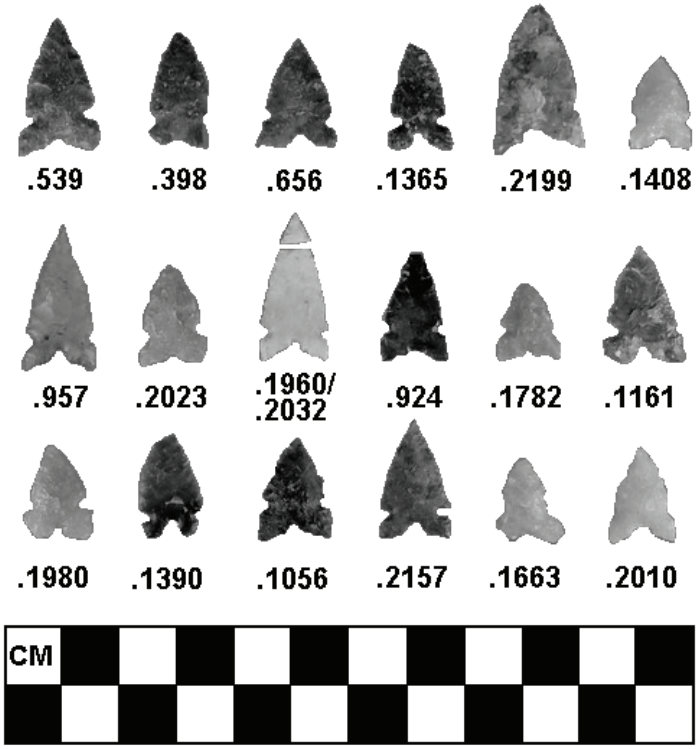
THE WYOMING
Archaeologist

VOLUME 60; NUMBER 2, 2016



ISSN: 0043-9665
[THIS ISSUE PUBLISHED
February 2019]

THE WYOMING Archaeologist

On the Cover:

Tri-notched projectile points from Carter Lease Site. See article by Kelly Poole, this volume.

Information for Contributors

THE WYOMING ARCHAEOLOGIST is published twice a year by the Wyoming Archaeological Society, Inc. Address manuscripts and news items for publication to: Dr Danny Walker, Editor; 1687 Coughlin St; Laramie WY 82072. Email dawalker@wyoming.com 307-399-0948

Please send a minimum of two (2) hard copies of each manuscript submitted. A third copy would speed the process. Please contact the Editor for instructions if the manuscript is available in electronic format. Readers should consult the articles in this issue for style and format. Deadline for submission of copy for spring issues is January 1 and for all issues is July 1. Reports and articles received by the Managing Editor after those dates will be held for the following issue.

The membership period is from January 1 through December 31. All subscriptions expire with the Fall/Winter issue and renewals are due January 1 of each year. Continuing members whose dues are not paid by March 31 of the new year will receive back issues only upon payment of $5.00 per issue. If you have a change of address, please notify the Executive Secretary/Treasurer. Your *WYOMING ARCHAEOLOGIST* will not be forwarded unless payment is received for return and forwarding postage. Back issues in print can be purchased for $5.00 each, plus postage. Back issues out of print are available at $0.25 per page plus postage.

Checks for chapter subscriptions and renewals should be sent to the chapter secretary involved. All other checks, subscriptions, and renewals should be addressed to the Executive Secretary/Treasurer. Correspondence and orders for back issues should be addressed to the Executive Secretary/Treasurer.

Society yearly subscription rates are as follows:
Individual Associate Member - $20.00
Institutional Member - $30.00
Canada and Other Foreign - $34.00

Other memberships may be available. Contact the Executive Secretary/Treasurer for information. Local chapter dues are in addition to state society dues. The Wyoming Archaeological Society is a Nonprofit Organization.

The Wyoming Archaeological Society, Inc. and its local chapters do not discriminate on the basis of age, gender, sexual orientation, gender identity, gender expression, ethnicity, disability, national origin, political affiliation, or religious belief.

The Wyoming Archaeological Society, Inc., or its appointed or elected officials can be held responsible for any comment or viewpoint expressed in any issue of The Wyoming Archaeologist. The author(s) of each article or issue are totally responsible for the content and view expressed in their paper(s).

THE WYOMING ARCHAEOLOGIST
VOLUME 60(2), FALL 2016

Table of Contents

THIS ISSUE PUBLISHED FEBRUARY 2019

WYOMING ARCHAEOLOGICAL SOCIETY MEMORIAL GIFT or CONTRIBUTION FORM

Given by: *Miss, Mrs., Mr., Ms., Dr.* $ _____ *(Amount)*

Name: *Last* _____ *First* _____ *Middle* _____

Address: _____ *City & State* _____ *Zip* _____

Donor phone number *( )* _____

TYPE OF GIFT: ***General Contribution*** *[ ]* ***Specific Contribution*** *[ ]*

In Memory of: _____
Name *City & State*

In Honor of: _____
Name *City & State*

Specify where you would like your money to go (e.g., Mulloy or Frison Scholarship Funds, The Wyoming Archaeologist, ???????)

Please make your check payable to THE WYOMING ARCHAEOLOGICAL SOCIETY
Send to Carolyn Buff, Executive Secretary/Treasurer, 1617 Westridge Terrace, Casper, WY 82604

WYOMING ARCHAEOLOGICAL FOUNDATION MEMORIAL GIFT or CONTRIBUTION FORM

Given By: Miss, Mrs., Mr., Ms., Dr. ***$***_____
Amount

_____
NAME: ***LAST*** ***FIRST*** ***MIDDLE***

_____
ADDRESS: ***CITY & STATE*** ***ZIP***
Donor phone number: _____
Type of Gift: ***General Contribution [ ]*** ***Specific Contribution [ ]***
In Memory of: _____
Name ***City & State***
In Honor of: _____
Name ***City & State***
Please specify where your donation is to be placed.
Jensen/Robson Research Grant _____; Jensen/Robson PhD Travel Award _____;
Hell Gap Research _____; WAF General Operations ____; Other _____.

Please make your check payable to the WYOMING ARCHAEOLOGICAL FOUNDATION and mail to Marsha Peterson, WAF Treasurer, P.O. Box 2168, Laramie, WY, 82073; 307-766-5564.

Any funding for the George C. Frison Institute please contact Todd Surovell at University of Wyoming, Dept. 3431, 1000 E. University Avenue, Laramie, WY 82071; or email Surovell@uwyo.edu; or telephone 307-399-5437.

NEWS AND ANNOUNCEMENTS

Wyoming Archaeological Society, Inc.
2018 Annual Meeting Minutes
4:17 p.m. – Red Lion Inn – Madison Room – Billings, MT
Friday, April 27, 2018

Presiding: Sylvia Huber, President

Call to Order: 4:17 p.m.

Report of Credentials Committee/Roll Call of Delegates: Executive Secretary/Treasurer Carolyn Buff certified the voting delegates: Absaroka – Donna Kinney and Eric Rossborough; Ancient Trails – Cher Burgess; Casper – Kerry and Chris Lippincott; Cheyenne – Richard and Jane Curritt; Fremont County – Bill Elder and Ed McAuslan; June Frison – Paul Sanders and Rachel Shimek; Pumpkin Buttes – Mike Stone and Denise Tugman; Sheridan/Buffalo – Jenny Aiello and Naomi Ollie; Sweetwater County – absent; and Upper Green River Basin – Dave Vlcek.

Roll Call showed nine chapters represented: Absaroka, Casper, Ancient Trails, Cheyenne, Fremont, June Frison, Pumpkin Buttes, Sheridan/Johnson County, and Upper Green River Basin.

Approval of Minutes of May 1, 2017: Motion by Rachel Shimek, second by Denise Tugman, to approve as published in Volume 60(1) Spring 2016 issue of *The Wyoming Archaeologist.* Carried.

Treasurer's Report: Executive Secretary/Treasurer Carolyn Buff gave the treasurer's report showing a total net worth of $75,321.98, a decrease of $4,388.48. The treasurer explained that much of the decrease was due to several chapters having not submitted their dues before the end of the fiscal year.

Motion by Mike Stone, second by Bill Elder to file the treasurer's report for audit. Carried.

Auditor's Report: Richard Currit, Matt Landt and Paul Sanders certified that the treasurer's report was in order.

Editor's Report: Carolyn Buff for Danny Walker – Announced that one issue had been published, one is in the works, and two others are close. This will get us through the 2017 volume. Manuscripts are needed to continue publishing.

Librarian's Report: Maddie Mackie – The library continues to receive materials into the inventory, and the materials are available for check-out. We receive newsletters and journals from other societies.

Committee Reports: Scholarship: Carolyn Buff announced that the Scholarship Committee would meet at lunch in the banquet room to evaluate the scholarship applications.

SAA/COAS: Marcel Kornfeld reported that the Council of Affiliated Societies is made up of local and regional societies and that SAA provides a table to display brochures, publications, etc. and that the Council has been rejuvenated. Chris Rowe has assumed the position of editor of the COAS newsletter and is asking for submissions.

Chapter Reports: The chapter reports will be published in *The Wyoming Archaeologist*.

State Archaeologist's Report: Greg Pierce reported that it would be a busy field season with six, 10-day sessions planned and volunteers are needed. Members can get the field season dates off the website.

The office salvaged a mammoth outside of Cody where they collected surface material, excavated, and cast bones. It is not known at this time whether the site is cultural or not.

Field programs for high school students are planned. In addition, avocational training on state lands holdings in the Bighorn National Forest is scheduled. There will be curation training in Laramie on June 16 for one day. Sign-up can be done on the website.

The curation lab is making headway on the database.

The archaeology fair is scheduled for September 8, 2018, from 10:00 a.m. to 3:00 p.m.

OLD BUSINESS:

WAS Payment for Student Registration Fees and Banquet Tickets: This issue was tabled from the 2017 spring meeting. Motion by Rachael Shimik, second by Mike Stone to cap the payments at $1,500, with payments being made to the first come, first served upon submission of abstracts, with payments to the primary authors or presenters only, papers and posters treated equally, with the issue to be revisited in 2019. Carried.

Wyoming Archaeology Awareness Month: Judy Wolf reported that Wyoming had placed second at the SAA with the poster. She requested $250 for Archaeology Awareness Month in September and thanked the Society for the continued support. She announced that chapters could pick up posters and that t-shirts, caps and aprons were available for purchase.

Motion by Dave Vlcek, second by Bill Elder to donate $250 to Wyoming Archaeology Awareness Month. Carried.

Judy announced that the company which had been printing the posters has gone out of business and that the nearest company who can print the size needed is in Denver, with a cost of each poster at a little over $2.00.

Wyoming History Day: Carolyn Buff for Danny Walker announced that the WAS award of $100 went to a student from Cody High School, titled "Destruction and Effort to Revive an American Icon: The Decimation and Conservation of the American Bison." This was one of the best senior papers he had seen in a long while with references properly cited and excellent writing skills.

.

Frison Institute: Jason Toohey reported that the Institute continues in its fund raising efforts with many of the gifts being matched by the state and that it is within $2,100 of ending the state match. To date, the endowment has allowed the institute to give out approximately $27,000.

He also announced that Stewart Slidell will be the keynote speaker on September 20 during the fall archaeology month festivities.

Friends of the George C. Frison Institute: Rich Adams, liaison – no report.

Wyoming Archaeological Foundation: Judy Wolf, president, reported that Hell Gap was designated a National Historic Landmark on December 23, 2016 with the dedication ceremony being held on July 22, 2017, in conjunction with the WAS summer meeting. Site tours were given by Hell Gap field school students to 230 people. Lunch was provided by the June Frison Chapter, the Wyoming State Historical Society, and Don Wyckoff, 2017 WAS banquet speaker.

Forty people watched the solar eclipse at the Hell Gap Site on August 21, 2018 from as far away as Puerto Rico, Harvard, Texas and Connecticut.

Three, ten-day field sessions were held, with work nearly done on the block which was started in 1999; work is about half done on the remains of Locality IE (Agate Basin to…Goshen?). 2017 was the first time since 1992 (the beginning of the reinvestigation) that we can see the entire cultural sequence form Goshen to the Late Prehistoric.

Improvements included obtaining several trailers serving as labs, storage, guest quarters (UW and MK/Pinner trailers); weather port for large events (courtesy Metcalf Archaeological Consultants); repair of cattle guard (Darren Garhart/Tank Farm); removal of posts, installed beam over site building so we can excavate Locality IE (Darren Garhart/Tank Farm); new steps into lab trailers (parts Darren Garhard/Tank Farm); bridge over drainage (Darren Garhard/Tank Farm); temporary load of water pumps (Darren Garhart/Tank Farm); gift of pump intake hoses (Darren Garhart/Tank Farm).

Web Site: John Laughlin reported that usage was going well and they work to keep the site updated. A special thanks went out to John and Dan Bach for their continued work on the site.

Names, addresses, etc.: Carolyn Buff requested that names, addresses, phone numbers and emails be updated as soon as possible and to please provide zip +4s. Any piece of junk mail can provide that information. Just look at the address.

NEW BUSINESS:

State Historic Preservation Office – Mary Hopkins announced that work would be continued at the Wold Ranch beginning July 9 with a possible open house again this year.

She thanked Sylvia Huber for help with Senate File 101 and that it was not a good bill for us, not constitutional nor enforceable, and to watch for a resurrection of the bill next year.

May is Historical Preservation Month with the governor to sign the proclamation on May 23, 2018 at 2:00 p.m.

The SHPO office is close to launching the revision of the database and close to finishing another education booklet on the history of tourism, highways, auto tours, and associated properties (hotels, motels, gas stations, etc.).

They have had several grant applications come in and reminded the members that any preservation organization can apply for a grant.

The SHPO is working on two new National Register nominations: Evanston Chinatown and Quebec 1, a peacekeeper facility.

The capitol restoration program is moving along nicely and anyone wanting a tour can let the SHPO office know and it can be arranged. Many architectural features have been found on the inside.

The Paleoindian context has been reviewed and hopefully a way can be found to get it published. The Stone Circle context is ready to go out for review.

Avocational Training Program – Marcia Peterson explained that a goal of OWSA is to survey the whole state and would like to begin a certification program for avocation archaeologists whereby participants would take classes and volunteer for surveys to earn hours toward a certificate. She would like to visit each chapter to discuss the program and get feedback.

Survey Section: No Report.

Brochures, Letterhead, Envelopes, Membership Cards: are available by contacting Carolyn Buff.

Correspondence: None to report.

Election of Officers: John Laughlin, chair, June Frison Chapter, Denise Tugman, Pumpkin Buttes Chapter, and Marcel Kornfeld, June Frison Chapter.

Nominated and agreeing to serve were Mavis Greer, president; John Laughlin, 1st vice president; and Rachael Shemik, 2nd vice president. Declared elected by acclimation.

Nominated for member-at-large to the Foundation (term ends 2020) were Jessica Bagwell, Marit Bovee, Brigid Grund, Spencer Pelton, Erick Robinson, and Christine Varah. A secret ballot vote was cast and Brigid Grund was elected, with the term ending 2020.

Nominating Committee procedures will be posted to the web site and will be passed on to the next committee.

2019 Nominating Committee: Rachael Shemik, 2nd vice president, June Frison Chapter, chair; Marcel Kornfeld, June Frison Chapter, and Christine Varah, Sheridan Chapter.

Selection of Site for 2019 Annual Meeting: Rock Springs is scheduled to host the 2019 meeting.

Selection of Site for 2018 Summer Meeting: Invitation by Marcel Kornfeld to visit the Hell Gap site from July 20-July 22, 2018. Camping facilities are available on site. The Hell Gap project will run with three, ten-day sessions.

Announcements: Mavis Greer announced that the American Rock Art Association will hold its annual meeting in Grand Junction, Colorado.

Please update your chapter officers with the executive secretary/treasurer and send any pertinent chapter information to John Laughlin or Dan Bach for inclusion on the web site.

The Wyoming Archaeological Foundation will meet at 7:30 a.m. in the Rosebud Room with breakfast being ordered off the menu. The field trip particulars will be announced in the morning, pending the weather.

Carolyn Buff announced that the WAS window clings and magnetic decals were available for sale here and from the website.

International Archaeology Day is October 20, 2018. The web site is www.archaeologyday.org for anyone interested in posting their activities.

.

Other Business to come before the Body: A Golden trowel was presented to Montana for their 60th anniversary.

Christine Varah would like to meet with other chapter presidents to network for more coordination between chapters.

Adjourn: There being no further business, the meet adjourned at 6:06 p.m.

/s/ Carolyn M Buff
Executive Secretary/Treasurer

Golden Trowel Award: 2018 recipient, Larry Todd

Keynote Speaker: Dr. Don Wyckoff, University of Oklahoma

Wyoming Archaeological Society Inc.
Executive Committee Meeting
April 26, 2018

Discussion centered on how much and how many student papers and posters the WAS should subsidize for registration fees and the banquet. Suggestions included partial stipends for all primary presenters and posters, the first 10 abstracts, capping the amount, and whether to finance papers, posters, or both.

It was decided a vote would be requested at the business meeting to cap the amount at $1,500.00 on a first come, first served basis, be it papers or posters, with payments for primary authors only.

/s/Carolyn M Buff
Executive Secretary/Treasurer

Wyoming Archaeological Society, Inc.
Scholarship Committee Minutes
April 27, 2018 – Red Lion Inn – Rosebud Room - Billings, MT
12:00 p.m.

Presiding: Carolyn Buff, Chair

Present: Carolyn Buff, Mavis Greer, Sylvia Huber, John Laughlin, Mary Lou Larson, Maddie Mackie, Marcia Peterson, Greg Pierce (ex officio), Paul Sanders

Absent: Brian Waitkus, Danny Walker

Carolyn Buff reminded all committee members that if they had printed the scholarship applications, they must then destroy them so that we are in compliance with the FERPA Act. We assure students the applications will be destroyed after the granting of the money because of the personal information contained in the applications.

Motion by Marcia Peterson, second by John Laughlin to award the Frison Scholarship to Scott Dersam in the amount of $1,000. Carried.

Motion by Marcia Peterson, second by Maddie Mackie to award the Mulloy Scholarship to Ashley Neff in the amount of $1,000. Carried.

Motion by Mavis Greer, second by Marcia Peterson to award $1,000 to Molly Herron. Carried. There were no applications for the Reiss Scholarship nor for the Jensen/Robson Traveling Scholarship.

It was also decided to include a statement in the letters to recipients that any equipment purchased with these scholarship funds must remain with the student's current University of Wyoming academic department.

Adjourn: 12:38 p.m.

/s/ Carolyn M Buff
Scholarship Chair

AUDITING COMMITTEE REPORT
March 31, 2018
In accordance with the bylaws, the Auditing Committee has reviewed the Treasurer's books and records for the Wyoming Archaeological Society, Inc. for fiscal 2017.

AUDITING COMMITTEE SUMMARY
March 31, 2018
The Wyoming Archaeological Society, Inc. owns one checking account, one savings account, two money market accounts, and two certificate of deposit accounts at the Reliant Federal Credit Union, 4015 Plaza Dr, Casper, WY 82604.

Balance on hand March 31, 2017 - $79,590.23
Receipts
Interest and Dividends - $1,044.05
Income - $9,220.22
Disbursements – $7,266.26
Balance on hand March 31, 2018 – $75,321.98
(a net decrease of -$4,388.48)
Includes no outstanding check(s) and one outstanding deposit of $1,560.50.

Audited and found correct.

/s/ Paul Sanders Date April 27, 2018

/s/ Richard Currit Date April 27, 2018

/s/ Matt Landt Date April 27, 2018

Wyoming Archaeological Society, Inc.
Chapter Reports for the 2017-18 Year

Absaroka: No report submitted.

Ancient Trails: The chapter has been largely inactive this past year and has not held regular meetings. We had a discussion with the Weston County chapter of the Wyoming Historical Society about planning joint meetings focused on archaeological programs.

Field Work: The chapter still intends to finish GPS mapping preserved segments of the Cheyenne-Deadwood Trail along Stockade Beaver Creek in the Black Hills.

Casper: No report submitted.

Cheyenne: Programs Presented – Dr. Randy Haas, recent work with the Peruvian Altiplano on some interesting Archaic sites; Dr. Mark Miller, "Middle Plains Archaic Bison Hunting in Southcentral Wyoming: Revisiting the Scoggin Site (48CR304);" Carolyn Buff, "Confessions of an Archaeology Groupie ... my experiences as an archy volunteer for 30+ years; Dr. Kevin Black, "Yarmony Potpourri: Architecture, Storage, Facilities, Mortuary Practices, Lithic Sourcing and Trail Systems; Dr. Spencer Pelton, "A Thermoregulatory Perspective on Global Human Dispersal; Dr. Steve Cassells, "Invader's End: Recovering WWII MIAs in Europe;" Marcia Peterson, avocational archaeology training program and new University of Wyoming Archaeological Repository Online Database.

Fremont County Chapter: Survey – Remote sensing with OWSA and BLM; Rock Art Photo Presentation of the Southwest.

Public Education – Distributed Wyoming Archaeology Awareness month posters to schools and museums in Fremont County and all schools on the Wind River Reservation; put public service announcements on Wyoming Public Radio, county10.com, dailyranger.com, Riverton Ranger, Wind River Radio Network, and the Lander Journal.

Work With Other Organizations – Riverton Rotary Club, Heart Mountain Relocation Center, OWSA and BLM, Woodard Site Trash Clean-Up.

Publications/Reports – Printed annual shirt pocket membership booklets for the Fremont County Archaeological Society listing goals of WAS, online sources of Wyoming archaeology reports, membership, programs and history.

Programs Presented – Gina Clingerman, "Unusual Find in the Copper Mountains;" Michael Page, "Wyoming Pottery;" Dan Eakin, "Nez Perce Trail;" Tom Lucan, "Flint Knapping Demonstration;" Patrick Walker, "The Ferris Mountain Plane Crash;" Jim Stewart, "Mountain Prehistoric Sheep Glyphs in Fremont County;" Dr. Larry Todd, "High Elevations, Old Sites, and New Perspectives on Human Paleoecology in Wyoming's Greater Yellowstone Ecosystem;" Dr. Todd Surovell, "Stories from the Mongolian Taiga."

June Frison Chapter: Public Education – Several members volunteered at the 2nd annual Wyoming Archaeology Fair held at the Wyoming Territorial Prison with various public outreach and education activities; tour of UW Archaeological Repository led by Dr. Marieka Arksey with 16 in attendance from multiple WAS chapters, including attendees from La Barge, Pinedale, Cheyenne, and Fort Collins, CO.

Work with Other Organizations – Chapter donated both funds and volunteer time to the Hell Gap National Historic Landmark Dedication ceremony in association with the Paleoindian Research Lab.

