

OVER-PAINTING AND MAINTENANCE OF ROCK ART SITES IN THE
LOWER PECOS
THESIS

Presented to the Graduate Council of
Texas State University-San Marcos
in Partial Fulfillment
of the Requirements

for the Degree

Master of ARTS

by

Sandra K. Wier, B A , B.A.

San Marcos, Texas
December 2010

COPYRIGHT

by

Sandra Kay Wier

2010

ACKNOWLEDGEMENTS

I want to express my gratitude to the numerous people who assisted me with the process of completing this thesis. First, I want to thank my family for their continued encouragement. They have provided me with the foundation upon which to build my knowledge and I am grateful for their support. Their willingness to listen and to review my work is much appreciated.

I wish to thank the faculty of Anthropology Department at Texas State University-San Marcos. My committee chair, Dr. Kent Reilly, in particular, who provided assistance and encouragement. His input regarding iconographic and structural analysis were invaluable. I would also like to thank Dr. Britt Bousman for his assistance, instruction, and participation on my committee. I am also indebted to Dr. Carolyn Boyd, without her guidance, my research would not have been possible. In addition to her participation on my committee, she assisted with logistical issues such as access to rock art sites, field crews, and lodging. I am grateful for Dr. Boyd's willingness to introduce me to the landowners and to share information. Her insight and encouragement were a tremendous help in writing this thesis.

I would also like to thank The Shumla School staff and volunteers for their assistance. Particularly, Jack and Missy Harrington for providing site access as well as hospitality. I would like to thank Elton Prewitt and Dr. Phil Dering for sharing their knowledge of the archaeology of the Lower Pecos. I am also especially grateful to Angel

and Jack Johnson who willingly provided valuable assistance in the field, helped with the coordination and planning of fieldwork, and often provided me with a place to stay.

Additionally, I am indebted to those who participated as field crew and who assisted me in recording the rock art. Kathleen Burgess's field assistance and her willingness to share her knowledge on photographing rock art were crucial to this project.

I would like to thank the Rock Art Foundation (RAF) who allowed me to record some of their rock art sites; without their assistance I would not have been able to document many of these sites. Additionally, I would like to thank Ira Yates whose financial assistance for the 2009 field season helped me complete my research. Finally, I would like to thank the numerous land owners who granted the field school participants and me access to their sites; without their cooperation, rock art research would not be possible.

This manuscript was submitted on April 29, 2010.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iv
LIST OF FIGURES	xi
ABSTRACT	xix
1: INTRODUCTION TO ROCK ART AND THE LOWER PECOS	1
The Lower Pecos Region	1
Defining Rock Art	2
Types of Rock Art	3
Pictographic Styles	6
Historic Style	6
Red Monochrome Style	7
Bold Line Geometrics	8
Red Linear Style	8
Pecos River Style	9
Pecos River Style Pictographic Elements	12
Anthropomorphs/Therianthropes	14
Centrastyled/Noncentrastyled	15
Hip Clusters/Feathered Hip Clusters	15
Masked	16
Antlered	16
U-Headed or U-Shaped Head	16
Rabbit-Eared	16
Plumes	17
Ecstatic Scalp/Ecstatic Hair and Halo-like Objects	17
Atlatis and Spears	17
Spiny Oval/Datura	18
Zoomorphs	18
Non-Representational Forms	19
Enigmatic Figures	19
Letter-Like Shapes	20
Comb Shapes	20
Geometrics	21
Arch and Circle	21

Boxes and Squares.....	21
Single-Pole Ladders.....	21
Handprints.....	22
Research Focus: Obscured Images and Altered Figures.....	22
2: TERMINOLOGY AND LITERATURE REVIEW.....	24
Natural Processes Impacting Rock Art Visibility.....	24
Human Alterations and Rock Art Visibility.....	25
Definition of Terms.....	25
Style.....	25
Intra-Style/Intra-Stylistic.....	26
Motif.....	26
Element.....	26
Theme.....	26
Composition/Compositional.....	27
Over-Painting.....	27
Overlap.....	28
Under-painting.....	28
Under-drawing.....	29
Inpainting.....	29
Contour/Outline Oriented.....	30
Literature Review.....	30
Review of Publications on Photographic and Image Enhancement Techniques.....	31
Peter G. Dorrell.....	31
Glen Fredlund and Linea Sundstrom.....	31
Robert Mark and Evelyn Billo.....	32
David Gebhard.....	33
Solveig A. Turpin.....	35
Review of Over-Painting in Ethnographic and Archaeological Literature.....	36
W. W. Newcomb.....	37
Terence Grieder.....	40
Constance S. Silver.....	42
Solveig A. Turpin.....	44
Carolyn E. Boyd.....	47
David A. Kaiser and James D. Keyser.....	49
Klaus F. Wellmann.....	51
Benjamin Valdez, Juan Cobo, Michael Schorr, Roumen Zlatev, and Leonel Cota.....	52
Patricia Vinnicombe.....	54
Jo McDonald.....	55
J. David Lewis-Williams.....	57
The Neuropsychological Model.....	60
Ethnographic Information.....	63
Australia.....	64

Mowanjum of the Kimberleys	64
North America	67
Chumash	67
Yokuts	69
Conclusion	69
3: RECORDING AND DOCUMENTING OBSCURED PICTOGRAPHS	70
Photography	70
Photographic Equipment	71
Cameras	71
Other Photographic Equipment	72
Photography Types	73
Visible Spectrum	73
Full Spectrum Photography	73
Infrared	75
Ultraviolet	76
Image Processing	76
Processing Visible Spectrum Photographs	77
Processing Infrared and Ultraviolet Photographs	78
Photograph Labels	79
Field Notes	79
Selection of