Programs Presented - Hallie Meeker, "Measuring Occupation Spans at Two Stone Circle Sites in Larimer County, Colorado;" Chris Johnston, "Run-

Treasurer's Report for Fiscal Year Ending March 31, 2018
RELIANT FEDERAL CREDIT UNION

CHECKING ACCCOUNT	**INCOME**	**EXPENSES**	**BALANCE**
Beginning Balance	$3,253.57		
Deposits	$9,220.22		
Interest Earned	$1.46		
TOTAL INCOME - Checking			**$12,475.25**
EXPENSES			
Bloedorn Lumber - Trowel		$15.99	
Merback Awards - Trowel Engraving		$31.50	
Petty Cash - mailing envelopes, postage for same		$50.00	
Reliant Federal Credit Union - Modern Printing, Secretary of State		$84.00	
Wyoming Archaeological Foundation - Annual Dues		$357.00	
Danny Walker - Bulk Permit		$225.00	
Wyoming Archaeological Foundation - Jensen/Robson Award		$250.00	
Wyoming Archaeological Foundation - Hell Gap Monument		$1,000.00	
Kenneth Hladek - Mulloy Scholarship		$1,000.00	
Wyomimg Archaeological Foundation - Wyckoff Honorarium Donation		$300.00	
Reliant Federal Credit Union - Staples, Modern Printing		$138.14	
Wyoming Archaeology Month - Archaeology Week Poster		$250.00	
Don Wyckoff - Keynote Expenses		$603.23	
Danny Walker - WCTF Red Buttes Grant		$750.00	
Reliant Federal Credit Union - Staples, Visa Card		$48.80	
USPS - Mailing		$147.00	
John Laughlin - GoDaddy		$100.85	
Upper Green River Chapter - Membership		$4.00	
USPS - Bulk Permit		$225.00	
University of Wyoming Copy Center - Printing of Journal		$1,185.75	
United States Postal Service - Bulk Mailing		$500.00	
TOTAL EXPENSES		**$7,266.26**	
ENDING BALANCE - Checking Account			**$5,208.99**
SAVINGS ACCOUNT			
BEGINNING BALANCE	$125.13		
Interest Earned	$0.36		
ENDING BALANCE			**$125.49**
MONEY MARKET ACCOUNT - 0040			
BEGINNING BALANCE	$7,792.71		
Interest Earned	$21.18		
ENDING BALANCE			**$7,813.89**
MONEY MARKET ACCOUNT - 0041 (BLM)			
BEGINNING BALANCE	$9,287.71		
Interest Earned	$25.11		
ENDING BALANCE			**$9,312.82**
Total available after March 31, 2017 = $6535.07 for Big Horn Basin projects, digitization, and report-writing			
CERTIFICATE OF DEPOSIT - 00100			
BEGINNING BALANCE	$45,574.05		
Interest Earned	$781.08		
ENDING BALANCE			**$46,355.13**
CERTIFICATE OF DEPOSIT - 0101 - Reiss Account			
BEGINNING BALANCE	$13,557.06		
Interest Earned	$214.86		
ENDING BALANCE			**$13,771.92**
TOTAL NET WORTH AS OF MARCH 31, 2018			**$75,321.98**
Total Income	**$82,588.24**		
Total Expenses		**$7,266.26**	
Net Increase (Decrease)			**$(4,388.48)**

Carolyn M Buff, Executive Secretary/Treasurer

ning of the Buffalo: The Archaeology of the Roberts Buffalo Jump (5LR100), Northern Colorado;" Dr. Larry Todd, "How Lucy Died: A Taphonomic Perspective;" Patrick Wilkinson, "Cave Voodoo in Haiti: An Ethnoarchaeological and Ethnographic Research Project;" William Mills, "Have We Been Using the Wrong "Map:? Archaeology Around the Late Glacial Channel River;" Dr. Greg Pierce and Marcia Peterson, presentation on the development of public outreach program for a Wyoming Avocational Archaeological Certification; Wesley Vanosdall, "Bodies, Artifacts, and Identities: Reexamining Materials and Meanings from 19th Century Overseas Chinese Burials from Evanston, Wyoming;" Dr. Marieka Arksey, "Chaos, Collapse and Caves: How the Ancient Maya used Rituals to Control a Crumbling World Order; Dr. Spencer Pelton, "Much Ado About Carbon: An Occupational Chronology for the Hell Gap Site and Some Implications for Paleoindian Prehistory.

Pumpkin Buttes Chapter – No report submitted

Sheridan-Johnson County: Programs Presented – Dave McKee, "Medicine Wheel/Mountain National Historic Landmark;" Dr. Staffan Peterson, "Little Bighorn Battlefield National Monument;" Cynde Georgen, "Subjects of the Mikado: Sheridan's Japanese Community;" Sylvia Brunner, "Bomber Mountain Site;" Bonnie Lawrence Smith, "Are Thunderbird Petroglyphys Linked to Golden Eagle Nests?" Christine Varah, "Archaeology of the Southern Wolf Mountains;" Yufna Soldier Wolf, "Repatriation of Little Plum, Little Chief and Horse: Arapahoe Children Removed from Their Home to the Boarding School in Pennsylvania;" Randy Schoppe "Fort Custer, Montana;" Mike Bies, "Dinwoody Rock Art."

Field Trips – Wold Ranch Buffalo Jump and Rock Art and Medicine Wheel

Sweetwater – No report submitted.

Upper Green River Basin Chapter - Survey – Drone project to document two significant rock alignment sites was cancelled due to NPS drone restriction on grant funds. Rescheduled for 2018 to be conducted by Wyoming State BLM office in partnership with WAS chapter.

Public Education – Provided letter of support for grant application to support new on-site interpretation panel for Trappers Point Archaeological site.

Work With Other Organizations – Partnered with Sublette County Historical Society to hold meetings and presentations at the Museum of the Mountain Man.

Programs Presented – Dr. Larry Todd, "Migration Corridors, Ice Patches, and High Elevation Landscapes;: Wade Haakenson, "Protohistoric Archaeology on the Mesa;" Doug Ramsey and Ken Cannon, "Recording Rock Alignments Using Small Unmanned Aerial Systems (sUAS) or Drones."

SHOSHONEAN PRONGHORN PROCESSING AND RETOOLING IN THE GREEN RIVER BASIN: EXCAVATIONS AT THE CARTER LEASE SITE

by
KELLY J. POOL

ABSTRACT

The Carter Lease site (48LN2041) lies along the western side of the Green River Basin in southwestern Wyoming and underwent data recovery in 2010 for the Ruby Pipeline, with 185 sq m excavated. Occurring roughly 200 to 300 years ago, the primary use episode focused on butchering and processing at least 14 adult pronghorn and three fawns, as well as beaver and rabbits. Retooling after the hunt was a secondary focus. The pronghorn were procured in the fall, probably during a mass kill event by a group of pedestrian Shoshonean people who possessed at least one metal tool. In addition, evidence of minor use of this locale about 663 BP was preserved in the bison bone assemblage.

INTRODUCTION

This large, multicomponent camp is about 10 miles southeast of Kemmerer, Wyoming, and six miles south of the Hams Fork River. Covering about 20 acres on the south side of Dry Muddy Creek, the Carter Lease site spreads generally southwest-northeast along an intermittent tributary of the creek (Figure 1). It lies in an aeolian setting characterized by areas of dunal deposition interspersed with deflated areas of exposed bedrock. Fine-grained aeolian sand overlies alluvium from the creek and its tributaries. The excavations were situated in a shallow sand sheet at the leeward base of a modern dune, with units extending a few meters westward into the dune. A stabilized remnant of an older dune west of the excavation block formed the "core" of the younger or modern dune. The sand supports vegetation dominated by sagebrush, greasewood, and bunchgrasses.

The site was originally recorded in 1990 and has been updated and expanded several times, most recently during the Ruby Pipeline Class III inventory (Dobschuetz et al. 2010). Metcalf Archaeological Consultants, Inc. (Metcalf) conducted data recovery excavations and pipeline construction monitoring on the site for the Ruby Pipeline in 2010. In 2011 a metal detector survey of the area surrounding the excavation block was undertaken to identify European goods; none were found. This paper summarizes the results of Metcalf's excavations on the privately owned northeastern corner of the site, presented in detail in the final report of data recovery (Pool 2015).

Cultural material consists of chipped and non-chipped stone, worked bone implements and decorative items, faunal remains including one bone with a probable metal cutmark, ceramic sherds, one clay bead, and heat-altered stone. Remains of pronghorn as well as other animals and also tools useful in butchering and processing represent most of the artifact assemblage. A secondary emphasis on retooling after the hunt is also represented in the cultural

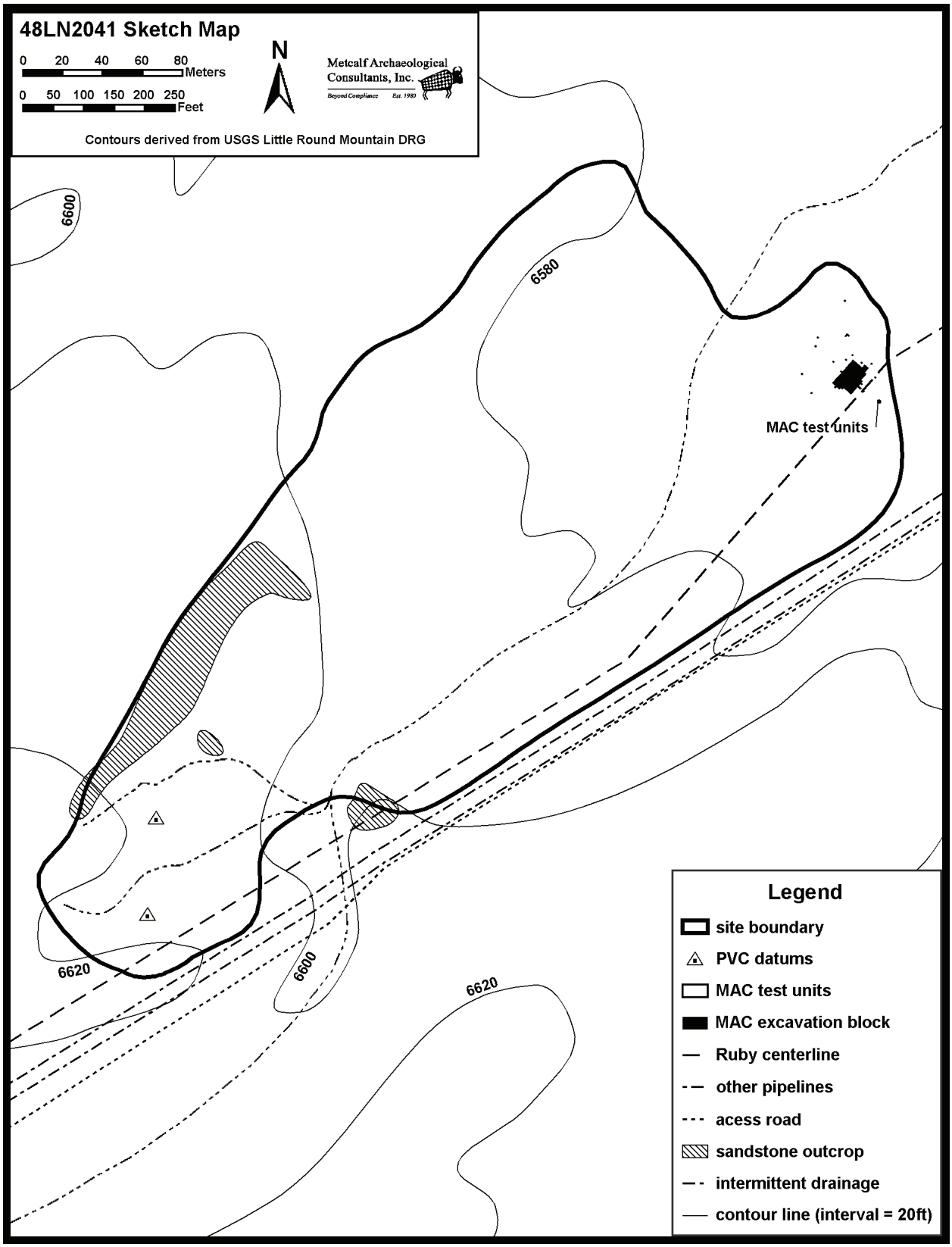


Figure 1: Site sketch map with excavation plan.

remains. Twenty-four small features and three large, thin stains were found. Samples submitted to outside specialists were flotation samples for macrobotanical analysis, charcoal for species identification, heat-altered stone and one ceramic sherd for fatty acids analysis, obsidian for hydration dating and trace element analysis, artifacts and soil control samples for pollen and starch analysis, ceramic sherds for petrographic analysis, and four charcoal samples, one bison metacarpal, and two pronghorn tibiae for radiocarbon dating. Artifacts have been donated by the landowner to the University of Wyoming Archaeological Repository.

DATING METHODS AND RESULTS

Radiocarbon and obsidian hydration dating were used to help place the excavations into chronological context. Two optically stimulated luminescence ages of ~6645 yr and ~2755 yr were recovered from stratigraphy by Western GeoArch Research (Mayer et al. 2015) but were rejected as too old based on all other chronological indicators. Thermoluminescence dating of ceramics was considered but not attempted because of a recent lack of success using the method on ceramics for a similarly aged, near-surface site in northwestern Colorado (Mueller and Firor 2009).

Accelerator Mass Spectrometry (AMS) dates were run on four sagebrush charcoal samples, two pronghorn tibiae (amino acids), and one bison metacarpal (amino acids) (Table 1). Overlap occurs in the two-sigma calibrated age ranges of six of the seven dates, suggesting they represent one pronghorn processing event. These dates fall at the juncture of the Protohistoric period (300/250 to 130 BP), cited as beginning with the initial entry of European goods into the region and ending with the Rocky Mountain fur trade, and the Historic period, as defined in southwestern Wyoming cultural chronology (Thompson and Pastor 1995). Determining actual age from such recent radiocarbon dates can be problematic (e.g., Reed and Metcalf 1999:151) because of the calibration curve as well as use of old wood, so radiocarbon dating of this use episode is not as useful as it would be in an older occupation. Additional indicators were used to place the occupation into chronological context, and the identification of a probable metal cutmark on pronghorn bone aided in confirming the main occupation in the excavated area occurred in the last several hundred years.

The earliest radiocarbon date (663±22 BP) was on bison bone and demonstrates minor use of this locale before the pronghorn processing episode. The age falls in the Late Prehistoric Firehole period (1000-300/250 BP), as redefined by Metcalf and Pool (2015) for the Ruby Pipeline project. This use, as well as other possible and minor indications of use apart from the pronghorn processing episode, could not be confidently separated from the main cultural level.

Twelve obsidian artifacts underwent hydration dating following sourcing analysis. All artifacts are debitage from Malad, Idaho, with the exception of an arrow point fragment sourced to the Black Rock area, Utah. Hydration results suggest the artifacts are from a single occupation dating about 445 years before present (Thomas Origer, personal communication 2011).

DIAGNOSTIC ARTIFACTS

Fifty-three tri-notched points, 18 small side-notched points, one small corner-notched point, three Shoshone knives, and 151 sherds from at least two Intermountain Ware vessels were recovered in association with the Carter Lease site excavation (Figures 2 and 3). Larson and Kornfeld (1994:202) list tri-notched points, Shoshone knives, and Intermountain Ware as well as Cottonwood Triangular projectile points; steatite artifacts; specific types of structures; and rock art, specifically the shield-bearing warrior motif, as typical of the Late Prehistoric period in this region and note

Table 1: Radiocarbon Ages.

FEATURE (F) #, CAT. #/SAMPLE (S) #	SAMPLE DESCRIPTION	^{14}C AGE BP	∂^{13}C	CAL BP AGES 2-Σ ≥ .05 PROBABILITY	RELATIVE PROBABILITIES FOR AGE RANGES	MEAN CAL BP AGE RANGES	LAB #
311N 205E (.1546/S96)	sage charcoal[a]	80±30	-24.9‰	25-140 220-260	0.73 0.26	83 240	Beta-291214
F14, 312N 206-207E (S92)	sage charcoal[a]	100±30	-24.6‰	14-146 214-268	0.71 0.28	80 241	Beta-291217
306N 209E (.377)	*Antilocapra americana* (pronghorn) tibia fragment	119±14	-18.86‰	22-41 59-142 217-234 237-265	0.11 0.58 0.10 0.16	32 101 226 251	GNS- 40146/2; NZA 51834
310N 206E (.1297)	*Antilocapra americana* (pronghorn) tibia fragment	119±14	-18.1‰	22-41 59-142 217-234 237-265	0.11 0.58 0.10 0.16	32 101 226 251	GNS- 40146/3; NZA 51835
F17, 310N 203E (.864/S105)	sage charcoal[a]	150±30	-22.7‰	0*-40 61-119 123-154 167-232 242-283	0.19 0.19 0.12 0.33 0.17	20 90 139 200 263	Beta-291215
F6A, 311N 207E (S73)	sage charcoal[a]	160±30	-23.2‰	0*-36 66-118 125-159 162-231 244-286	0.19 0.13 0.12 0.38 0.18	18 92 142 197 265	Beta-291216
313N 204E (.2084)	*Bison* sp. complete metacarpal	663±22	-18.59‰	636-670[b] 562-594[b]	0.52 0.48	653 578	GNS- 40418/5; NZA 55632

Note: All dates are AMS. Calibrations, except where noted, were done using CALIB 6.0.2 with IntCal09 calibration curve and are presented as years before present (1950) (http://radiocarbon.pa.qub.ac.uk/calib/calib.html).

[a]Charcoal analyst, Kelly Pool or Kim Kintz, Metcalf Archaeological Consultants, Inc.

[b]Calibrations were done using CALIB 7.0 with IntCal13 calibration curve and are presented as years before present (1950) (http://calib.qub.ac.uk/calib/calib.html).

they have also "become diagnostic of Shoshone occupation." Other regional sites containing tri-notched points, Shoshone knives, and Intermountain Ware include Eden-Farson dating to 230 BP (Frison 1971), Bugas-Holding dating to 380 BP (Haspel 1984; Rapson 1990), and Big Goose Creek dating to 530 BP (Frison et al. 1978) (Larson and Kornfeld 1994:Table 23.2).

Possibly associated with the earlier 663 BP use of the site area, the single corner-notched arrow point recovered from excavations differs from the typical Rose Spring form which is so common during the Uinta phase of the Late Prehistoric period. The blade exhibits nearly parallel sides but is both wider and larger than the Rose Spring points collected from other sites on the Ruby Pipeline project.

CULTURAL STRATIGRAPHY

Data recovery contained in a 170 sq m block and 15 test units exposed artifacts and features on the leeward side of a high dune, and at least two uses of this sheltered spot were identified based on dating and diagnostic artifacts. Nearly all the cultural remains are assumed to have resulted from a recent, short-term event in September or October which was primarily focused on pronghorn butchery and processing following a mass kill, with a secondary focus on retooling. Procurement of the pronghorn would have provided not only meat, marrow, and grease for overwintering, but also hides for

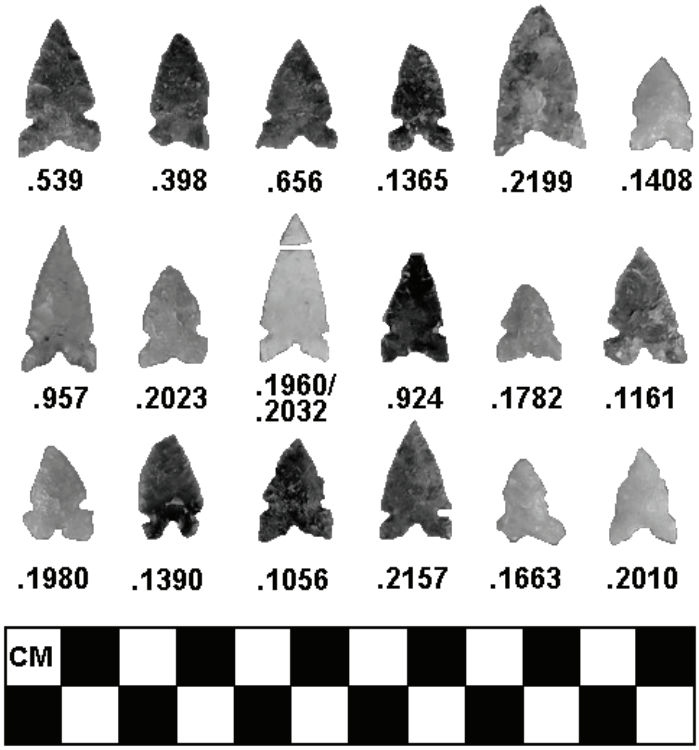


Figure 2: Tri-notched projectile points.

wintertime warmth. It is also possible some of the pronghorn hides might have been intended for use in trade, as could have been the case with pelts from the beaver and possibly an ermine recovered from the site. At the same time, repair and replacement of the chipped stone tool kit, arrow shafts, clothing, and decorative items were undertaken.

Across most of the excavation block, the remains of this primary use episode were shallowly buried in an unstratified context between 0 and 30 centimeters below ground surface. Most of the pronghorn carcass butchery and processing occurred at the base of the dune, and remains decreased in density with distance eastward. Embedded tasks, such as retooling after the hunt, were also undertaken at the base of the dune. Evidence of this other work, in addition to discard piles from animal processing, was identified around the periphery of the faunal processing area. The use episode was tightly confined at the base of the dune, as suggested by the high incidence of tool refits within the excavated area.

Debris from retooling and carcass processing overlapped to some degree, but remains were sufficiently discrete to distinguish them from each other. The relative ease in identifying individual tasks emphasizes the occupation was quite short-term, with little scuffage and foot traffic to mix and disperse the remains. While some material concentrations could be identified as dumps of discarded debris, others were assumed to reflect activity areas created in place based on the presence of size grade (SG) 4 bone and debitage. This preservation of individual work areas lends support to the idea of a mass kill with the resulting carcasses butchered and processed at one time. If, on the other hand, kills had been closely spaced with processing extending over a longer period of time, more blurring of task areas would have occurred.

Associated evidence of animal processing and retooling extended a few meters west of the

Figure 3: Shoshone knives.

dune base onto its slope, where massive animal burrowing and deep sagebrush roots have heavily impacted the integrity of cultural deposits. Within these disturbed dunal deposits, however, the earlier and far less intensive of the two use episodes was distinguished, based largely on a radiocarbon date from a bison metacarpal found under the main pronghorn processing level. Recovery of bison calf bone possibly associated with the occupation suggests a springtime use of the area. Although bison remains were lightly scattered across the entire excavated area and some spiral fractures were identified on the remains, they are not definitively cultural. Even when artifacts were found near these bison bones, they were attributed to the pronghorn-related occupation, either because of the lack of stratigraphy in the shallow depositional areas on the eastern portion of the excavation or because of the mixing through extreme bioturbation in the dunal deposits on the western portion of the excavation.

Because much of the bison bone could not be confidently separated from the primary use episode and nearly all the excavated artifacts clearly relate to the pronghorn processing occupation, the entire recovered assemblage and excavated area was treated as a single analytical unit. Further, although much if not most of the bison assemblage probably predates the pronghorn processing episode based on stratified occurrence in the dunal deposits, differential horizontal distribution, variable stages of weathering, and the 663 BP radiocarbon age, a contrasting distribution of calf and adult bison bone suggests the slight possibility of a third and latest use of the area being represented by some of the bison calf bone.

The single analytical unit is defined by overlapping radiocarbon ages; similar obsidian

hydration ages; similarity in the artifact assemblage of a Shoshonean occupation; a tightly confined artifact and feature distribution; tool refits; and similar degrees of weathering on pronghorn and beaver bone. It is roughly estimated to date between 200 and 300 years old or between AD 1700 and 1800. Bearing in mind the radiocarbon and obsidian hydration ages, this estimate for the occupation date is bracketed on the earlier end by the identification of a cutmark on bone made by a metal tool, one of the European goods entering the regional trade networks around 300 BP (Thompson and Pastor 1995). The later bracketing age of 200 years is partially based on the presence of three adult beaver in the assemblage. By the late 1830s, beaver had largely been decimated in this region from the effects of overhunting for the fur trade (Russell 1955:123; Shimkin 1947:268).

BUTCHERING AND PROCESSING

Butchery and processing of at least 14 adult pronghorn and three fawns were the focus of this occupation (Figure 4), but the activities were not exclusive to pronghorn as demonstrated by the far fewer but intermixed remains of several other species. Specifically, the remains of at least three beaver exhibit butchery marks, and, based on their occurrence among the pronghorn bone, they were part of the same use episode (Figure 5). Further, at least some of the rabbits represented in the faunal assemblage were used at the same time for bone bead production and almost certainly food. With a single exception (308N 205E), however, the highest densities of identifiable rabbit bone did not match those of the pronghorn or the beaver and were instead in the dune deposits (Figure 6). The rabbit bone found in the heavily bioturbated dune

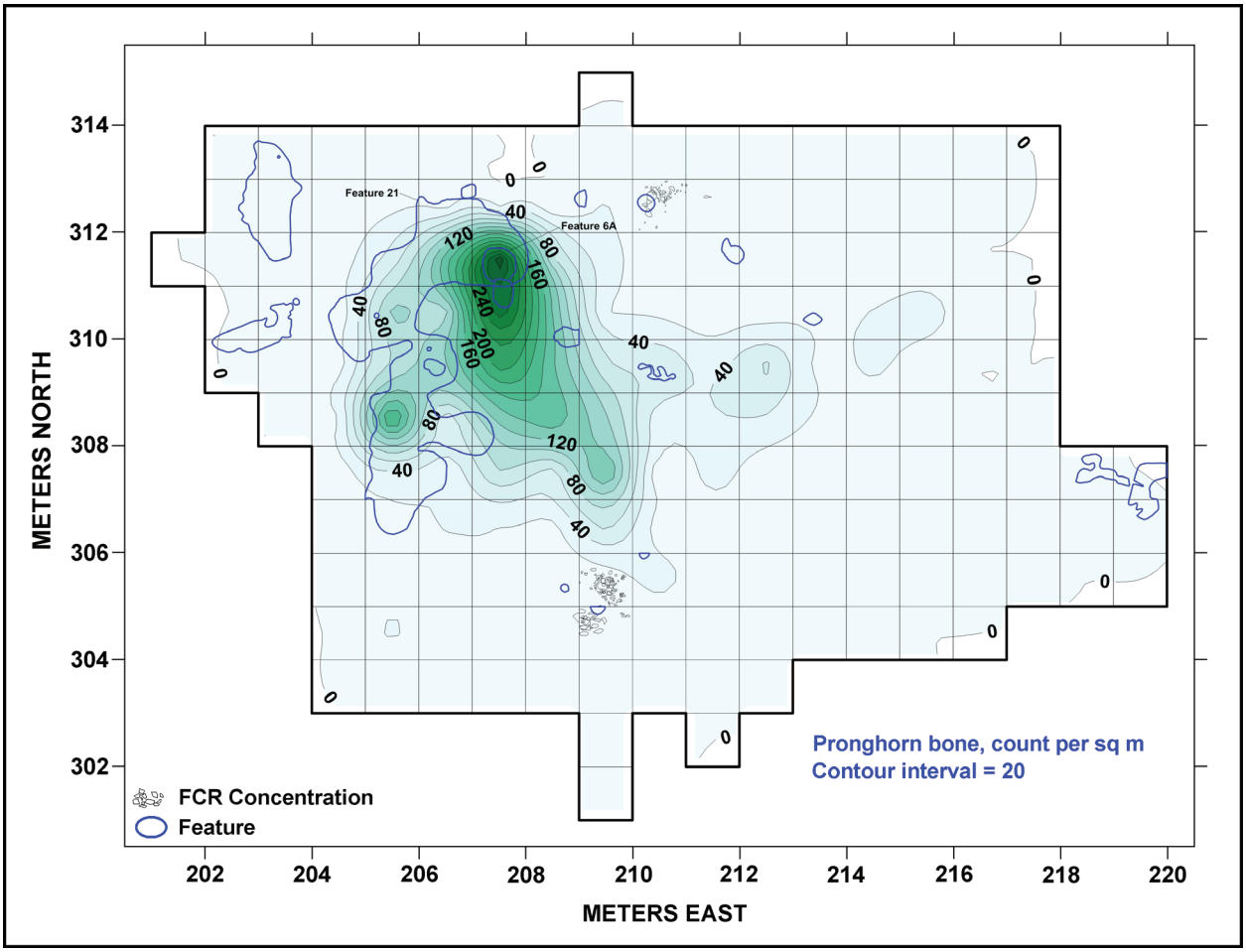


Figure 4: Distribution map of pronghorn bone in the excavation block.

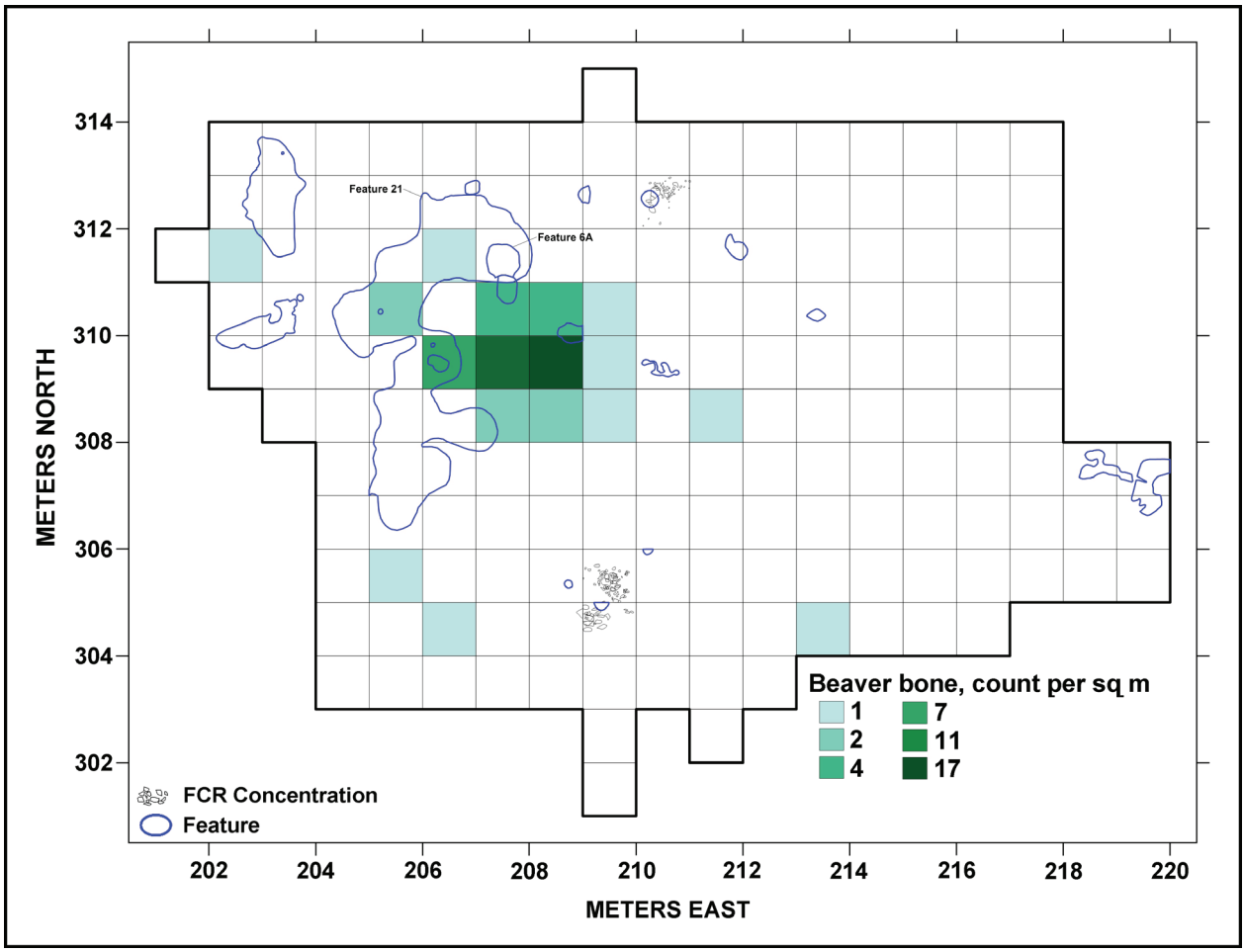


Figure 5: Distribution map of beaver bone in the excavation block.

(201-204E) is probably a non-cultural inclusion into the assemblage (Lee 2015). Finally, as discussed, bison bone partially overlapped the pronghorn and beaver bone in its horizontal distribution (Figure 7). Based on its scattered vertical distribution in the dunal deposition as well as on differential weathering and an earlier radiocarbon date (663 BP), it was deposited before and possibly also after the pronghorn processing episode.

An area roughly 5-x-5-m in size (307-311N 205-209E) encompassed most of the identifiable pronghorn and beaver bone (Figure 4, Figure 5), extending largely southward from hearth Feature 6A. Nearly all the pronghorn bone exhibiting butchery marks was contained in this 25 sq m block, with the exception of a long bone shaft from unit 306N 209E exhibiting a cutmark probably made by a metal tool. Further, butchered beaver bone was confined to a 3-x-3-m block (308-310E 206-208E) inside this larger area.

Following transport of at least some complete pronghorn carcasses to this locale for processing, much of the initial butchery probably occurred immediately east of Feature 6A in a roughly 15 sq m area (310-312N 208-212E) based on a high concentration of tools useful in carcass dismemberment such as knives and cutting tools and on a general lack of bone in the area (Figure 8). Once removed from the bone, strips of meat may have been hung on racks and poles for drying or smoking west and southwest of Feature 6A, with foot traffic and long-burning fires for drying and smoking resulting in broad, shallow amorphous charcoal and oxidation

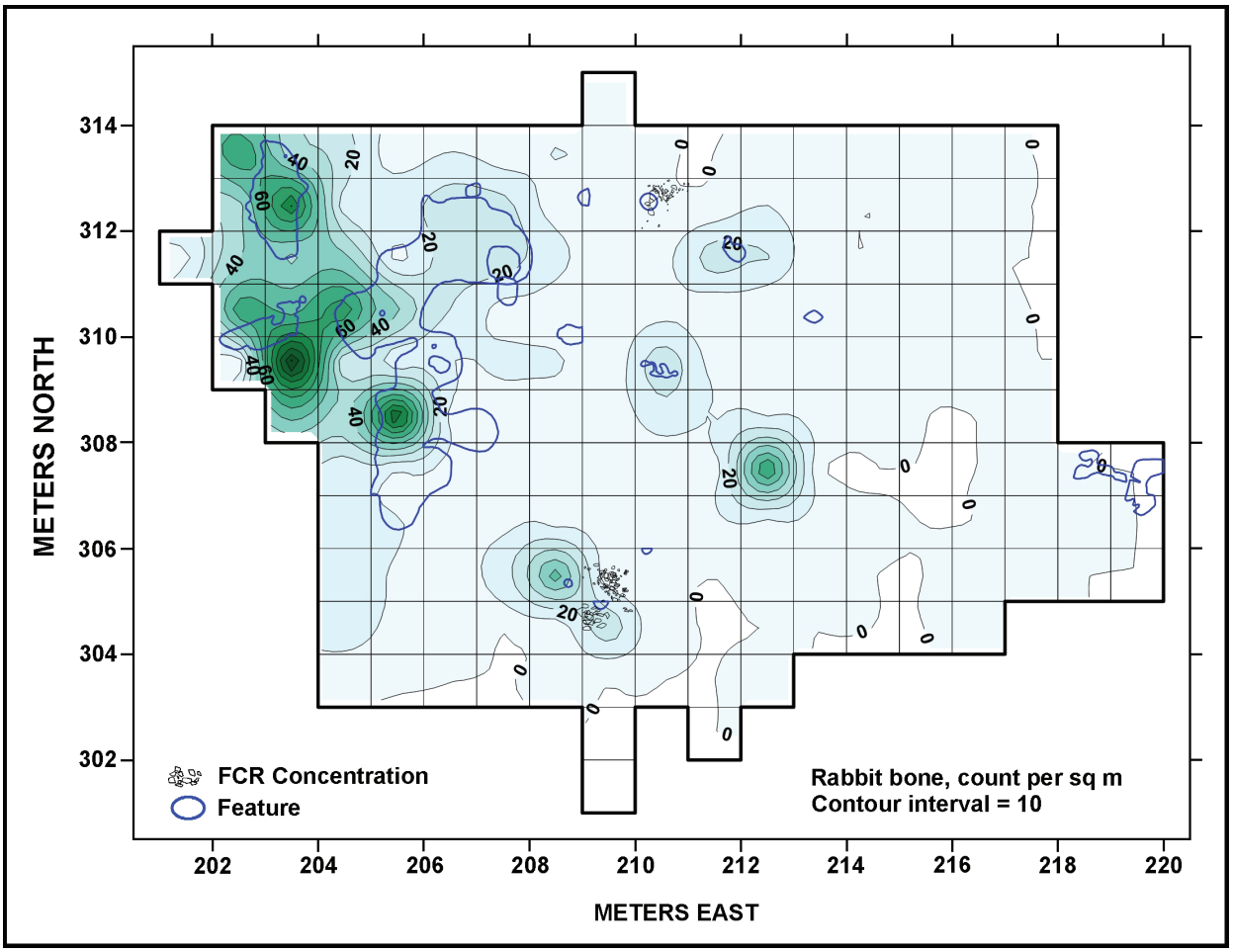


Figure 6: Distribution map of rabbit bone in the excavation block.

stains such as Features 15, 17, or 21.

Following meat stripping, bones were processed for marrow and grease. Many of the pronghorn long bones broken open for marrow extraction were discarded 1-3 m south of Feature 6A. Beaver remains were found in these same units, but the presence of a greater number with cutmarks than impact fractures suggests beaver were butchered more for their meat than for their bone marrow or grease (Lee 2015). Several large stones were found which might have been used as anvils during bone breakage. Many of these stones clustered in and south of the proposed initial butchering area between 209 and 214E, however, and they did not co-occur with the impact-fractured bone in 205 to 209E.

To render grease and remove any remaining morsels of meat, epiphyseal ends of long bones as well as axial elements such as vertebrae and ribs could have been boiled in a lined pit, possibly Feature 6 abutting Feature 6A. Adjacent Feature 6A was probably used as a stone heating hearth, from which rocks were removed when hot and dropped into the lined pit to indirectly boil water to extract the bone grease. Once exhausted of grease, many bone fragments appear to have been discarded around Feature 6A and perhaps used in the hearth as fuel, based on the dense concentration of burned bone around that pit. Given the large amount of processing which must have occurred, occasional removal of ash and spent fuel from Feature 6A and shattered rocks from Feature 6 would have been necessary, with hearth dumps reflected in Features 2 and 20 as well as other undefined FCR concen-

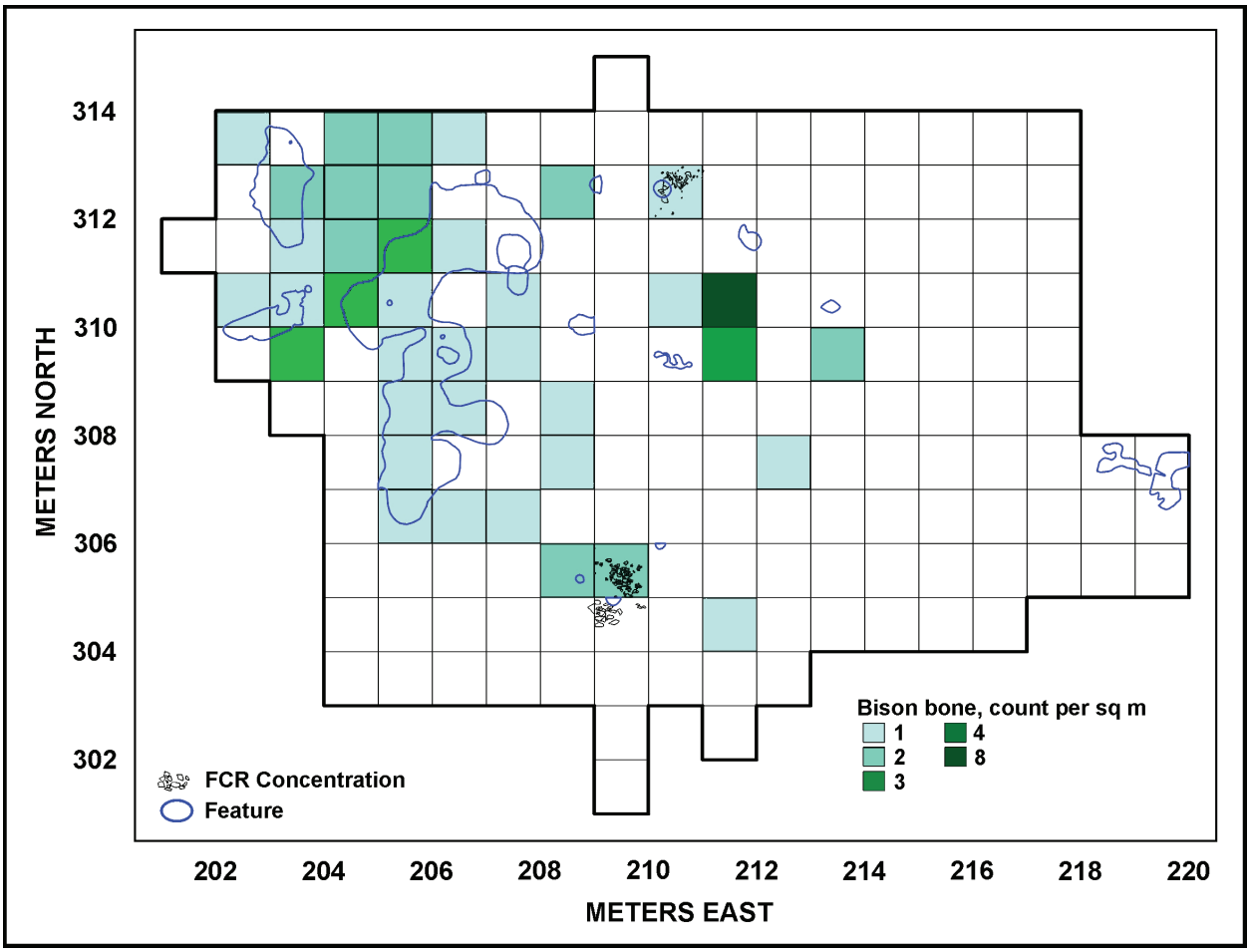


Figure 7: Distribution map of bison bone in the excavation block.

trations. As mentioned, these hearth cleanouts encircled the faunal processing area (Figure 9).

The extent and range of ceramic vessel use with regard to animal processing is unclear. Because the highest count of sherds in the block clustered near Feature 12, it seems likely the pot they represent might have been in or near the hearth when it broke. Further, a scatter of burned stone (Feature 12A) beside the hearth could have been debris from indirect boiling in the vessel. In Smith's ethnography of the Northern Ute, she states (1974:87) "clay pots were used for boiling meat, sometimes with seed or yampa flour added. The pot was placed near the fire, and hot ashes were heaped around it. Sometimes hot stones were placed in with the food to make it boil faster." The lipid signature from a shoulder sherd suggested a mixture of probable pronghorn meat and roots had been cooked in the vessel. Based on the identification of roots in the lipid signature, the ceramic vessel might have been used for soup-making, while the several larger hearths to the west were used to render grease by indirect boiling. The reason sherds were scattered across the excavation block is unknown, considering other artifact types seem to have remained at or near their original point of production or discard.

Finally, hide processing and production may have occurred in the Feature 21 area, based on the possible postholes, staining, at least one small hearth, and the long-burning fires signalled by oxidation underlaying the thin and discontinuous charcoal-stained sand lens. All end scrapers—tools which can be used in hide processing—lay 1-3 m east of Feature 21, how-

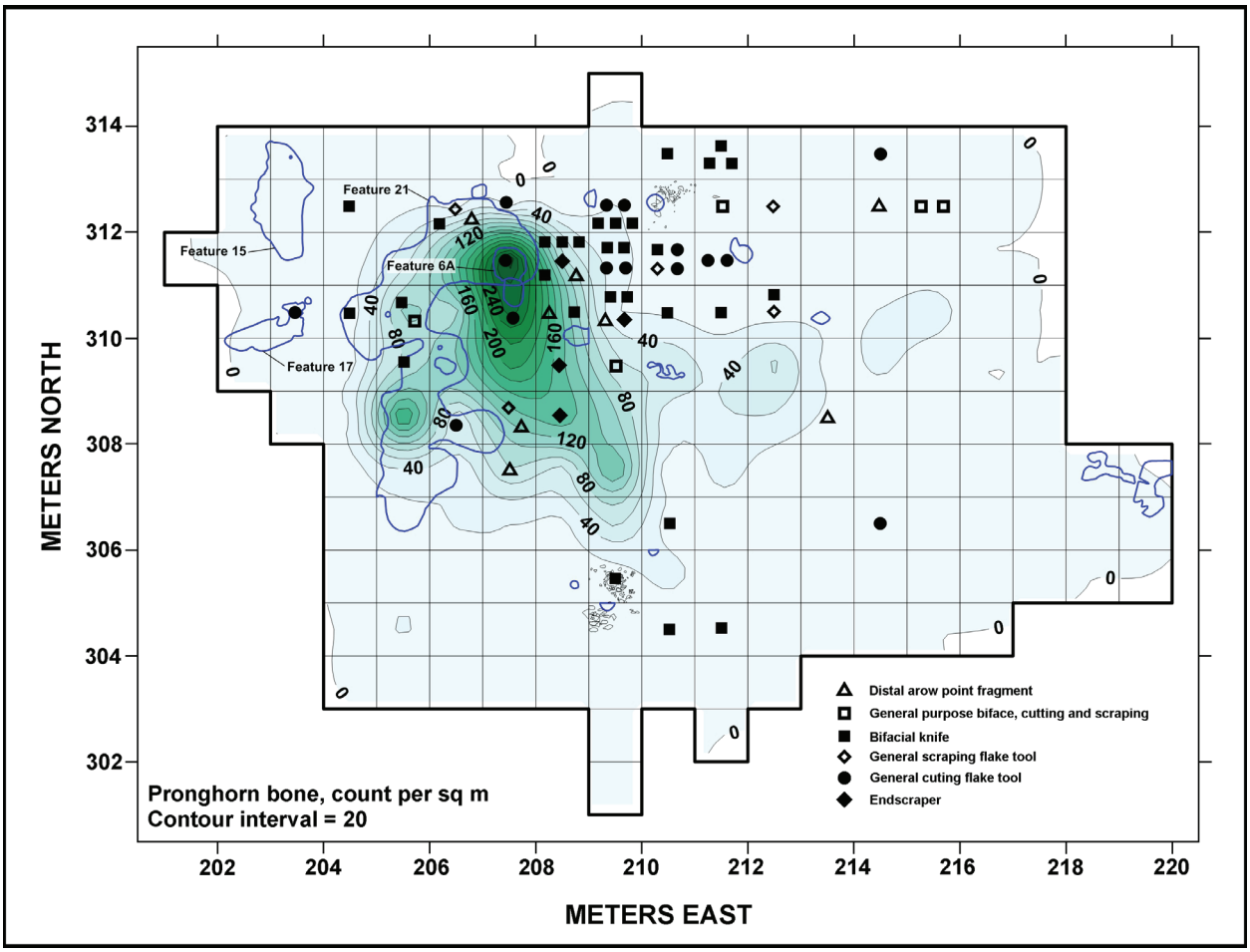


Figure 8: Distribution map of pronghorn bone with chipped stone tools associated with animal processing in the excavation block.

ever. Garment making or repair associated with hide work might have been undertaken east of Feature 6A, as the single patterned awl fragment and the bone burin were both recovered in that activity area. Expedient awls, however, were also discovered among the marrow-extracted bones south of Feature 6A.

RETOOLING

The most concentrated evidence of retooling also was preserved in and around Feature 6A; the highest density of debitage and tools in the excavation was recovered from near this hearth. Notably, while evidence of faunal processing extended south and eastward from Feature 6A, the highest concentration of debitage, preforms, and point bases trended northwestward from it—probably upwind (Figure 10). Repair and discard of broken tri-notched points as well as creation of new points and additional tools probably occurred beside the fire.

At least four discrete non-hearth-centered chipped stone clusters which could have been associated with retooling were identified around the eastern and southwestern periphery of the faunal processing area. With one exception (unit 306N 215E), SG 4 flakes dominate debitage in each spot, suggesting an emphasis on tool finishing and maintenance and also implying flintknapping was conducted in place. First, a concentration of 274 flakes, five arrow points, and a few utilized flakes in unit 312N 214E appears to signal a locus where broken points were replaced, resharpened, or repaired based

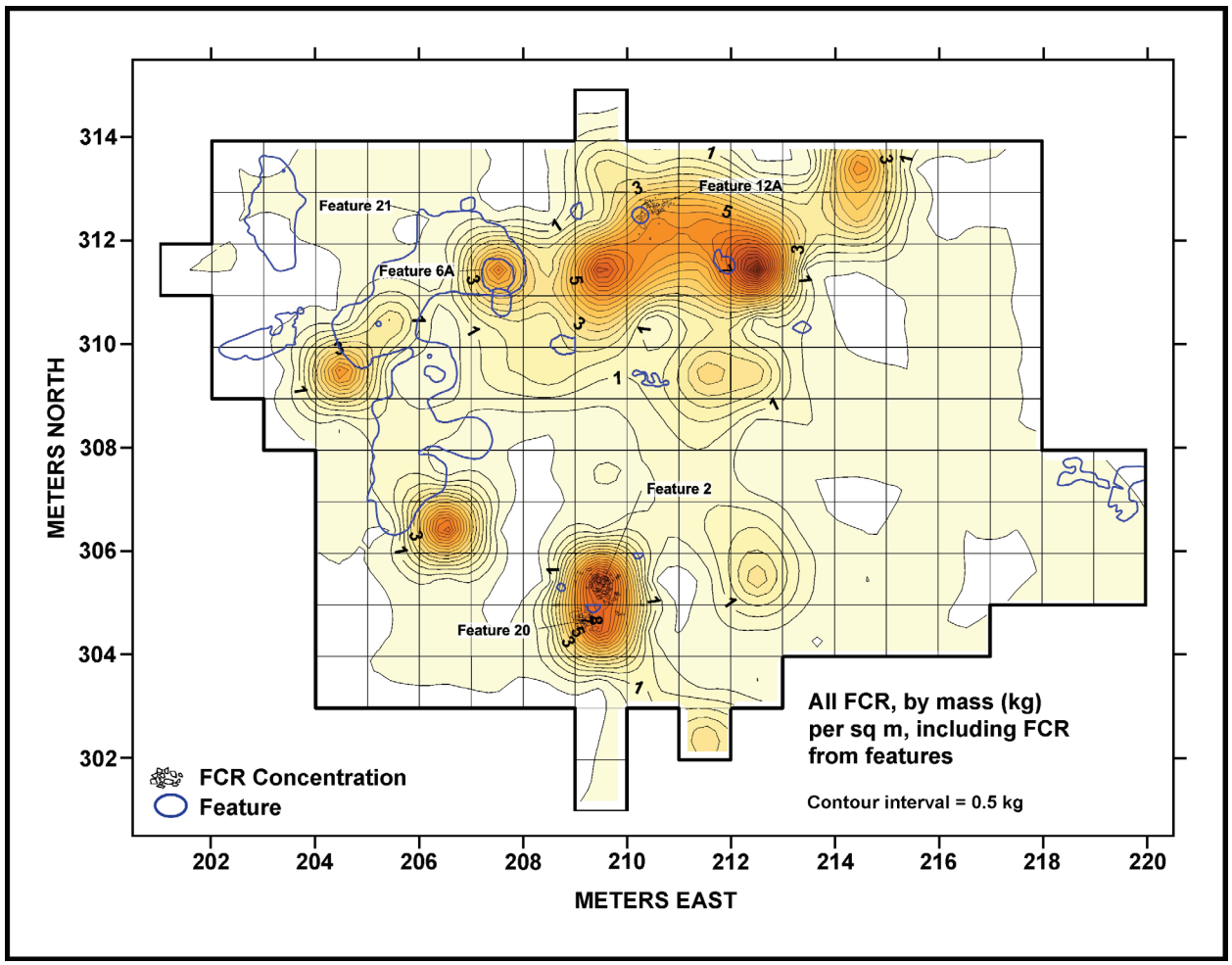


Figure 9: Distribution map of all FCR by mass in the excavation block.

on the fact that 86 percent of the flakes are SG 4. A second work area was also defined by a spike in flake count (n = 285) within a single unit (306N 215E). It contained the highest density of SG 2 and SG 3 flakes in the excavations, and the low proportion of SG 4 debitage suggests a larger biface than an arrow point may have been produced. A third flintknapping area was identified in unit 304N 211E, the southernmost concentration of activity in the excavations. It was defined based on an increase in debitage—especially quartzite—compared to surrounding units and a concentration of stone tools. It is notable that five of the seven Desert Side-notched points lacking basal notches occurred in or immediately around this unit, and all but one is quartzite. Finally, in the southern portion of large stain Feature 21, a dense cluster of cryptocrystalline and quartzite debitage (n = 438) was identified in conjunction with a heavily oxidized 1-x-2-m area (307-308N 205E). Further, although unrelated to retooling, these two units also exhibited a distinct peak in mass of unidentified bone, both burned and unburned, as well as a spike in the number of large pieces of burned and unburned pronghorn bone and of rabbit bone, mostly unburned. This concentration of rabbit bone is the only one of five in the excavations which contained burned bone, although a mere one-quarter of this small cluster is burned.

In addition to the debitage and chipped stone tool clusters indicative of retooling through lithic reduction or resharpening, the presence of spokeshaves and U-shaped abraders might also signal retooling through the production of new

arrow shafts or the reworking of broken shafts. These two artifact types are few in number, and, except for the spokeshave in Feature 21, none were directly associated with the flintknapping areas. Generally, spokeshaves were found around Feature 6A, and abrader fragments were scattered between the two main faunal processing areas. Distribution of the abrader fragments, however, may have more to do with final use as hearth heating elements rather than as shaft abraders.

Decorative artifacts of bone and clay were recovered, including four groove-and-snap bone beads or bead fragments, one clay bead, and two canine tooth pendants. Two of the bone beads and both pendants, all fragmented or exhausted, were discarded and probably replaced as part of the retooling focus of this locale. Bone bead manufacture debris was found. The three complete beads, two bone and one clay, were probably lost rather than discarded. While the clay bead was found west of Feature 6A, five of the six decorative bone items were discovered in and immediately east of the main bone processing area. The two tooth pendants were recovered among the marrow-extracted bone and are assumed to have been discarded because of their worn suspension grooves.

DISCUSSION

Results from investigations at the Carter Lease site have contributed to the regional database, most notably in the research domains of chronology, cultural dynamics, and subsistence.

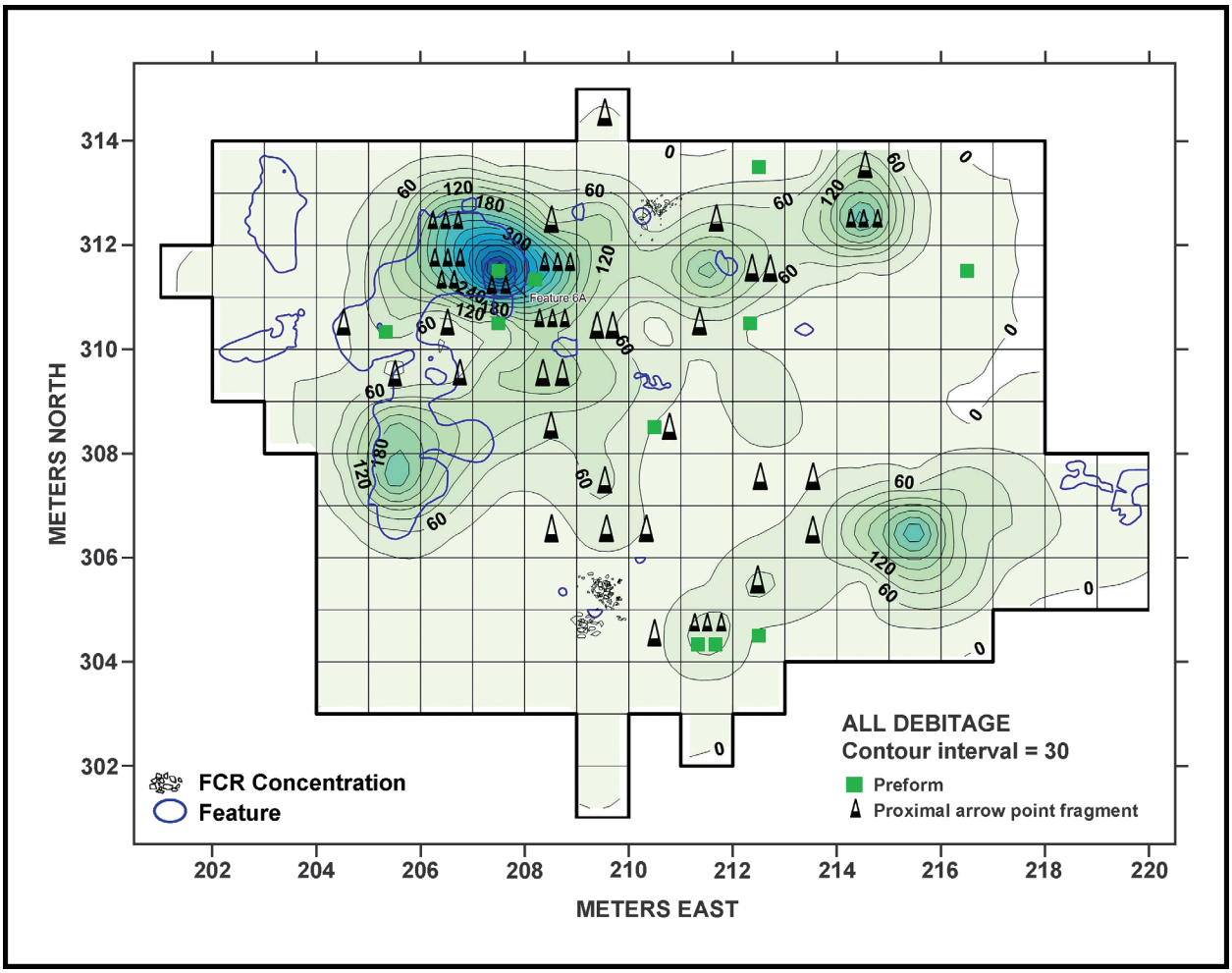


Figure 10: Distribution map of debitage with chipped stone tools associated with retooling in the excavation block.

With regard to chronology, few other sites in this region are known to date to a similar time period as the 200 to 300 year-old pronghorn processing component. For example, the Bureau of Land Management (BLM) Kemmerer Field Office Class I overview lists only two previously investigated Protohistoric sites, the Bridger Antelope Trap (48UT1) and the Bridger Gap Burial (48UT920) (BLM 2004:37). Additionally, six historic sites are listed in this Class I document as Historic Native American (BLM 2004:Table 4). Other regional overviews (Pastor et al. 2015; Thompson and Pastor 1995) also document the low number of professionally investigated Protohistoric sites in this region. Kautzman (2008) has undertaken the largest and most recent study of similarly aged regional sites, building up a comparative database by examining a wide area including the Green River and Great Divide basins and the Rock Springs Uplift. He has identified 26 Contact period, two Historic period, and eight rock art sites which could be broadly contemporaneous with the Carter Lease site use episode based on the presence of European goods, the nature of the site, and radiocarbon dates (Kautzman 2008:Table 1).

More sites of this age, however, probably exist unrecognized on the landscape and in our recorded sites database. They can be difficult to identify. Reed and Metcalf (1999:151), for example, have stated,

> . . . one of the primary problems in Protohistoric-era archaeology is precise chronometric dating. Radiocarbon determinations often have calibrated ranges covering many decades, and may have ranges extending to the present. That calibrated ranges span decades or centuries is seldom a problem in the more ancient archaeological eras, but is problematic when dealing with contexts that can be interpreted with historic documentation.

This lack of refinement within radiocarbon data can encourage reliance on the presence or absence of European goods as a chronological indicator, but sole use of this technique as a time indicator can be problomatic as well. Protohistoric sites are often distinguishable from Late Prehistoric sites only by the presence of European goods when radiometric dating is not possible or sufficiently fine-tuned. Some European items, however, are known to deteriorate beyond recognition with exposure, as is the case with metal, or they may be collected by artifact hunters. In the case of the Carter Lease site, for example, if the bone exhibiting a metal cutmark had deteriorated, dating would have been much less clear. Further, many European goods were probably curated by Native Americans for long periods of time, rather than discarded when they initially broke or wore out. Specifically with regard to the project region, Scheiber and Finley (2012:351) ask,

> How do we define these centuries without overreliance on artifact ratios (that is, marking time by the relative percentages of indigenous to introduced materials)? There is a tacit assumption that people uncritically chose European-manufactured objects soon after they became available. These artifacts become diagnostic index fossils, not hallmarks of change in the resulting interpretations. In fact, native people often chose to use a mixture of old and new materials following access to metal and glass objects. Matching material change to social change is thus difficult when artifact assemblages of the 1830s could be very similar to those from the 1530s, but originating from very different social, economic, and political contexts.

To explore and illustrate the difficulties with identification of Protohistoric or Early Historic period sites on the landscape, 19 Lincoln and Sweetwater county sites in the Wyoming Cultural Records Office database potentially dating to 650 BP and later were examined (Pool 2013). For the most part, types of European goods on these 19 sites include only one or a few metal artifacts, beads, pieces of flaked glass, or pieces

of horse bone with cutmarks made by a metal tool. If the the metal or the cutmarked bone had deteriorated or if these artifacts were picked up by artifact collectors before site recording, 10 sites would have been categorized as dating only to the Paleoindian (n = 2), Archaic (n = 5), Late Prehistoric (n = 2), or Historic (n = 1) periods, with nine sites probably unknown in age, rather than also associated with the Protohistoric or Early Historic periods. Deprived of their European goods or evidence of them, 19 sites containing valuable information on Protohistoric period settlement pattern and artifact assemblage characteristics would have been associated only with an earlier time period or categorized as unknown in age, demonstrating how easily sites of this age can be obscured in the cultural record.

Next, excavations at the Carter Lease site have also contributed in the area of cultural dynamics, with obsidian and ceramic sourcing providing the best evidence by which to examine trade or travel routes represented at this site. Two hundred fifty obsidian flakes were found, divided among 2 percent SG 2 flakes, 31 percent SG 3 flakes, and 67 percent SG 4 flakes. In addition, 18 obsidian bifaces and three obsidian flake tools were recovered. Of this total, 36 artifacts (21 flakes and 15 arrow points) underwent quantitative (n = 20) or integrated net peak ratio (n = 16) analyses for sourcing (Hughes 2015). Thirty-two items including arrow points and debitage originated at the Malad source in southeast Idaho, while the obsidian of a complete tri-notched point came from Teton Pass in northwest Wyoming. In addition, two pieces of obsidian debitage and the obsidian of an arrow point margin were traced to the Black Rock area and Wild Horse Canyon, both in southwest Utah.

Importantly, obsidian sourcing provides a method of exploring the dynamics of culture change before and after colonization of the region. Scheiber and Finley (2011b) recently compiled obsidian source data for the Greater Yellowstone Ecosystem (GYE), the central Rocky Mountains, and the Wyoming Basin to examine alterations through time in regional mobility and exchange. During an earlier study limited to southwest Wyoming, Thompson et al. (1997) had found no increase in the amount of non-local obsidian on Protohistoric sites compared with Late Prehistoric sites; this result was unexpected because of the assumption of increased mobility related to introduction of the horse with the associated potential of transporting larger amounts of obsidian and greater contact with both indigenous and European people. Investigating the opposite point of view, Scheiber and Finley (2011a:373) hypothesized:

> . . . access to . . . resources decreased during the transition from precontact to postcontact periods with the breakdown of traditional exchange networks as a result of territory reduction, impediments or restrictions to certain travel corridors, epidemic diseases and increasing economic involvement in the fur trade.

Scheiber and Finley found the southwestern Wyoming Archaic components were dominated by southeastern Idaho obsidians (2011a:Table 5). During the Late Prehistoric period, their results suggested regional mobility and exchange increased based on source diversity and the relatively large number of samples from each of the wide variety of sources. In contrast, and similar to Thompson et al.'s (1997) finding, they (2011a:386) confirmed that sample

> . . . diversity and evenness dramatically decrease during the Historic period in both areas of Wyoming (the two areas in which we have sourced obsidian artifacts from post-contact period sites.) Seventy percent of Historic period obsidian from southwest Wyoming originates in Southeast Idaho, whereas 90 percent of northwest Wyoming obsidian is from the Yellowstone Plateau.

This distribution matches ethnographic accounts (e.g., Shimkin 1986) of the Mountain

Shoshone living on the Yellowstone Plateau and the Plains Shoshone inhabiting southwest Wyoming and southeast Idaho. Scheiber and Finley (2011a) use this change in source area diversity as an indication of ethnogenesis at this time. In addition, they use the presence of obsidian at the Historic period sites (post-AD 1805) to demonstrate traditional technology continued in indigenous Shoshone communities long after the availability of European goods (Scheiber and Finley 2011a:389).

The sourced obsidian distribution for the main use episode at the Carter Lease site fits with Scheiber and Finley's (2011a) Historic period obsidian distribution for southwest Wyoming. Eighty-nine percent of the sampled Carter Lease site obsidian is from southeastern Idaho, underlining the idea that Wyoming Basin travel and connections during this time were primarily east-west instead of north-south, perhaps constrained because of some or all of the reasons proposed by Scheiber and Finley (2011a). Only one artifact (3 percent), a complete tri-notched point, was sourced to northern Wyoming. An additional eight percent of the Carter Lease site sourced obsidian is from southwest Utah and was probably acquired through exchange networks and not direct procurement, because of the distances involved.

Scheiber and Finley (2011b) have also begun to use instrumental neutron activation analysis (NAA) to source ceramics as a means of exploring change in mobility before and after colonization. They have reported results of sampling for four Wyoming sites, one in the Wyoming Basin and three in the GYE, all dating between AD.1500 and the 1800s. Because the Wyoming Basin is mostly Tertiary sedimentary geology and the GYE exhibits extrusive igneous geology, they believe locally produced wares should be readily distinguishable in each region. Scheiber and Finley (2011b) state NAA results will mimic those of the obsidian sourcing study, with greater diversity in clay sources before European contact and less diversity after European contact. Fifty sherds from the four sites were analyzed, and, although the sample size was small, they report (2011b:182) results showing "little overlap exists between sites or regions, again suggesting local production with little exchange." They conclude the ceramics "with obsidian artifacts indicate that the Wyoming Basin and GYE were socially distinct areas during the early contact period" (Scheiber and Finley 2011b:182).

At the Carter Lease site, petrographic analysis of two ceramic sherds revealed they are sandy clay containing poorly sorted sediments from volcanic materials. According to Hill (2015), this source is a new body composition result for petrographic analyses of Protohistoric and Historic ceramics from Wyoming. Hill (personal communication, 2014) believes the sherds are made of local clay containing the mix of volcanic rocks he observed. It is most likely the observed volcanic inclusions may have eroded from a secondary deposit within a tuff, and, if not local, the clay containing such material could have been acquired from a variety of places across the Wyoming Basin or outside the basin. In any case, the source remains unknown, but the identification of ceramics at this site containing volcanic sediments probably derived from a secondary source suggests pinning down what constitutes a locally produced or imported ware in the Wyoming Basin will in some cases be more complex than classification of a sedimentary or volcanic clay source.

Finally, excavations at this site have also contributed to the regional database with regard to subsistence, and the pronghorn-related use episode typifies the Shoshonean Game Processing Area property type (Section F, page 2) of the National Register of Historic Places multiple property nomination draft for Late Prehistoric and Early Historic Shoshonean Occupation in Wyoming (Spath 1988). The relatively large number of animals processed at a single location during an apparent short-term, focused use episode is suggestive of mass procurement, most

likely the result of communal hunting using a pronghorn trap or corral. At least some of the pronghorn carcasses were transported complete to this processing area, suggesting the animals were probably killed close although not at the excavation locale. Remains of a trap were not observed in the excavations, which might be a result of poor preservation, but better locations for a corral exist nearby. Bison and pronghorn hunting literature (e.g., Hockett and Murphy 2009; Kornfeld et al. 2010:215-289; Lubinski 1999) illustrates a range of variation in proximity of kill and processing sites to each other, and Spath (1988) also observes Shoshonean game processing areas might occur in isolation from communal procurement sites. Most likely, the two locales were situated near each other.

Arrow point fragments offer some evidence of the excavated area as a non-kill/non-corral location. Arrows in the excavations are dominated by 65 percent basal fragments, followed by 15 percent complete points, 10 percent tips, and 10 percent midsections or other fragments. That proportional distribution mimics what was found from all three cultural levels of the Trappers Point site (Francis and Widman 1999:166) as well as the general guidelines (50 to 60 percent bases) used by Hockett and Murphy (2009) in the north-central Great Basin for identifying point clusters indicative of a non-corral setting. Corral locations or kill sites are more likely to exhibit a higher percentage of tips and midsection fragments as well as complete points (Hockett and Murphy 2009). Obvious exceptions to this proportional distribution exist, of course, including the transportion of tips inside animal bodies to the processing site as well as the co-location of the processing site with the kill location.

With 14 adult pronghorn and three fawns identified, the Carter Lease site meets the standard suggested by Lubinski (2013) for a pronghorn bonebed, using a threshold of five pronghorn procured within two days. As of the year 2000, six sites in southwestern Wyoming had been identified as pronghorn bonebeds (>60 percent of NISP and > 5 MNI) (Lubinski 2000). Five are Late Prehistoric or later in age; Stratum V at the Trappers Point site dates to the Archaic period. With the exception of the latter site, seasonality estimates for the occupations are fall to winter, with kills probably having occurred between October and January (Lubinski 2000:113). Mass procurement at this time of year makes sense based on large herd size and the best hides. With recovery of this recent event from the Carter Lease site as well as newly identified Archaic and Late Prehistoric mass pronghorn spring kills at the Ruby Pipeline project's Bathtub site (Nelson 2015), more data to investigate the issue have been contributed to the pool of sites meeting the criteria for pronghorn mass procurement.

ACKNOWLEDGEMENTS

Thanks to Ruby Pipeline, LLC, for funding this work and to the landowners, who generously agreed to donate the artifacts to the University of Wyoming Archaeological Repository for future researchers. Laurie Boros of the FERC and Lynn Harrell of the Kemmerer BLM provided useful feedback on the report from which this article is drawn. Metcalf staff analysts included Jennifer Borresen Lee (fauna), Jenny Stahl (chipped and non-chipped stone), and Gail Lincoln (ceramics), Anne McKibbin, Patrick O'Brien, Preston Debele, and Jesse Clark produced graphics. Outside specialists graciously accomodated a tight schedule, and Casey Dukeman, Mark Mitchell, David Rhode, and Danny Walker generously lent their expertise in various aspects of analysis. Finally, thanks to Mike Metcalf for his useful comments and advice.

REFERENCES CITED

Bureau of Land Management (BLM)

2004 *Cultural Resources Class I Regional Overview for the BLM Kemmerer Planning Area, Wyoming*. Prepared by the U.S. Department of the Inte-

rior, Bureau of Land Management, Kemmerer Field Office, Wyoming.

Dobschuetz, Kris, Rebecca Halbmaier, Steve Shelley, and Steve Swanson (editors)
2010 *A Cultural Resource Survey for the Ruby Pipeline Project: Wyoming Segment – Lincoln and Uinta Counties, Wyoming*. Environmental Planning Group, Cheyenne. Submitted to the Federal Energy Regulatory Commission, Washington, D.C. On file at the Bureau of Land Management Kemmerer Field Office, Kemmerer, Wyoming.

Francis, Julie E., and Yvette Widman
1999 Variability in the Archaic: Projectile Points from Trappers Point. In *The Trappers Point Site (48SU1006): Early Archaic Adaptations in the Upper Green River Basin, Wyoming*, edited by Mark Miller, Paul Sanders, and Julie Francis, pp. 139-170. Cultural Resource Series, No. 1. Office of the Wyoming State Archaeologist, Laramie.

Frison, George C.
1971 Shoshonean Antelope Procurement in the Upper Green River Basin, Wyoming. *Plains Anthropologist* 16:258-284.

Frison, George C., Michael Wilson, and Danny N. Walker
1978 *The Big Goose Creek Site: Bison Procurement and Faunal Analysis*. Occasional Papers on Wyoming Archaeology No. 1. Office of the Wyoming State Archaeologist, Laramie.

Haspel, Howard H.
1984 A Study of Shoshonean Ceramics of Wyoming: The Bugas-Holding Ceramic Assemblages. *The Wyoming Archaeologist* 29:25-40.

Hill, David V.
2015 Petrographic Analysis of Ceramics. In *Ruby Pipeline Project: Final Report of Excavations, Lincoln County, Wyoming, Volume 7: Site 48LN2041: the Carter Lease Site*, edited by Kelly J. Pool, pp. 189-192. Metcalf Archaeological Consultants, Inc., Eagle, Colorado. Prepared for Ruby Pipeline, LLC. On file at Wyoming Cultural Records Office, Laramie.

Hockett, Bryan, and Timothy W. Murphy
2009 Antiquity of Communal Pronghorn Hunting in the North-Central Great Basin. *American Antiquity* 74:708-734.

Hughes, Richard E.
2015 Obsidian Sourcing. In *Ruby Pipeline Project: Final Report of Excavations, Lincoln County, Wyoming, Volume 1: Project Background and Overview, Methods, and Specialist Reports*, edited by Kelly J. Pool, Nicole Sauvageau, Amy Nelson, and Naomi Rintoul, pp. 133-142. Metcalf Archaeological Consultants, Inc., Eagle, Colorado. Prepared for Ruby Pipeline, LLC. On file at Wyoming Cultural Records Office, Laramie.

Kautzman, Matthew D.
2008 Cultural Change within the Western Frontier: Evidence from Southwest Wyoming. Unpublished MA Plan B Paper, Department of American Studies, University of Wyoming, Laramie.

Kornfeld, Marcel, George C. Frison, and Mary Lou Larson
2010 *Prehistoric Hunter-Gatherers of the High Plains and Rockies* (3rd ed.). Left Coast Press, Walnut Creek, California.

Larson, Mary Lou, and Marcel Kornfeld
1994 Betwixt and Between the Basin and the Plains: The Limits of Numic Expansion. In *Across the West: Human Population Movement and the Expansion of the Numa*, edited by David B. Madsen and David Rhode, pp. 200-210. University of Utah Press, Salt Lake City.

Lee, Jennifer Borresen
2015 Faunal Remains. In *Ruby Pipeline Project: Final Report of Excavations, Lincoln County, Wyoming, Volume 7: Site 48LN2041: the Carter Lease Site*, edited by Kelly J. Pool, pp. 105-176. Metcalf Archaeological Consultants, Inc., Eagle, Colorado. Prepared for Ruby Pipeline, LLC. On file at Wyoming Cultural Records Office, Laramie.

Lubinski, Patrick M.
1999 The Communal Pronghorn Hunt: A Review of the Ethnographic and Archaeological Evidence. *Journal of California and Great Basin Anthropology* 21:158-181.
2000 Prehistoric Pronghorn Hunting in Southwest Wyoming. In *Pronghorn Past and Present: Archaeology, Ethnography, and Biology,* edited by Jana V. Pastor and Patrick M. Lubinski, pp. 109-118. Plains Anthropologist Memoir 32.
2013 What is Adequate Evidence for Mass Procurement of Ungulates in Zooarchaeology? *Quaternary International* 297:167-175.

Mayer, James, William Eckerle, Doug Kolb, Orion Rogers, and Sasha Taddie
2015 Geoarchaeological Studies. In *Ruby Pipeline Project: Final Report of Excavations, Lincoln County, Wyoming, Volume 1: Project Background and Overview, Methods, and Specialist Reports*, edited by Kelly J. Pool, Nicole Sauvageau, Amy Nelson, and Naomi Rintoul, pp. 39-128. Metcalf Archaeological Consultants, Inc., Eagle, Colorado. Prepared for Ruby Pipeline, LLC. On file at Wyoming Cultural Records Office, Laramie.

Metcalf, Michael D., and Kelly J. Pool
2015 Chronology. In *Ruby Pipeline Project: Final Report of Excavations, Lincoln County, Wyoming, Volume 8: Project Synthesis*, edited by Kelly J. Pool, pp. 3-28. Metcalf Archaeological Consultants, Inc., Eagle, Colorado. Prepared for Ruby Pipeline, LLC. On file at Wyoming Cultural Records Office, Laramie.

Mueller, Jenn, and James Firor
2009 Excavations at the Long Knife Site (5MF5827). In *The Rockies Express Pipeline Archaeological Data Recovery Project, Moffat County, Colorado, Volume 5,* edited by Alan Reed. Alpine Archaeological Consultants, Inc., Montrose, Colorado. Submitted to Bureau of Land Management, Denver, Colorado.

Nelson, Amy (editor)
2015 *Ruby Pipeline Project: Final Report of Excavations, Lincoln County, Wyoming, Volume 5: Site 48LN3997, The Bathtub Site.* Metcalf Archaeological Consultants, Inc., Eagle, Colorado. Prepared for Ruby Pipeline, LLC. On file at Wyoming Cultural Records Office, Laramie.

Pastor, Jana V., Stacy R. Goodrick, Brent A. Buenger, David Johnson, and David Darlington
2015 *A Chronicle of Past Land Use in the Upper Green River Basin: Class I Inventory Report for the LaBarge Platform*, *Sublette and Lincoln Counties, Wyoming.* Western Ar-

chaeological Services, Inc., Rock Springs, Wyoming. Prepared for BLM Pinedale and Rock Springs field offices and AECOM.

Pool, Kelly J.
2013 The Carter Lease Site in Context: Wyoming Basin Evidence for Pre- and Post-Contact Shoshonean Occupations. Paper presented at the 71st Annual Plains Anthropological Conference, Loveland, Colorado.

Pool, Kelly J. (editor)
2015 *Ruby Pipeline Project: Final Report of Excavations, Lincoln County, Wyoming, Volume 7: Site 48LN2041: the Carter Lease Site*. Metcalf Archaeological Consultants, Inc., Eagle, Colorado. Prepared for Ruby Pipeline, LLC. On file at Wyoming Cultural Records Office, Laramie.

Rapson, David J.
1990 Pattern and Process in Intra-Site Spatial Analysis: Site Structural and Faunal Research at the Bugas-Holding Site. Unpublished Ph.D. dissertation, Department of Anthropology, University of New Mexico, Albuquerque.

Reed, Alan D., and Michael D. Metcalf
1999 *Colorado Prehistory: A Context for the Northern Colorado River Basin*. Colorado Council of Professional Archaeologists, Denver.

Russell, Osborne
1955 *Journal of a Trapper*. University of Nebraska Press, Lincoln and London.

Scheiber, Laura, and Judson Bird Finley
2011a Obsidian Source Use in the Greater Yellowstone Area, Wyoming Basin, and Central Rocky Mountains. *American Antiquity* 76:372-394.
2011b Mobility as Resistance: Colonialism among Nomadic Hunter-Gatherers in the American West. In *Hunter-Gatherer Archaeology as Historical Process*, edited by Kenneth Sassaman and Donald Holly, Jr., pp. 167-189. University of Arizona Press, Tucson.
2012 Situating (Proto) History on the Northwestern Plains and Rocky Mountains, Chapter 29. In *The Oxford Handbook of North American Archaeology*, edited by Tim Pauketat, pp. 347-358. Oxford University Press, Oxford.

Shimkin, Demitri B.
1947 Wind River Shoshone Ethnogeography. *Anthropological Records* 5:245-288. University of California, Berkeley.
1986 Eastern Shoshone. In *Great Basin*, edited by W. L. D'Azevedo, pp. 308-335. Handbook of North American Indians, Volume 11. Smithsonian Institution, Governmental Printing Office, Washington, D. C.

Smith, Anne M.
1974 *Ethnography of the Northern Utes*. Papers in Anthropology No. 17. Museum of New Mexico Press, Santa Fe.

Spath, Carl
1988 National Register of Historic Places Multiple Property Nomination Draft for Late Prehistoric and Early Historic Shoshonean Occupation in Wyoming. Electronic document, http://wyoshpo.state.wy.us/pdf/shoshone.pdf, accessed June 13, 2013.

Thompson, Kevin W., and Jana V. Pastor
1995 *People of the Sage: 10,000 Years of Occupation in Southwest Wyoming*. Archaeological Services, Western Wyoming Community College, Cultural Resource Management Report No. 67. Rock Springs, Wy-

oming.

Thompson, Kevin W., Steven Creasman, and Jana V. Pastor

1997 Wyoming Basin-Yellowstone Plateau Interaction: A Study of Obsidian Artifacts from Southwestern Wyoming. *Tebiwa* 26(2).

Kelly J. Pool
Metcalf Archaeological Consultants, Inc.
P.O. Box 899, Eagle, CO 81631

DRESSED TO KILL: HUMAN BODY ARMOR IN PLAINS BIOGRAPHIC ROCK ART

by
JAMES D. KEYSER

Despite scattered ethnohistoric and ethnographic reports of Northern Plains Indians using leather body armor for their horses and wearing it on their own bodies (e.g., Burpee 1909:110-111; Moulton 1988:150; Secoy 1992:46-47; Wissler 1910:163), there are no surviving ethnographic specimens of such armor. Furthermore, until recently, what little was known of its form and construction came from a few ethnohistoric reports (many from Spanish observers on the Southern Plains) and the Segesser I hide painting, which shows a marauding force of nine mounted Indians[1] attacking a palisaded village somewhere in the Southern Plains or adjacent Southwest (Hotz 1991). Recent research, however, (e.g., Greer et al. 2019; Mitchell 2004) has shed significant light on horse armor, including how it was constructed and how and when it was used. The same has not yet been done for warriors' personal body armor, despite recent site reports showing instances where various humans appear to be wearing such garments (e.g., Greer et al. 2019; Keyser and Poetschat 2014:103-106; 2015:26-27, 144; Kaiser and Keyser 2015:177-178; Loendorf 2013:74-75). This report summarizes the current available rock art information about personal body armor and compares its form and construction to what little information we have from the early historic record.

HUMAN BODY ARMOR

A few warriors in Biographic rock art are clearly shown wearing personal body armor, presumably made of tanned hide, which was worn primarily before use of firearms became commonplace. Such armor was reported ethnohistorically. Writing in the 1770s, Mathew Cocking was shown "a coat without sleeves[,] six-fold leather quilted" used by "Snake" (Shoshone?) enemies of the Cree, and he saw similar jackets, reportedly made of moose hide, in use among the Blackfoot (Burpee 1909:110-111). About a decade later, Umfreville observed Plains warriors with "coats ... made of many folds of dressed leather, which are impenetrable to the force of arrows" (Secoy 1992:46), and in 1805 Lewis and Clark described both personal body armor and horse armor for the Shoshone as being "many folds of dressed antelope skin, united with glue and sand ... covering their own bodies and those of their horses. These are sufficient against the effects of the arrow" (Secoy 1992:46-47; see also Moulton 1988:150)

Such body armor is, in fact, illustrated on the Segesser I hide painting, worn by several of the mounted warriors attacking a palisaded village somewhere on the Southern Plains or in the Southwest (Hotz 1991). Several Segesser riders wear a long leather armor coat covering their upper body and extending below their waist (Figure 1). The coats have short sleeves and a collar, and are split partially up the midline—in both front and back—so they drape over the horse's back and down the sides of

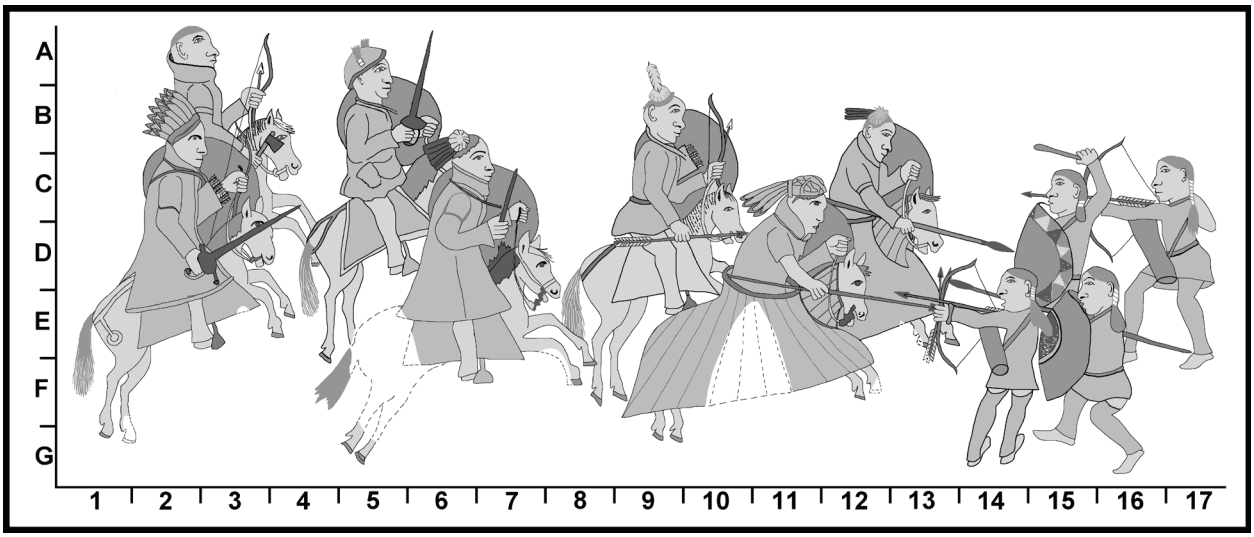


Figure 1: A battle between mounted and pedestrian forces is portrayed on the Segesser I hide painting, which dates about A. D. 1700. The two lead horses of the attacking force (at left) wear armor mimicking almost exactly the armor shown in Plains rock art (cf. Figures 3, 4, 6). More importantly, all riders wear leather armor coats, several of which show a high collar, reinforced upper sleeves, and a split to permit a man to wear it while on horseback. Also note the weaponry used by both forces, which includes swords, bows and arrows, clubs, lances, knives, hatchets, and large shields. Drawing by author from published photograph (Hotz 1991).

its body for ease of use while riding (Figure 1D/1). While this painting gives no clue about the actual method of construction, the visible form (for both personal body armor and horse armor) closely mimics what is pictured in rock art. Armored warriors in the Segesser painting each carry a shield and their weapons include bow and arrows, sword, knife, and spear. Some warriors even carry multiple weapons. This, too, is consistent with the armored warriors' armaments portrayed in Plains rock art (Figure 2), where more than half of the ten known examples are drawn in scenes involving swords and metal axes, but only two are associated with firearms. In addition, two of the eleven armored warriors carry multiple weapons (Figure 2d, g; Table 1).

Personal body armor would have been particularly effective against most of the "pre-gun" armaments common to Plains Indian warfare. Spears and arrows (even those with metal points), would not likely have penetrated deeply enough to cause fatal wounds when forced to go through the multiple layers of specially treated leather, especially for garments reinforced with sand and small pebbles. Equally important, such armor coats would have considerably lessened the blow from stone or wooden clubs, whose Protohistoric period status as a primary weapon of warfare (Keyser 2018a) likely carried over into the early Historic period. Likewise, they must also have been effective against swords and axes, since these are the weapons carried by either antagonist or protagonist in several scenes involving armor-wearing warriors (Figures 2j, 3).

LEATHER GARMENTS

Ten warriors have so far been identified in Northwestern Plains rock art as wearing personal body armor obviously in the form of a leather coat, jacket, or poncho. An additional warrior wears what can only be reasonably identified as a long leather poncho-like garment decorated with vertical lines[2] (Figures 2, 4, 5). One of these body-armored warriors is mounted on a horse, which is also armored in the same fashion (Figure 4); three others are horsemen (Figure 2a-c); and the remaining seven are pedestrians. Two of these pedestrians fight enemies riding

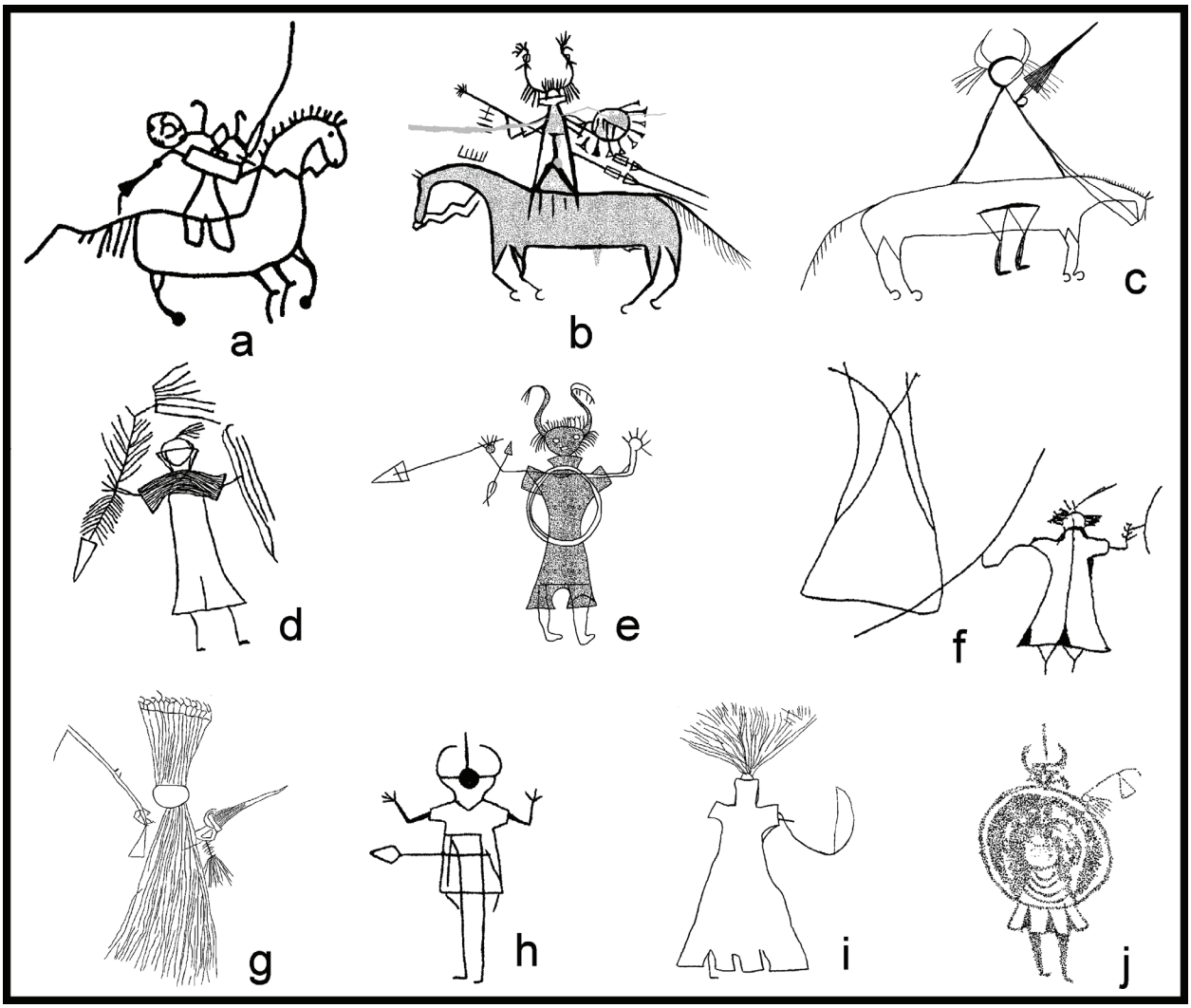


Figure 2: Leather armor coats illustrated in Plains rock art. a, North Cave Hills (39HN217); b, Tolar (48SW13375); c, Writing-On-Stone (DgOw-21); d, Warrior Woman (24YL1358); e, Horned Headgear (24ML508); f, Fontanelle Reservoir (48LN18); g, Musselshell site (24ML1059); h, White Mountain (48SW302); i, Lucerne (48SW82); j, Goffena (24ML408). Compare weaponry shown with these warriors to the weapons illustrated in Figure 1. Images b, e, g adapted by author from originals published by Loendorf (2012, 2013; Loendorf and Olsen 2003), f is sketch published by Dibble and Day (1963), others are direct tracings (a, h, i) and photo-tracings (c, d) by author.

armored horses (Figures 3, 6), and one of these combatants engaging an armored horse carries a large full-body size shield in addition to his body armor (Figure 6). Two riders and one pedestrian carry small, equestrian-period shields in addition to their body armor (Figure 2a, b, e). Weapons carried by the armored warriors include spear (5), sword (3), bow and arrow (2), socketed Spanish lance with extra foreshaft (1), Missouri war axe (1), and gun (1). Weapons used by enemies against whom these men are fighting include bows and arrows, swords, lances, guns, and a Missouri war axe (Figures 3, 7; Table 1). Six of these warriors are shown in obvious combat with other foes. One of these men engages with enemies while stealing a horse (Figure 2e; Loendorf 2013). A seventh warrior counts coup on an enemy tipi by striking it with his lance (Figure 2f).

The body armor itself is relatively easy to recognize in most instances and there is a surprising amount of detail depicted as to how the

Table 1: Armaments Associated with Personal Body Armor

	Armored Warrior									Opponent							
Leather Armor	Horse	Horse Armor	Sword	Missouri War Axe	Spanish Lance	Bow	Metal Point	Gun	Lance	Horse	Horse Armor	Sword	Missouri War Axe	Bow	Metal Point	Gun	Lance
39HN217	X		X														X
48SW13775	X				X					--	--	--	--	--	--	--	--
DgOw-21	X		X							--	--	--	--	--	--	--	--
24YL1358						x*			X	X	X	X	X				
24ML508	X						X			X					X	X	
48LN18									X	X							
24ML1049			X					X		--	--	--	--	--	--	--	--
48SW302									X	X		X					
48SW82						X								x*			
24ML408				X						X	X						
24YL419	X	X							X								X
Rod-and-Slat Armor																	
48BH4275										X							
48FR2508 (1)															X		
48FR2508 (2)							X										

x* Indicates recurved bow

armor was constructed in its basic form. Typically, the armor coats have a thin to relatively wide flaring A-line shape. In those cases where it can be determined, the length of most appears to extend from about mid-thigh to below the knee, but two appear to extend almost to the ground (Figure 2g, i). Seven portrayals show a distinctive high collar (Figure 2a, b, d-f, h, i) and three others show the triangular poncho-like garment extending upward to the chin, so the neck is completely covered (Figures 2c, g, 4). Collars range in shape from wide and boxy to tall and funnel-shaped, wider at the top. Two of these just cover the neck, but the other five reach upward to cover the chin and even the lower half of the face. On seven examples, a slit running upward from the garment's hem is clearly shown.[3] Another example from DgOw-21, at Writing-On-Stone, shows the bottom hem of the garment along the side of the horse, with both of the rider's legs protruding out below in such a way it obviously portrays the armor coat laying over the sides of the horse, which would have necessitated such a split.[4] In seven instances, wide, short sleeves (ending at or just slightly above the elbow) are shown, and in two of these, they are part of a broad yoke, which appears to be reinforced or padded to protect the shoulders (Figure 2a, d). One example shows the lower portion of the garment constructed

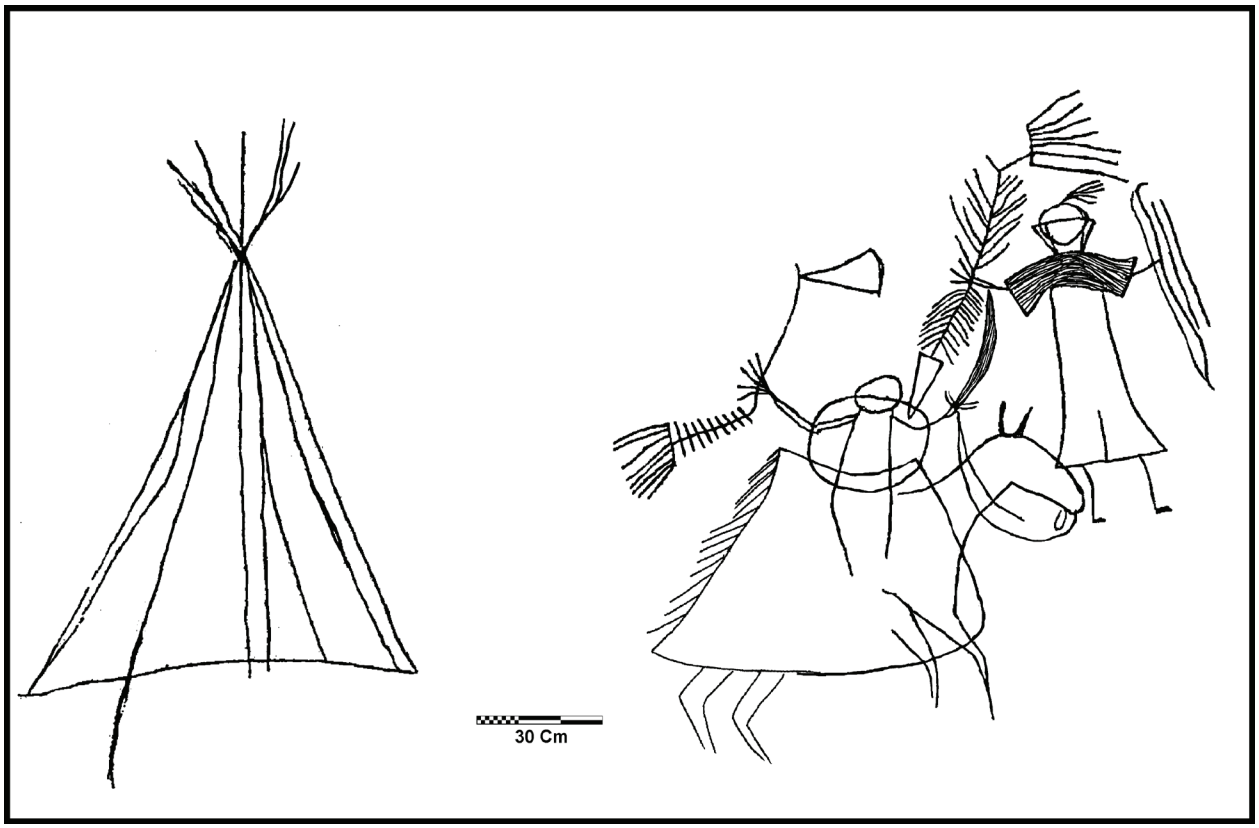


Figure 3: Scene at Warrior Woman site (24YL1358) showing pedestrian wearing armor coat (note central split for use on horseback) fighting shield bearing warrior mounted on armored horse. Note horseman's weapons are Missouri War Axe and broadsword. Photo-tracing made from photographs courtesy of Mavis and John Greer.

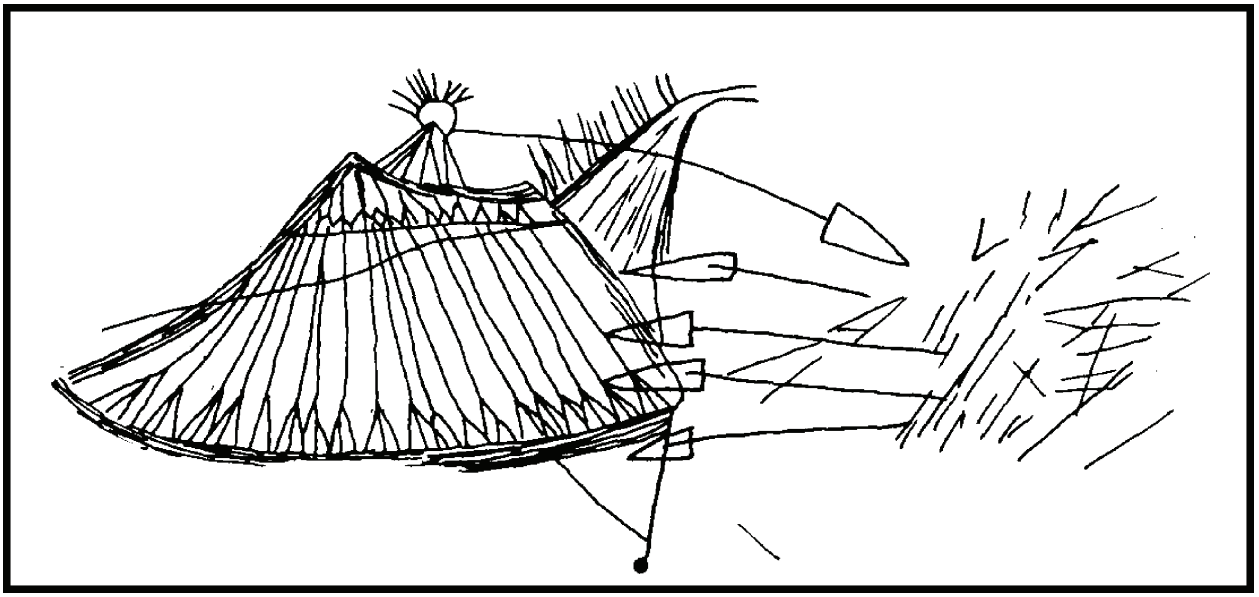


Figure 4: Battle composition at Nordstrom-Bowen site (24YL419) shows armored horse with rider who also wears body armor in combat with enemy force represented by dashes, possible tipis (V- and X-shapes), and rank of large spears. Note two rows of "Crow Feathers" design covering horse armor and similar vertical lines indicating rider's armor coat. Direct tracing by author.

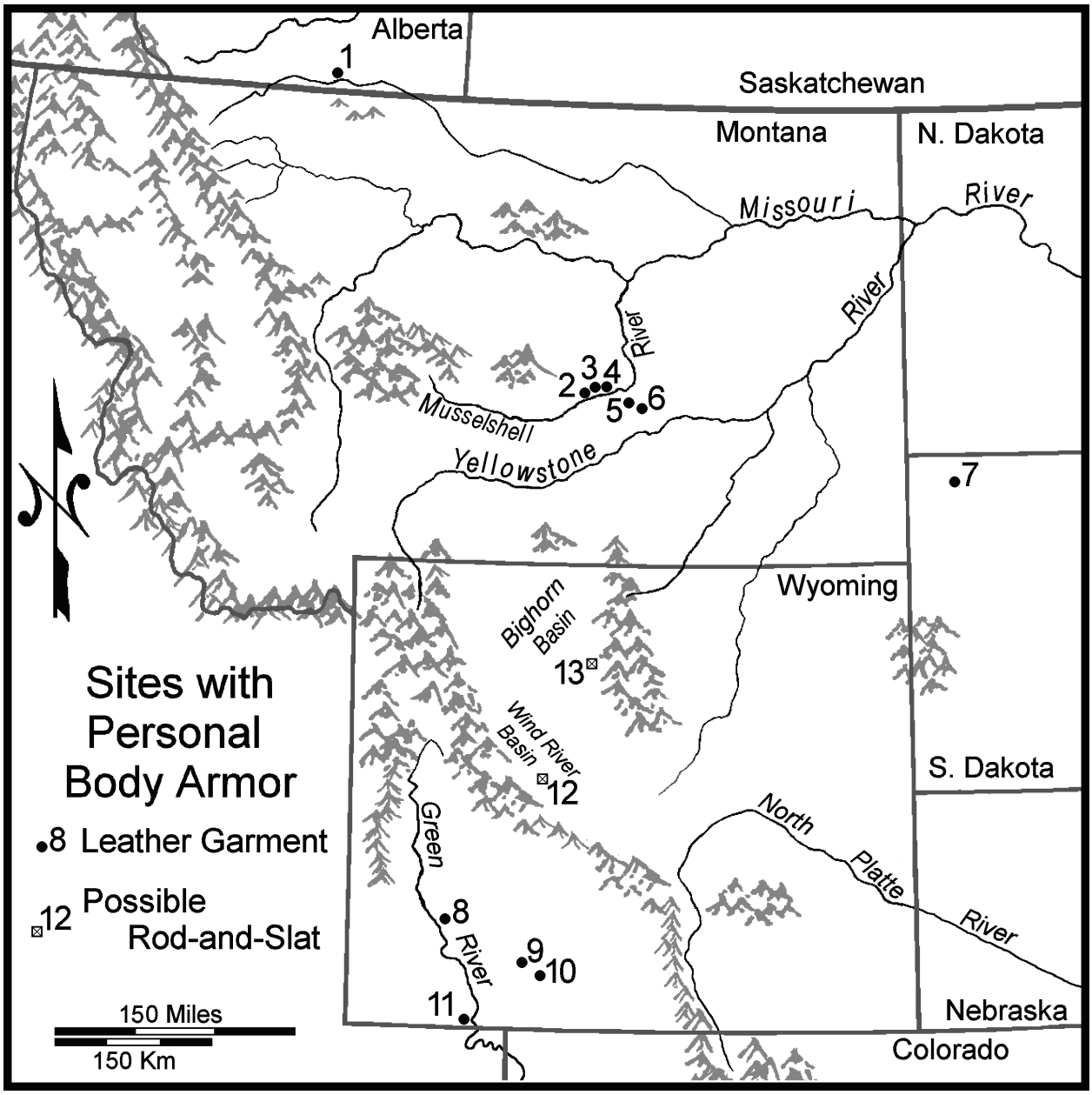


Figure 5: Location of Northern Plains rock art sites with illustrations of armor coats. 1, DgOw-21; 2, 24ML408; 3, 24ML508; 4, 24ML1049; 5, 24YL1358; 6, 24YL419; 7, 39HN217; 8, 48LN18; 9, 48SW302; 10, 48SW13375; 11, 48SW82; 12, 48FR2508; 13, 48BH4275.

of what appear to be overlapping leather slats extending just below the full-body size shield the warrior carries (Figure 2j). The way these slats or strips are illustrated in this pictograph suggests there may have been an underlying garment painted a different color than the slats themselves. Finally, the armor coat worn by the rider of the armored horse is decorated with a pattern of vertical lines converging to meet in the lower half of the warrior's face (Figure 4). These lines mimic the "Crow feathers" decoration on the horse armor itself, suggesting the garment was either covered with appliqued feathers or (more likely) painted with a symbolic feather design. Such a design, for both the horse's and human's armor, likely was meant to invoke the metaphoric speed of a bird's flight. A similar decorative schema may be indicated

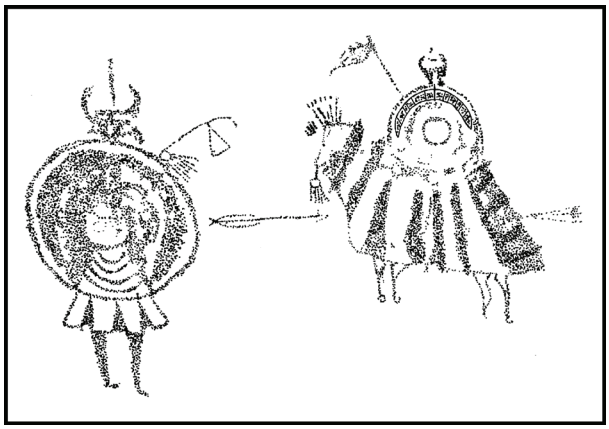


Figure 6: Red painted combat scene at Goffena site (24ML408) shows pedestrian shield bearing warrior (at left) armed with Missouri War Axe decorated with scalp on its handle and a pennant projecting past the blade (cf. Figure 7). Note his armor coat shown as skirt-like appendage of alternating light and dark flaps seen below his shield. Mounted enemy rides armored horse (whose armor shows the same construction pattern of alternating light and dark flaps of material) outfitted with a horse bonnet, forelock ornament, and scalp-decorated bit. Arrows approach the front of the horse and stick in its armor at rear. Photo-tracing from photograph courtesy of Mavis and John Greer.

on the poncho-like armor garment carved at 24ML1049 (Figure 2g).

POSSIBLE WOODEN ROD-AND-SLAT ARMOR

Elsewhere, in many areas of North America, Indian warriors also used wooden rod-and-slat shields and body armor (Jones 2004:20-21, 58-62, 71, 93-94, 107-108, 154-155). Wooden shields were known ethnographically among tribes living in the Eastern Woodlands and the northern Columbia Plateau (Jones 2004:69). Wooden body armor was reported from many areas, the nearest to our area of interest being the Columbia Plateau and Northeastern Woodlands (Jones 2004:58-62, 70-72). On the Northwestern Plains, Loendorf (Loendorf and Mark 2010:6) has suggested rectangular shields filled with vertical line patterns, which are carried primarily by Seedskadee style shield bearers (Keyser and Poetschat 2014:48-49), are wood slat shields made by binding wooden pieces together with cordage and reinforcing them with cross pieces. Although there are neither Plains ethnographic references to such shields nor surviving examples from Plains ethnographic collections, Loendorf's identification seems most reasonable, and it is consistent with the nearly universal occurrence of the vertical line pattern for such rectangular shields.

If these rectangular shields do, in fact, represent wooden rod-and-slat construction, it would not be unreasonable to suggest Plains warriors might also have used wooden body armor. There are three Seedskadee Style warriors who may be shown wearing wooden slat body armor. These three warriors, drawn at Red Canyon (24FR2508) and 48BH4275 in Wyoming, each have their body more or less completely covered from their shoulders to their waist by a series of closely spaced horizontal lines (Figure 8). If these body lines are not merely paint, tattoos, or ribs (portrayed as metaphorical internal organs,

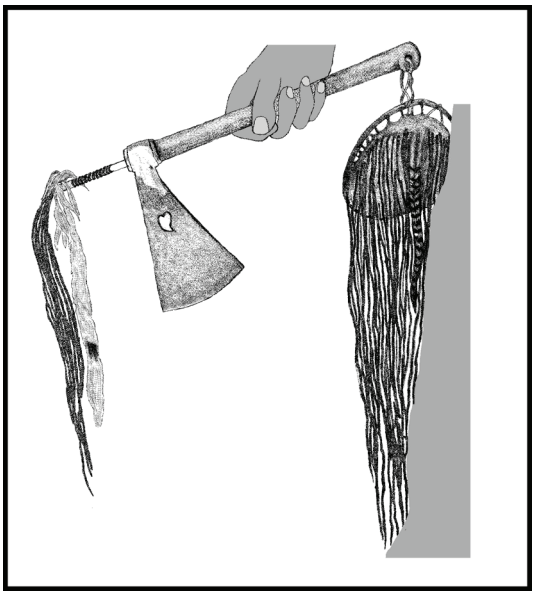


Figure 7: Missouri War Axe illustrated by Karl Bodmer aas part of his 1834 portrait of Hidatsa chief, Addih-Hiddisch (Goetzmann et al. 1984:315). Note pendent scalp on proximal handle end and horsehair and ermine tail pennant projecting out ahead of metal blade. Shaded area at right indicates warrior's body partially obscuring the scalp. Author's drawing from reproduction of Bodmer painting.

as they are on some earlier Late Prehistoric period and later Historic period warriors) they may be body armor constructed in much the same manner as the rectangular, rod-and-slat, wooden shields carried by other Seedskadee Style warriors. Although the lines on the bodies are horizontal while those on the shields are vertical, this difference may be explained by the fact shorter, horizontally oriented slats would have enabled much easier movement and bending of the body for a warrior wearing such wooden armor. Jones (2004:42-44) suggests hair-pipe breastplates may, in fact, derive from body armor of horizontal rod-and-slat construction. Given only three examples, all drawn on simple stick-like anthropomorphs where costume detail is difficult to illustrate, we will need more complete recording of both sites—and hopefully the discovery of other similar drawings at additional sites—before we can verify such horizontal-line body patterns truly represent wooden body armor.

A fourth warrior, at 24ML1049 (Figure 2g), wears a poncho-like body covering of vertical lines running from the ground to his head. At first glance one might think this indicates closely spaced vertical rods or slats bound together to form an armor covering. The problem I have with such an interpretation is that the entire drawing is composed of fine scratches used to indicate several other elements including the stand-up feather headdress, the metal sword blade, and the tab (which comprised feathers, a scalp, or ermine pelts or other streamers) hanging from the sword's handguard in addition to the apparent body armor. Thus, the lines themselves are not unique to the armor, and cannot be confidently identified as indicating wooden rods sewn together to make it. Possibly they indicate a horizontal line design painted or quilted on the garment itself. But instead, it seems equally likely they simply represent a drawing technique used by this particular artist to illustrate his self-portrait. Finally, one additional argument against these being wooden rods or slats is the observation that rod-and-slat body armor of this length (covering the man from the ground up to his neck) would render the warrior essentially immobile.

SEGESSER I AND ITS RELEVANCE

The Segesser I hide painting was collected by the Jesuit priest Philipp von Segesser von Brunegg during his ministry in Sonora, Mexico and sent to his family in Switzerland (Hotz 1991:3-12). The painting, made of several hides

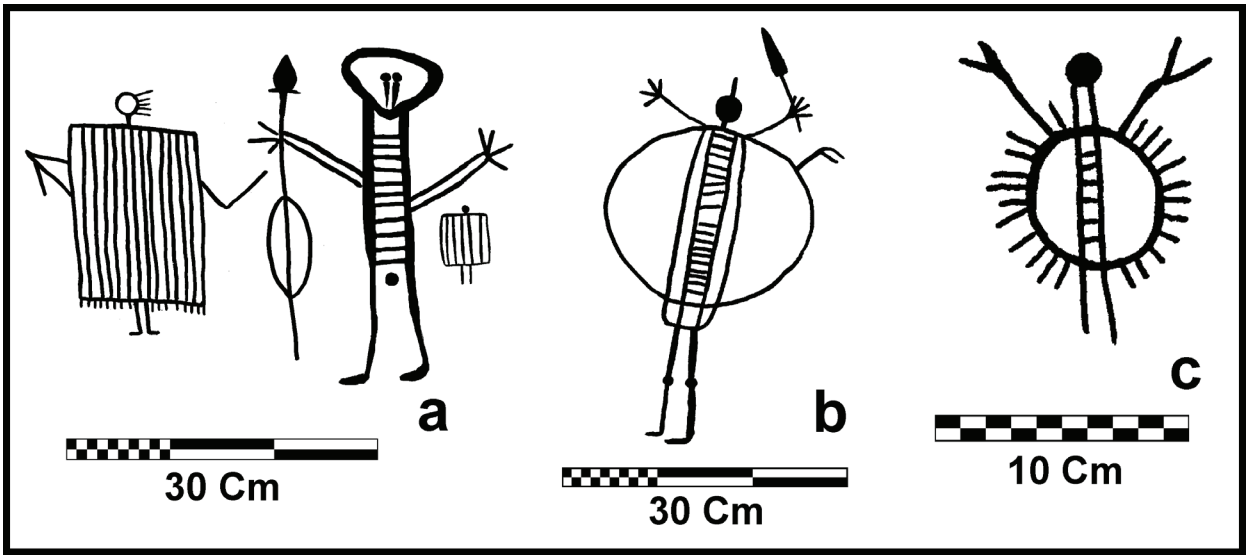


Figure 8: Three Seedskadee-style warriors show horizontal lines across their bodies possibly indicating wooden rod-and-slat armor. a, b, 48FR2508; c, 48BH4275.

stitched together and measuring approximately 1.4 by 6 meters (4.5 by 19.5 feet), documents a battle occurring between about A.D. 1680 and A.D. 1710 (Hotz 1991:53-61). In this fight, a force of mounted Mexican Indians attacks what is apparently an Apache village on the Plains of southern New Mexico. Spearheading the attack are two riders on armored horses leading a group of at least nine warriors. Other attackers were obliterated when part of the painting was destroyed. The lead riders are shown using their long spears to initiate a breakthrough in the battle lines of a similarly sized group of pedestrian Apaches defending their village and a palisaded refugium in which non-combatants have sought protection. Both attackers and defenders use large, full-body size shields, but not all warriors on either side carry a shield. Riders are armed with lances, short swords, bows and arrows, and tomahawks, while pedestrians use lances, bows and arrows, and tomahawks.

Leather horse armor drawn in the Segesser I hide painting mimics exactly the form of horse armor pictured in Northern Plains rock art (cf. Greer et al. 2019), but what concerns us here is that all the horsemen (including those mounted on armored horses) are further protected by leather armor in the form of coats or jackets showing ample sleeves of various lengths and high stiff collars covering the man's neck and lower face. The coats are split up the front and back, so they can be used easily by horsemen. It is these garments that provide insight into those depicted in Northern Plains rock art.

Except for the feather decoration on the armor worn by the rider and his horse at Nordstrom-Bowen (and possibly by the pedestrian at 24ML1049), all major attributes of personal leather body armor drawn in Northern Plains biographic art can be seen in the armor worn by the warriors in the Segesser I hide painting. For example, the length of the Segesser I armor coats ranges from about the knee to mid-calf, similar to all but one of the rock art examples, which seems to show a much shorter coat (Figure 2h). However, the shorter coats with less obvious collars worn by two riders in the background of the Segesser group may be analogous to this shorter garment shown in rock art. The coat's split (for use on horseback) is illustrated on the Segesser I robe in two of the same ways as in rock art. The split is most often shown partially draped over the horse's hind quarters (cf., Figure1D/1; Figure 2a, b). However, the garment is also drawn with no split expressly portrayed. Rather, these are shown as a horizontal boundary along the horse's side with the rider's leg or legs extending out from under the coat (cf. Figure 1E/6; Figure 2c). Only the various ways of showing the pedestrian warriors' split garment (e.g., Figure 2d-f, i, j) do not occur on Segesser, but this is because the armored attacking force includes no pedestrians. The pedestrian defenders wear no obvious armor.

On the Segesser I robe, six mounted attackers have a high collar as part of their armor coat. This feature is portrayed in two basic configurations, one designed to protect primarily the back of the neck (Figure 1B/2, C/11), and the other also covering the front of the neck and lower face (Figure 1C/6). These two variants are similar to the two ways rock art artists drew their armor collars (cf. Figure 2a, e vs. Figure 2b, d). The reinforced shoulder pad, shown as a yoke-like form in rock art (Figure 2a, d), is shown on the Segesser I robe as an extra thickened padded shoulder area with a distinctive border (much like a football player's shoulder pads) on several riders (Figure 1B/2-3, C/6). Sleeves on the Segesser I riders range from full length, extending to the wrist (Figure 1D/2, D/7), to shorter, above-the-elbow types (Figure 1D/11). These latter sleeves are like those shown on rock art body armor.

Finally, armaments of the Segesser I attackers and defenders mimic almost exactly the weaponry associated with Northwestern Plains armor-wearing warriors. With their large shields, spears, swords, bows and arrows, and axes, the Northwestern Plains warriors and their

foes could have been outfitted from the same armory as the Segesser I combatants.

CHRONOLOGY

A few clues allow us to make a reasoned estimate as to the probable age of the body armor depicted in Northwestern Plains rock art. We can do this by establishing the earliest and latest probable dates and then assessing how the armor depictions fit within that span. Initially, we can see every one of these armor-wearing humans (including those with the possible rod-and-slat armor) dates to the Protohistoric or Historic period, based on their association with items known to postdate the Late Prehistoric period. These items—either their own or those of their opponents—include horses, guns, swords, metal axes, metal projectile points, a Spanish lance, and recurved bows (Table 2). In fact, 10 of the 14 examples are either horsemen or fighting with horsemen, strongly suggesting that body armor—at least on the Northern Plains—was adopted as a result of the introduction of this animal.

Table 2: Chronological Indicators with Body Armor

Leather Armor	Horse	Sword	Missouri War Axe	Spanish Lance	Recurved Bow	Metal Point	Gun
39HN217	X	X					
48SW13775	X			X			
DgOw-21	X	X					
24YL1358	xx	xx	xx		X		
24ML508	Xx					X	xx
48LN18	xx						
24ML1049		X					X
48SW302	xx	xx					
48SW82					xx		
24ML408	xx		X				
24YL419	X						
Rod-and-Slat Armor							
48BH4275	xx						
48FR2508 (1)						xx	
48FR2508 (2)						X	

X Armor-wearing warrior possesses
xx Opponent possesses
Xx Both possess

To put this another way, across the region more than 2000 Late Prehistoric and Protohistoric period warriors (both shield bearers and others) have been recorded (Keyser 1977, 1979, 2018a; Keyser and Klassen 2001; Keyser and Poetschat 2014), and only these four warriors (Figures 2g, i, 8a, b) wear personal body armor, which could possibly predate the arrival of the horse. Furthermore, of the more than 1600 shield bearing warriors—including some dating well into the Historic period (Keyser and Poetschat 2014; Keyser et al. 2012)—only four wear body armor (Figures 2e, j, 8b, c). And of these, only one at Wyoming's Red Canyon (Figure 8b) is not directly associated with a horse. But even he is associated with a metal-tipped arrow. Hence, it seems clear—personal body armor and horses are inextricably linked on the Northern Plains.

In sum, nearly all these images postdate A.D. 1700-1730, when ethnohistoric records and oral tradition indicate horses were first ridden on the Northwestern Plains (Ewers 1955:15-18; Haines 1938:430; Medicine Crow 2000:23; Secoy 1992:105). However, it is possible the two Red Canyon warriors wearing what might be rod-and-slat armor—given the full-body size shield carried by one figure and a similar-sized shield carried by the other's opponent—might actually predate horse riding in this area of southwestern Wyoming. This is not certain, however, because both are associated with metal weapons. If they are pre-horse period figures, though, they could date as early as a century before A.D. 1700, since we know the first metal projectile points entered the region in the early decades of the 1600s (Keyser and Kaiser 2010:123-126). However, the third Seedskadee style warrior who might be wearing rod-and-slat armor, is directly associated with

horseman, and he carries a large-size shield. Likewise, the three other mounted men in this same composition also carry large shields (Keyser and Poetschat 2014:48). Therefore, the apparent shield size for Seedskadee style shield bearers is not completely reliable as a fine-scale chronological indicator. Given the preponderance of metal weapons associated with the Seedskadee style shield bearers at Red Canyon (Keyser and Poetschat 2014:46-53) coupled with the absence of horses drawn at the site, I suspect these two Red Canyon warriors do predate horse riding in this area. But I also suspect they only predate A.D. 1700 by a short time; probably not more than a couple of decades. The third Seedskadee style warrior with possible body armor probably dates to shortly after A.D. 1700. Thus, it would seem the earliest date for personal body armor is likely to have been sometime around A.D. 1675, and, the three Seedskadee style warriors were carved sometime between A.D. 1675 and A.D. 1725.

But given that all armor-wearing humans are of post-contact period age, it is equally interesting to note only two of these are associated with firearms. One of these is the armored warrior at 24ML1049, who holds both a long gun and a relatively short-bladed broadsword. Because the use of firearms is typically thought to be somewhat later in the Northern Plains chronological sequence than the introduction of horses, one might assume this was one of the later examples of body armor, but there is a single gun clearly seen with an armored horse in a combat scene at 24GV191, about 140 km (90 miles) upstream on the Musselshell River from 24ML1049. This fight scene (Figure 9) involves an armored horse and rider (who carries a spear with a distinctive tab) and a shield bearing warrior who appears to have been drawn some significant years before the armored horse. However, the armored horse artist integrated the pre-existing shield bearer into this combat scene by surrounding him with the outline of a second horse armor and giving him a flintlock gun (identifiable by the ferules, which served to hold the ramrod). The gun is shown firing over the head of the more complete horse and rider. The earlier shield bearing warrior and the gun were almost certainly integrated into this scene involving the armored horse to show the horseman braving an enemy's fusillade of firepower and retreating unscathed. This specific war honor was frequently illustrated in later Biographic art narratives in an almost identical fashion (Afton et al. 1997:24-25, 59-60, 64-65; Keyser and Poetschat 2009:26, 86). The fact that this scene shows a gun in use between two horsemen whose mounts wear armor indicates it must be quite early in the history of gun warfare on the Northwestern Plains—as early as 1730-1740 (Secoy 1992:36)—during what Secoy (1992:45-47) calls the "Occasional Gun" period. Given this early gun at 24GV191, it is certainly possible the armored gunman at 24ML1049 dates to about the same period.

The second instance of personal body armor associated with firearms is an Assiniboine horse raider at the Horned Headgear site (24ML508) who faces off against a relatively large group of about ten Crow enemies (Figure 10), four of whom are armed with guns (Loendorf 2013). All the Crows in this fight have horses. A constellation of factors, including the number of horses and firearms, the mature style used to draw the horse illustrated as a complete animal, the elaborate horse accoutrements drawn on the antagonist's mount, the protagonist's headdress style, and the sophisticated biographic art lexicon used to tell the story of this man's successful horse raid, led Loendorf (2013:76-79), and later Keyser (2018b:149), to suggest a date somewhere between about A.D. 1780 and 1825 for the drawing.

Given these two bracketing dates—the earliest reasonable date around A.D. 1675 for the Red Canyon warriors and the latest at about A.D. 1825 for the Horned Headgear warrior—can any closer estimate be provided for the ten examples that do not appear to

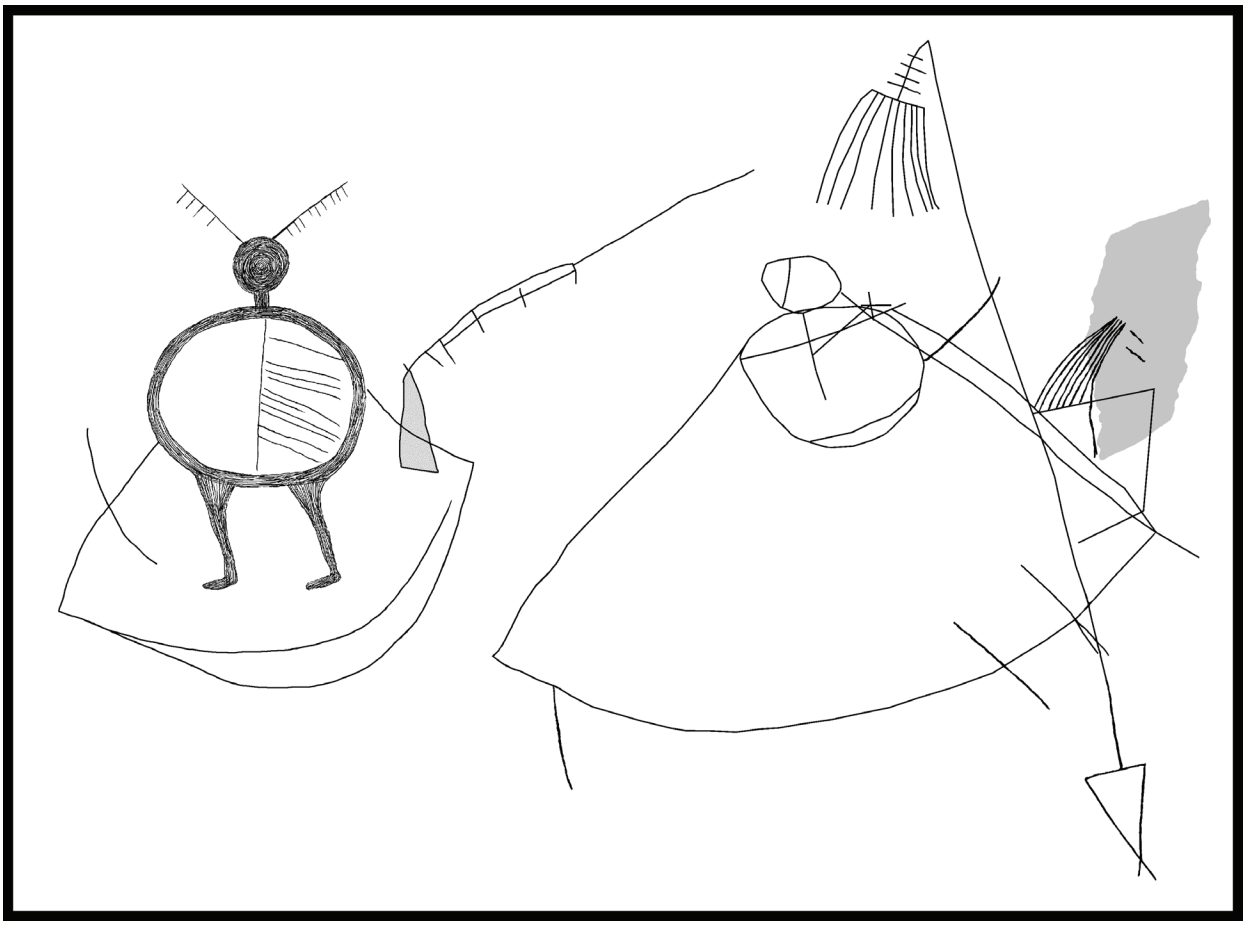


Figure 9: At 24GV191, an earlier shield bearing warrior (at left) was integrated into this combat scene by drawing horse armor around his lower body and giving him a flintlock gun, which fires over the head of a retreating armored horse and rider. Note the stylized tab on the rider's lance. Photo-tracing by author from image courtesy of Mavis and John Greer.

be near the extremes of this time range? The armored horse ridden by the armored man at 24YL419 and those armored horses facing off against the armored warriors at 24YL1358 and 24ML408 suggest these scenes are early in this time span—well predating 1800. Horse armor is bulky and unsuited for the fast-paced Indian warfare characteristic of the 19th century. Likewise, horse armor is primarily effective against shock troop weaponry rather than guns, which became a staple of Plains warfare about A.D. 1790-1800 (Secoy 1992:51-64). Given this, it seems unlikely horse armor or personal body armor was used much in the 19th century, a fact consistent with the ethnohistoric record. First, the only reference to such armor after 1800 is by Lewis and Clark in 1805. Second, throughout the second quarter of the 19th century the Northwestern Plains was visited frequently by many different artists, explorers, and self-trained ethnographers (e.g. Catlin, Bodmer, Maximillian, Point, DeSmet), and permanent trading posts were established in several places, yet not one of these observers reported or illustrated either horse armor or human body armor during that time. Finally, we have more than a dozen pieces of perishable Biographic art (painted bison robes and ledger drawings) from the period between A.D. 1800 and A.D. 1850 (Keyser 1996, 2000; Ewers 1968; Horse Capture et al. 1993; Lycett and Keyser 2018) and there is no drawing so far identified as either horse armor or personal body armor on any of them.[5] Given the lack of indisputable evidence for use of

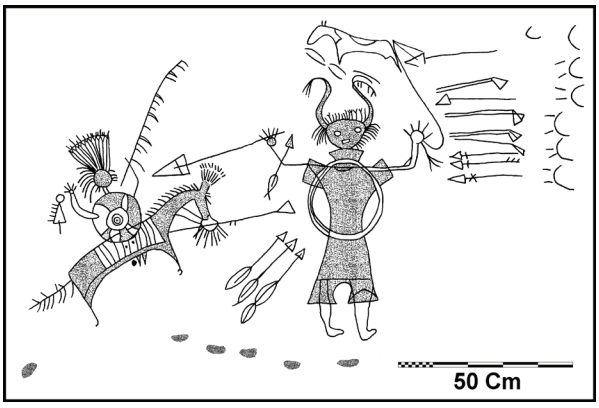


Figure 10: This scene at Horned Headgear shows the protagonist (at center) wearing an armor jacket with a high collar and what appear to be pants that extend down below his knees. Author's drawing adapted from original published by Loendorf (2013).

either horse or personal body armor after 1805, it seems most likely the three armored warriors associated with armored horses at 24YL419, 24YL1358, and 24ML408 date significantly earlier—to the period between A.D. 1730 and 1770, before the advent of full-fledged horse and gun warfare.

However, besides the example at 24ML508, two other rock art images provide evidence human body armor was retained for use by a few warriors in the decades just before and after 1800. One of these is the armored rider at site 39HN217 in the North Cave Hills of South Dakota. The association of this rider with a classic Cheyenne shield design led Keyser and Cowdrey (2008) to attribute the drawing to a Cheyenne artist, and they note this corresponds well with the Cheyenne occupation of this area of the Northwestern Plains from approximately A.D. 1770 to A.D. 1830 (Sundstrom 1990).

The second example is the armored rider at Tolar (48SW13775) just east of Rock Springs, Wyoming. This image was identified by Loendorf (Loendorf and Olson 2003) as a Comanche petroglyph, based on detailed similarities with Comanche ledger drawings from the mid-1800s. Loendorf suggests a date between A.D. 1720 and A.D. 1820 for the site, but I and others (Keyser et al. 2004:136) have suggested it could even date nearer A.D. 1850-1860 when the ledger drawings were done, especially since one of these ledger artists, Yellow Wolf, uses a Spanish socketed lance just like the one drawn at Tolar in his A.D. 1852 ledger drawing. However, Yellow Wolf also holds a gun, and the opposing forces in this fight have more than a dozen other guns in his ledger drawing, while no gun is shown at Tolar. The key to dating Tolar, then, would seem to be the body armor. Interestingly, Loendorf and Olson (2003:6) suggested the Tolar rider might be wearing a leather armor coat because his legs are not visible, but they apparently did not relate their observation to the fact that in Yellow Wolf's own drawing both he and his opponent wear a long elaborately decorated coat and a plainer, shorter jacket, either or both of which might represent leather armor. Unfortunately, there is no annotation that might help us identify whether either of the garments depicted in Yellow Wolf's ledger drawing were intended to illustrate leather armor. In sum, the Tolar drawing depicts leather body armor worn by a Comanche warrior, but whether it dates to the mid to late 1700s or as late as the mid-1800s remains an open question.

There is simply not enough information to estimate the probable age of the armor-wearing warriors at DgOw-21, 48LN18, 48SW302, and 48SW82 any closer than to note they were probably carved before guns became widely used in Plains Indian warfare. This would likely date them sometime between A.D. 1750 and A.D 1820, when guns became commonplace in all areas of the Northern Plains.

ETHNIC IDENTITY

We have reasonably solid evidence for the ethnic affiliation of five of these personal armor drawings and suggestive evidence for five others. All this information is detailed below:

CHEYENNE

The armor-wearing warrior at 39HN217 carries a shield whose heraldic design is a buffalo head and groups of small, inward-pointing tri-

angles at the cardinal directions on the extreme margin of the shield. Unfortunately, the shield carried by the rider is too small to show very much specific detail beyond these basic heraldic units, but we are lucky the artist of this rock art panel drew a much larger, more detailed version of this same shield in the center of the composition on this panel. Based on in-depth analysis and comparison of the basic meaningful units of this larger shield's heraldry with the typology of Cheyenne shield designs formulated by Nagy (1994), Keyser and Cowdrey (2008) have shown this shield to combine subclasses of three of the most basic meaningful units of Cheyenne shield heraldry into a classic variant of Cheyenne heraldic shield design. These basic meaningful units are: (1) the central buffalo head; (2) triangles at the cardinal directions around the shield's rim (as one subclass of the "Four Directions" basic meaningful unit); and (3) the quadrilateral arrangement of lightning bolts extending inward from the shield margin at the semi-cardinal points. Finally, the petroglyph appears to date to the period when the Cheyenne were the predominant group in this area of northwestern South Dakota. There are many other petroglyphs and additional archaeological evidence in and around the North Cave Hills pointing to a heavy Cheyenne presence in the century after A.D. 1780. In short, this rider's shield identifies him as a Cheyenne warrior, and the probable date of the image is consistent with known Cheyenne occupation of the area.

COMANCHE

Larry Loendorf has identified the armor-wearing rider at Tolar as a Comanche drawing based on detailed similarities between this petroglyph and two mid-1800s Comanche ledger drawings (Loendorf and Olson 2003). Correspondences between the Tolar rider and the ledger drawings include the form of the horse, from its head and neck position, hooked hooves, and pinnate tail, to the zigzag "lightning" reins; the rider's detailed headdress and feather decorated shield; and the socketed Spanish lance he carries. In addition to the similarities of this rider with the ledger drawings, bears drawn on other site panels bespeak a Comanche origin, since they share a distinctive form with a bear drawn as Comanche shield heraldry (Keyser et al. 2004:135-138). Finally, the origin of the Comanche, a tribe best known from the southern Plains, is a group who broke away from the Plains Shoshone in this area of southwestern Wyoming in the early 1700s (Loendorf and Olson 2003:5; Rollings 1989). During the late 1700s into the mid-1800s, Comanches were bringing horses from the southern Plains to this area of southwestern Wyoming to trade to their Shoshone cousins at the Shoshone Rendezvous—a well-known trade center in the nearly continent-wide trade network used by native populations (Loendorf and Olson 2003:4-5). In short, distinctive correspondences between two different images at the Tolar site and similar Comanche ledger drawings and shield heraldry strongly support the identification of this horse and rider as a Comanche drawing, made during a time when this tribe would have been regular visitors to the area.

ASSINIBOINE

A third petroglyph—the armor-coat-wearing warrior in a combat scene at the Horned Headgear site—has been identified as an Assiniboine drawing (Loendorf 2013). Based on correspondences between ledger drawings and historic artist's renderings of Assiniboine tipis and those drawn at Horned Headgear, coupled with a distinctive antelope-horn war bonnet worn by the scene's protagonist, Loendorf identifies this as an Assiniboine warrior coming to steal horses from Crow enemies. This identification is strengthened by the depiction of the primary enemy in the combat scene, whose horse wears a feather bonnet, so far known to be an ethnic marker of Crows in Northern Plains rock art (Keyser 2012). The area where this site is located is on the frontier between Crow and Assiniboine territory, and the site has been interpreted as a calling card petroglyph left by

an Assiniboine raider documenting a successful expedition against the Crows (Keyser 2018b). In short, at Horned Headgear, an Assiniboine artist, commemorating a successful horse-raiding expedition, drew himself wearing a long armor coat with a high collar as he engaged Crow enemies after the successful raid.

CROW

Four depictions of personal body armor in an area encompassing the middle Musselshell River drainage and the Bull Mountains just to the south express design aspects suggesting they are the product of Crow artists. These attributes include one example of Crow Feathers, one horse bonnet, and two examples of a distinctive weapon tab. Each of these is discussed in turn, below.

An armored horse at the Nordstrom-Bowen site (24YL419) in the Bull Mountains region between the Musselshell and Yellowstone rivers has its armor covering decorated with "Crow feathers" (Figure 4), an artistic convention employed almost exclusively in Crow biographic art to indicate bird feathers used as ornamentation in various ways. Such conventionalized "feathers" are drawn to illustrate war bonnets, weapon tabs, shield bustles, individual feathers attached to weapons and tied in a horse's forelock or tail, and even the tail feathers of a bird painted on a Crow shield (Keyser and Minick 2018:29-31). In this case, and at another site in the Musselshell River drainage about 140 kilometers (90 miles) west, they are used as decoration on horse armor (Greer et al 2019). These Crow feathers show a central stemline with a bifurcate or trifurcate termination. At Nordstrom-Bowen, the rider's body is covered with the same radiating line pattern as the horse armor, indicating he too wears the same sort of leather armor as covers the horse.

The Crow feathers convention is one of the best markers of Crow ethnic or tribal identity in rock art. Drawing feathers used as decorative accoutrements in this way—showing a central stem with a triangular termination is known only for Crow, Comanche, Mandan, and Blackfoot artists, but it was regularly used only by the Crow. In robe art, Mandan chief, *Mato-tope* (Four Bears), and one Blackfoot artist painting on the Malcolm robe are the only non-Crow artists to draw feathers in this manner. Mato Tope drew such feathers on several bison robes to indicate a special horse bonnet (Keyser 2010:39) and the unnamed Malcolm Robe artist drew such feathers in four portraits of one warrior's stand-up war bonnet (Lycett and Keyser 2018:Figure 7). Otherwise, at least five Crow robe artists drew this convention on at least three robes and two war shirts.

In rock art there are only three examples of feathers drawn in this manner that can reasonably be attributed to artists other than Crows. One is the feathers surrounding the perimeter of a shield carried by the previously discussed mounted Comanche warrior at Tolar (Loendorf and Olson 2003:6); another is the feather-decorated banner lance illustrated in the coup count at 48SW82 in the Lucerne valley in extreme southwestern Wyoming (Keyser and Poetschat 2015:60); and the third is the war bonnet feathers of the enemy in an Assiniboine drawing at 24ML508, the previously discussed Horned Headgear site (Loendorf 2013:74). However, at Horned Headgear, the enemy is apparently a Crow warrior and the "Crow feathers" may have been used as an ethnic marker by the Assiniboine artist. In contrast, Crow artists drew such feathers in rock art at a minimum of eight rock art sites scattered across the breadth of the Crow homeland from the Wind River Basin to the Musselshell River (Figure 5). In summary, Crow feathers illustrated in the manner of these decorating the horse and body armor at Nordstrom-Bowen, are a strong ethnic marker for Crow rock art across the Northwestern Plains and likely indicate this image was drawn by a Crow artist.

Horse bonnets are currently known on a dozen rock art horses (Keyser 2012, 2018b) all but two of which are found in south cen-

tral Montana "Crow country." Furthermore, of the twelve bonneted horses, all but two of them (both examples found at sites in Crow country along the middle Musselshell River), are specifically associated with a suite of "Crow" characteristics including a specific configuration used to draw the horses themselves (Keyser 2018b; Keyser and Renfro 2017), the incorporation of a "Crow" feather design, and their association with a specific "Crow" style of human figure (Keyser 2018b). Of the two examples that cannot reasonably confidently be assigned to Crow authorship based on these attributes, one is worn by a horse drawn by an Assiniboine artist who apparently used the horse bonnet to specifically identify his Crow enemy (Loendorf 2012, 2013), and the other is the armored horse at 24ML408, who faces off against the pedestrian shield bearer who wears personal body armor. The forms of the horse and both humans in the scene at 24ML408 are obscured by their armor coverings and shields, but the horse's bonnet and forelock ornament are probably sufficient to identify this as a Crow drawing, since both items appear to be ethnic markers of the Crow, at least in this area of central Montana. If, as I suspect, this is a Crow drawing, it is the enemy pedestrian warrior who wears body armor in addition to carrying a full-body size shield. This man would not be a Crow, but there is insufficient information to determine his ethnicity.

A characteristic and distinctive way to draw a weapon tab, which is shown attached to the proximal end of two lances, a sword, and a tomahawk (Figures 2d, g, 3, 9) may also indicate Crow authorship of these drawings. These tabs (Figure 11) have a short, rake-like form with a short main stem (corresponding to the "handle"), which is typically crossed by several short perpendicular cross pieces. The tab often ends in a terminal crossbar from which extend several (seven to more than a dozen) approximately perpendicular lines. Two of these tabs show the stem with crosspieces but forego the terminal crossbar and simply show the cluster of lines originating from the lower end of the stem line. Such tabs are drawn at four sites—two at 24YL1358, and single examples at 24GV191, 24ML1049, and the as yet only partially recorded Kyte site (Kyte 2001). These latter three sites have a strong presence of Crow rock art based on several attributes including styles of horses and humans and types of horse accoutrements. While no formal study has been done of this particular type of tab, they are so far known only here in this fairly restricted area of Crow country at sites where Crow rock art predominates. I offer here the preliminary suggestion that this form of weapon tab may also be a Crow ethnic marker.

In contrast to the Cheyenne, Comanche, and Assiniboine drawings, where the armor-coat-wearing warrior appears to be a self-portrait so the illustrated body armor can reasonably be attributed to the tribe of the artist who drew the panel, three of these putative Crow drawings are less assuredly portraits of Crow warriors wearing body armor. The horseman at 24YL419 is almost certainly a Crow self-portrait, but the stand-alone warrior at 24ML1049 could represent either the Crow artist or a vanquished foe. In the scene at 24YL1358, it is unclear whether the mounted man or his pedestrian opponent (who wears the body armor) is the victor—and presumably the artist—so we cannot tell whether the body-armor-wearing pedestrian is a Crow or an enemy from any of several tribes. Finally, at 24ML408, the horse wears a feather bonnet, suggesting the rider represents the Crow artist, so the body-armored pedestrian enemy is certainly a member of another tribe.

SHOSHONE

Finally, the three Seedskadee style warriors possibly wearing rod-and-slat body armor are part of a style which I have tentatively identified as being of Shoshone origin (Keyser and Poetschat 2014:119-120). This is based on the geographic distribution of the style, stylistic relationships to shield bearing warriors drawn

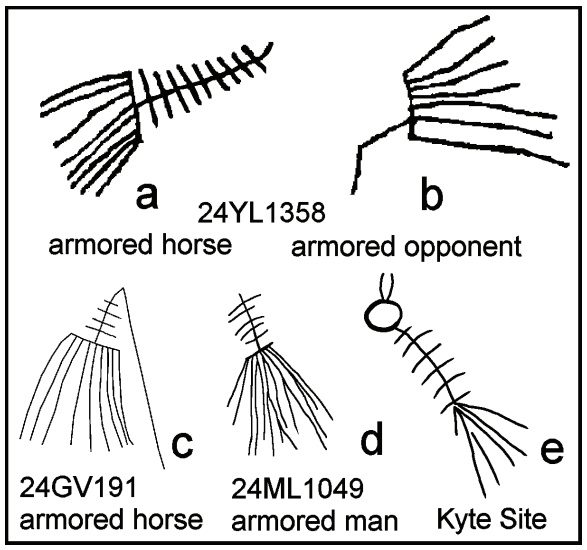


Figure 11: Crow-style tabs attached to various weapons. a, Missouri War Axe; b, c, lance; d, sword; e, unidentified (but probable tomahawk). a-c, e, Photo-tracings by author from images courtesy of Mavis and John Greer and Michael Kyte; d, adapted from Greg White tracing published by Loendorf (2012).

at sites further west across the northern Great Basin from southern Idaho into southeastern Oregon, and the general time frame indicated for the Seedskadee style's association with very early horses and the first metal tools to enter southwestern Wyoming. In contrast to the somewhat ambiguous portrayals in two scenes involving probable Crow images, the weapon capture scene involving Seedskadee style warriors has details such as the size of the armored warrior himself and his tear streak face paint suggesting he is the victor in this scene.

In summary, this specific shield bearing warrior style is almost exclusively restricted to an area known to have been occupied by the Shoshone when they were the predominant group in the area. The style is also directly associated with the introduction of the first horses into the region, which came through a trade system in which the Shoshone were key participants. Finally, the style appears to be stylistically related to other shield bearing warriors further west, which were almost certainly drawn by related Numic-speaking groups. If these images are the product of Shoshone artists, and if the horizontal lines on the body do represent rod-and-slat armor, then such armor was worn by at least a few Late Prehistoric and Protohistoric period Shoshone warriors.

Finally, no evidence-based suggestions can be made about the ethnic identity for the other armor-wearing humans at this time. The artists could have been members of any of several different tribes including Arapaho, Assiniboine, Blackfeet, Cree, Flathead, Gros Ventre, Kiowa, Nez Perce, or Sioux, all of whom fought with one another and with the tribes known to have used body armor in this region during the 1700s and early 1800s. Future work in deciphering ethnic identity may advance our knowledge in this area.

SUMMARY AND INTERPRETATION

With more than a dozen rock art examples scattered from Writing-On-Stone in southern Alberta to the North Cave Hills of South Dakota and southwestward to the Green River of southwestern Wyoming, it is obvious personal body armor was widely used by Northern Plains warriors. In addition, all examples are associated with horses and/or historic trade weaponry, dating its use exclusively to the Protohistoric and early Historic periods. Coupled with the fact that not one example is known from a Late Prehistoric period—or verifiably pre-horse period—context, despite detailed recording of more than 2000 warriors from this time across the region (e.g., Keyser and Poetschat 2014; Keyser et al. 2012), this indicates such body armor almost certainly arose in response to changes in Plains warfare accompanying the introduction of the horse. Whether this adoption of body armor was a direct result of diffusion from groups who had observed the use of metal and chain mail armor by the Spaniards who invaded the Southwest and Southern Plains, or was borrowed from some other area, or was an independent invention in response to the diminution of shield size accompanying the

introduction of horses (Keyser 2010) and the development of early horse-oriented warfare cannot yet be determined.

However, as Sahkomaupee recounted to David Thompson (Tyrell 1916:330), pre-gun, post-horse warfare gave a decided advantage to mounted warriors, who rode "swift as deer ... [dashing] at the Peeagans [Blackfeet], and with their stone pukamoggan knock[ing] them on the head" and killing many. From Sahkomaupee's description of these early battles fought against mounted enemies, it is obvious the advantages of body armor as protection from club-wielding horsemen using their mounts much like tanks would have been quickly apparent to Plains warriors. Combined with the reduction in shield size known to have accompanied the integration of horses into warfare, the adoption of body armor seems a natural progression. The rock art scenes in which this armor is illustrated demonstrate it was considered adequate protection against spears, bows and arrows, metal tomahawks, and swords, but the fact guns are so rarely involved in scenes where body armor is used supports the idea it was not particularly effective against firearms.

But just as quickly as armor was adopted, guns began to change warfare in different ways. The first guns were few and often unreliable, with powder and balls in short supply. However, as guns became more commonplace, gunmen became more proficient, and traders proliferated so the scarcity of powder and ammunition became less an issue. Soon, personal body armor and horse armor became more a hindrance than a help against enemies with reliable firearms. And concurrently, the focus of warfare was shifting away from interpersonal conflict to sneak attacks designed to steal an enemy's horses. In such "lightning raids," personal body armor quickly became obsolete and its use ineffectual.

During its heyday, however, several groups—including the Cheyenne, Comanche, Assiniboine, and Crow—are known to have used personal body armor and it seems likely the Shoshone, Blackfoot, and other tribes also made and used it. Leather armor was the most common, with eleven examples so far found, and there seems to have been two primary styles. The most common was an A-line garment with a distinctive collar rising to cover the neck and often the lower face, combined with a bulky, reinforced yoke from which short sleeves extended down to just above the elbows. This is illustrated in seven cases. The second style, shown in three examples, was a more poncho-like, tent-shaped garment without a separate collar and apparently without sleeves, since weapons project directly out from the armor. One example of such a poncho may have been decorated with feathers or illustrations of a feather pattern. A possible third style appears to have been constructed of overlapping leather flaps, possibly of alternating different colors, but so little of this armor extends out from behind its wearer's shield to cover his upper legs that possible pattern and construction methods are difficult to verify. All three of these styles were split down the midline, front and back, so the wearer could ride a horse.

A second type of body armor may be shown in Northern Plains rock art as a wooden rod-and-slat torso covering, illustrated as horizontal lines across the body of three Seedskadee style human figures in southwestern Wyoming. This body pattern is proposed to be wooden armor based on the association of these Seedskadee style figures with distinctive rectangular shields showing a vertical line pattern, which have been suggested to be wooden rod-and-slat construction. If it is body armor, it covers only the torso, with neither sleeves nor neck collar illustrated. Verification of both this wooden body armor and the wooden shields awaits further research.

In conclusion, four decades of rock art recording on the Northern Plains has yielded more than a dozen examples of warriors wearing personal body armor. Such armor is unknown from ethnographic collections and is reported

ethnohistorically in only a few passing references. Yet, the rock art illustrations are of sufficient detail for us to discern patterns and methods of construction and determine the efficacy of this armor against Historic period weaponry. We can also reasonably estimate when and why it was adopted by Plains warriors. This is one more significant example why our knowledge of Plains Indian material culture owes a significant debt of gratitude to the rock art record.

END NOTES

[1] This attacking force was almost certainly larger, but a large piece of the Segesser I painting just to the rear of the nine attackers has been removed. This lost piece contained part of one still-visible warrior and likely several others.

[2] Interestingly, the slit in the hem of the garment at 24YL1358 was misinterpreted as indicating a vulva and the garment itself was then seen as a woman's dress, leading the original investigator to name the site "Warrior Woman." The power of suggestion has then led another observer to see the sides of the collar as earrings (though the horizontal line connecting the tops of these and running across the warrior's face was not explained).

[3] This warrior, at 24ML1049, is drawn wearing a long, A-line garment with a shape much like several of the obvious leather coats at other sites. It is represented as a series of converging vertical lines much like the poles in a tipi. The warrior also wears a standup feather bonnet drawn with similar vertical lines. Clearly these lines in the garment cannot represent wooden rods, or the warrior would essentially be immobile, and the drawing equally clearly does not represent a tipi since it is topped by a head wearing a war bonnet. Given the location of this image in Crow territory, and the use of similar vertical line decoration on armor garments (Greer et al. 2019), which has been interpreted as representing metaphoric feather design, I feel this likely represents similar decoration on a leather coat. If so, this would make the garment very similar to the one worn by the rider at 24YL419 (Figure 4).

[4] Showing both legs in this manner is typical of Plains Indian perspective and allows us to understand the poncho-like armor garment must have been split to drape across the horse's back and midway down both sides of the animal.

[5] There is one ledger drawing meriting mention here. The drawing, dating to A.D. 1852, was done by the Comanche warrior, Yellow Wolf, and shows his combat with an individual enemy during a fight between large opposing forces. Yellow Wolf, who has just dismounted from his horse, wears a long, elaborately decorated, A-line garment, but there is no indication of either a slit to facilitate horseback riding or the protective sleeves or collar. His opponent wears a shorter jacket-like garment with what might be a protective collar but could just as well be a hood (like on a capote) laid back so it did not cover his head. I suspect one or both garments may have been intended as leather armor, but unfortunately Yellow Wolf did not illustrate them with enough diagnostic attributes to verify this.

ACKNOWLEDGMENTS

Over five decades, many people and funding agencies have assisted in collecting the data on which this article is based. Larry Loendorf, who has studied in detail three of the sites yielding key information about the topic, graciously allowed me to make drawings of figures from his publications. Larry and Mark Willis made available 2018 photographs of the warrior at the Musselshell site from which a photo-tracing was made by the author and David Kaiser. Mavis and John Greer have provided photographs from which several images used here were made, and our work together on armored horses in the region helped crystalize several of my ideas. Jack Brink facilitated a revisit to several sites at Writing-On-Stone, which I had initially recorded more than three decades earlier. The late Michael Kyte provided a let-

ter report on an as-yet unrecorded site, which has provided information for this and several other recent articles. David Kaiser assisted with the recording of images from 48FR2508, DgOw-21, and 24ML1049.. Mike Bies helped make possible visits to both 48FR2508 and 48BH4275. The late Ken Feyhl took me to visit the Nordstrom-Bowen site. Jim Stewart first took me to 48FR2508 and afterward shared dozens of his images from there, which were used to check and verify our tracings done 20 years later. Mike Taylor assisted with recording images from 48BH4275 and helped enhance photographs used to make other drawings. Russ Tanner first introduced me to the White Mountain and Tolar sites. Carl Davis assisted with the recording of 39HN217. The USDA Forest Service, Alberta Parks, and the Oregon Archaeological Society provided funding for projects on which several of these images were first recognized and recorded.

REFERENCES CITED

Afton, Jean, David Fridtjof Halaas, and Andrew E. Masich

1997 *Cheyenne Dog Soldiers: A Ledgerbook History of Coups and Combat*. University Press of Colorado, Boulder.

Burpee, Lawrence J. (editor)

1909 An Adventurer from Hudson Bay: Journal of Matthew Cocking, from York Factory to the Blackfeet Country, 1772-73. *Transactions of the Royal Society of Canada*, Third Series. Volume II, Section II.

Dibble, David S. and Kent C. Day

1963 A Preliminary Survey of the Fontenelle Reservoir, Wyoming. *University of Utah Anthropological Papers* 58.

Ewers, John C.

1955 *The Horse in Blackfoot Indian Culture*. Smithsonian Institution Bureau of American Ethnology, Bulletin 159. Washington, DC: United States Government Printing Office.

1968 Plains Indian Painting: The History and Development of an American Art Form. Introduction to *Howling Wolf: A Cheyenne Warrior's Graphic Interpretation of His People,* by Karen D. Peterson. American West Publishing Company, Palo Alto, California.

Goetzmann, William H., David C. Hunt, Marsha V. Gallagher, and William J. Orr

1984 *Karl Bodmer's America*. University of Nebraska Press, Lincoln.

Greer John, Mavis Greer, and James D. Keyser

2019 Armored Horses in Northwestern Plains Rock Art. *Archaeology in Montana.* In Press

Haines, Francis

1938 The Northward Spread of Horses among the Plains Indians. *American Anthropologist* 40:429-437.

Horse Capture, George P., Anne Vitart, Michael Waldberg, and W. Richard West, Jr.

1993 *Robes of Splendor: Native North American Painted Buffalo Hides.* The New Press, New York.

Hotz, Gottfried

1991 *The Segesser Hide Paintings: Masterpieces Depicting Spanish Colonial New Mexico.* Thomas E. Chavez, editor. Museum of New Mexico Press, Santa Fe.

Jones, David E.

2004 *Native North American Armor, Shields, and Fortifications.* University of Texas Press, Austin.

Kaiser, David A. and James D. Keyser

2015 Delving Into the Details: Further Discoveries at Writing-On-Stone. *American Indian Rock Art* 41:167-182.

Keyser, James D.
1977 Writing-On-Stone: Rock Art on the Northwestern Plains. *Canadian Journal of Archaeology* 1:15-80.
1979 The Plains Indian War Complex and the Rock Art of Writing-On-Stone, Alberta, Canada. *Journal of Field Archaeology* 6(1):41-48.
1996 Painted Bison Robes: The Missing Link in the Biographic Art Style Lexicon. *Plains Anthropologist* 41:29-52.
2000 *The Five Crows Ledger: Biographic Warrior Art of the Flathead Indians*. University of Utah Press, Salt Lake City.
2010 Size Really Does Matter: Dating Plains Rock Art Shields. *American Indian Rock Art* 36:85-102.
2012 Northern Plains Horse Bonnets: "His Horse Wore a Magnificent Headdress." *Whispering Wind* 40(5):4-10.
2018a Warriors and Weapons: Late Prehistoric/Protohistoric-Period Warfare in Bear Gulch Rock Art. In *Archaeological Perspectives of Warfare on the Great Plains*. Andrew J. Clark and Douglas B. Bamforth, editors, pp. 66-119. University Press of Colorado, Boulder.
2018b Cheval Bonnet: A Crow Calling Card in the Blackfeet Homeland. *Ethnohistory* 65(1):129-155.

Keyser, James D. and Mike Cowdrey
2008 Northern Plains Biographic Rock Art: Ethnography Written on Stone.*Archaeology in Montana* 49(1):19-34.

Keyser, James D. and David A. Kaiser
2010 Getting the Point: Metal Weapons in Plains Rock Art. *Plains Anthropologist* 55:111-132.

Keyser, James D. and Michael Klassen
2001 *Plains Indian Rock Art*. University of Washington Press, Seattle.

Keyser, James and David L. Minick
2018 *Horse Raiders in the Missouri Breaks: Eagle Creek Canyon Petroglyphs, Montana*. Oregon Archaeological Society Press, Publication No. 25, Portland.

Keyser, James D. and George Poetschat
2009 *Crow Rock Art in the Bighorn Basin: Petroglyphs at No Water, Wyoming*. Oregon Archaeological Society Press, Publication 20, Portland.
2014 Northern Plains Shield Bearing Warriors: A Five Century Rock Art Record of Indian Warfare. Oregon Archaeological Society Press, Publication No. 22, Portland.
2015 *Seeking Bear: The Petroglyphs of Lucerne Valley, Wyoming*. Oregon Archaeological Society Press, Publication No. 23, Portland.

Keyser, James D., and Stephanie L. Renfro
2017 A Horse is a Horse—and They Can Tell Us Things. *American Indian Rock Art* 43: 11-28.

Keyser, James D., David A. Kaiser, George Poetschat and Michael W. Taylor (editors)
2012 *Fraternity of War: Plains Indian Rock Art at Bear Gulch and Atherton Canyon, Montana*. Oregon Archaeological Society Press, Publication 21, Portland.

Keyser, James D., Russel L. Tanner, and David T. Vlcek
2004 Pictures by the Seedskadee: A Preliminary Analysis of the Biographic Rock Art of the Green River Basin, Southwestern Wyoming. *Plains Anthropologist* 49:129-151.

Kyte, Michael
2001 *Site on the Musselshell River*. Illustrated Letter Report dated May

21, 2001, on file with Keyser.

Loendorf, Lawrence
2012 *Three Rock Art Sites on the Musselshell River, Montana*. Sacred Sites Research, Inc, Albuquerque, New Mexico.
2013 The Horned Headgear Site, Montana. *American Indian Rock Art* 39: 71-80

Loendorf, Lawrence and Robert Mark
2010 *Report on the Project to Photograph the Shield from Aztec Ruins*. Report on file with Aztec Ruins National Monument, Aztec New Mexico.

Loendorf, Lawrence and Linda Olson
2003 The Tolar Petroglyph Site. *American Indian Rock Art* 29:1-10.

Lycett, Stephen J. and James D. Keyser
2018 Beyond Oral History: A Nineteenth Century Blackfoot Warriors' Biographic Robe in Comparative and Chronological Context. International Journal of Historical Archaeology (on-line at https://www.researchgate.net/journal/1092-7697_International_Journal_of_Historical_Archaeology).

Medicine Crow, Joseph
2000 *From the Heart of Crow Country: The Crow Indians' Own Stories*. University of Nebraska Press, Lincoln.

Mitchell, Mark
2004 Tracing Comanche history: Eighteenth-century Rock Art Depictions of Leather-armoured Horses from the Arkansas River Basin, South-eastern Colorado, USA. *Antiquity* 78(299):115-126.

Moulton, Gary E. (editor)
1988 *The Journals of the Lewis & Clark Expedition, Volume 5, July 28—November 1, 1805*. University of Nebraska Press, Lincoln.

Nagy, Imre
1994 A Typology of Cheyenne Shield Designs. *Plains Anthropologist* 39:5-36.

Rollings, W. H.
1989 *The Comanche*. Chelsea House Publishers, New York.

Secoy, Frank Raymond
1992 *Changing Military Patterns of the Great Plains*. University of Nebraska Press, Lincoln. (Reprint of 1953 original).

Sundstrom, Linea
1990 *Rock Art of the Southern Black Hills: A Contextual Approach*. Garland Publishing, Inc., New York.

Tyrell, Joseph Burr (editor)
1916 *David Thompson's Narrative of His Explorations in Western America, 1784-1812*. The Champlain Society Publications 12. Toronto, Ontario, Canada.

Wissler, Clark
1910 Material Culture of the Blackfoot Indians. *Anthropological Papers of the American Museum of Natural History* Vol. V, Part 1.

James D. Keyser
Oregon Archaeological Society
Portland, Oregon

2017 Chapter Information

Absaroka Chapter
Chapter Address – PO Box 181 – Cody 82414-0181
Sylvia Huber, President – 307-527-7523
PO Box 522 – Cody 82414-0522
Email eagleofcody@tctwest.net
Bonnie Smith, Vice President – 310-308-2300
1231 Chalk Rd – Powell 82435-4701
Email bonnies@centerofthewest.org
Eric Rossborough, Secretary – 608-843-3558
1921 Sheridan Ave – Cody 82414-3932
Email ericr@centerofthewest.org
Sara Murray, Treasurer – 307-899-4561
1335 Rumsey Ave – Cody 82414-3712
Email saramur@yahoo.com

Ancient Trails Chapter
Alice Tratebas – Presidentt – 307-746-4917
PO Box 883 – Newcastle 82701-0883
Email atrateba@blm.gov; atratebas@aol.com
Lucille Dumbrell – Vice President – 307-746-2268
203 Grandview Dr – Newcastle 82701-0656
Email lucilld@rtconnect.net
Mary Capps – Secretary/Treasurer – 307-746-4142
PO Box 656 – Newcastle 82071-0656
Email capco24@yahoo.com

Casper Chapter
Dr. Mavis Greer, President – 307-473-2054
PO Box 51874 – Casper 82601-1874
Email mavis@greerservices.com
Dr. John Greer, Secretary – 307-473-2054
PO Box 51874 – Casper 82601-1874
Email jgreer@greerservices.com
Carolyn M Buff, Treasurer – 307-234-5424
1617 Westridge Terrace – Casper 82604-3305
Email jcbuff@bresnan.net

Cheyenne Chapter
Dan Bach, President/Secretary/Co-Treasurer – 307-514-2685
1220 Jessie Dr – Cheyenne 82009
Email macrofloral@msn.com
Jack Hicks, Vice President – 970-988-1994
28002 Golden Wheat Ln – Ft Collins CO 80528-3127
Email fordchapel@gmail.com
Russ Kaldenberg, Co-Treasurer – 307-772-9317
2453 Longhurst Ct-Muscatine IA 58761-2064
Email rkaldenberg@asmaffiliates.com

Fremont County Chapter
Bill Elder, President - 307-349-1282
3 Elizabeth Cir – Lander 82520-9229
Email wye1017@cwc.edu
Leniegh Shrinar, Vice President - 307-856-6653
146 Mazet Rd – Riverton 82501-8823
Email lschrin2@gmail.com
Nancy Kindle, Secretary – 307-856-1758
PO Box 762 – Riverton 82501-0762
Email nkindle@gmail.com
Larry Amundson, Treasurer – 307-856-3373
85 Goose Knob Dr– Riverton 82501-8306
Email larryamundson@wyoming.com

June Frison Chapter
Rachel Shimek, President – 515-231-2003
100 S 8th St #1 – Laramie 82070-2003
Email rshimek@uwyo.edu
Emily Brush, Vice President
Dept Anthropology – 1000 E University Ave
Dept 3431 – Laramie 82071-3431
Email ebrush1@uwyo,edu
Carmen Clayton, Secretary – 307-742-7669
855 N Pine – Laramie 82072
Email Carmen.clayton@wyo.gov
Ebony Creswel, Treasurer
1758 N 9th #3 – Laramie 82072-7018
Email ecreswel@uwyo.edu

Pumpkin Buttes Chapter
Tommie Butler, President – 307-682-7447
205 Overland Tr – Gillette 82716-4328
Email tombutler@bresnan.net
Denise Tugman, Vice President – 307-351-6919
PO Box 3182 – Gillette 82717-3182
Email dtugman@lsi-inc.us
Mike Stone, Secretary/Treasurer – 307-682-6298
2279 State Hwy 50 – Gillette 82718-9346
Email mak90_98@yahoo.com

Sheridan/Johnson County Chapter
Christine Varah, President – 321-693-2846
2038 Pima Dr – Sheridan 82801
Email cvarah@swca.com
Jenny Aiello, Vice President – 406-579-6832
1222 Woodwind Dr – Sheridan 82801
Email janagra@cra7.ky.com
Colin Ferriman – Vice President – 307-674-1702
850 Val Vista – Sheridan 82801
Email crferriman@cra7-ky.com
Viola Gardner – Secretary/Treasurer – 307-684-7759
614 N Burritt Ave – Buffalo 82834
Email viola.gardner@wyo.gov

Sweetwater County Chapter
Bill Current, President – 307-362-0561
2901 Driftwood Ln – Rock Springs 82901-4394
Email current@onewest.net

Upper Green River Basin Chapter
Sam Drucker, President – 307-367-2226
PO Box 456 – Pinedale WY 82941-0456
Email james814@centurytel.net
Dave Vlcek, Vice President – 307-367-6365
PO Box 184 – Pinedale 82941-0184
Email davev69@live.com.mx
Clint Gilchrist, Secretary/Treasurer – 307-367-6763
PO Box 662 – Pinedale 82941-0662
Email clint@sublette.com

Wyoming Archaeological Foundation
Judy Wolf, President, WAS Immediate Past Pres – 307-742-5526
1657 Riverside Dr – Laramie 82070-6627
Email jkwolf@uwyo.edu
(term expires 2018)
Dr. Mary Lou Larson, Secretary – ex officio - 307-766-5566
2418 Crazy Horse Way – Laramie 82070-5550
Email mlarson@uwyo.edu
Marcia Peterson, Treasurer – ex officio - 307-399-7914
2014 Sheridan St – Laramie 82070-4320
Email marcia.peterson@wyo.gov
Sylvia Huber, WAS President – 307-307-527-7523
PO Box 522 – Cody 82414-0522
Email eagleofcody@tctwest.net
Denise Tugman, Member-at-Large – 307-351-6919
PO Box 3182 – Gillette 82717-3182
Email dtugman@lsi-inc.us
(term expires 2019)
Dr. Danny Walker, Member-at-Large – 307-399-0948
1687 Coughlin St – Laramie 82072
Email dawalker@wyoming.com
(term expires 2018)
Dr. Greg Pearce, State Archaeologist – ex officio – 307-766-5564
Dept Anthro – 1000 E University Ave
Dept 3431 – Laramie 82071-3431
Email greg.pierce@wyo.gov
Dr. Todd Surovell – George C. Frison Institute Dir – 307-399-5437
3901 Grays Gable Rd – Laramie 82072-6901
Email surovell@uwyo.edu
Dr. George Frison, ex-officio – 307-745-9277
Dept Anthro – 1000 E University Ave
Dept 3431 – Laramie 82071-34431
Dr. Marcel Kornfeld – Hell Gap Site Manager – 307-745-9636
2418 Crazy Horse Ln – Laramie 82070-5550
Email anpro1@uwyo.edu

Carolyn M Buff
Wyoming Archaeological Society
Executive Secretary/Treasurer
1617 Westridge Terrace
Casper, WY 82604-3305

THE WYOMING **Archaeologist**

VOLUME 60; NUMBER 2; 2016

Table of Contents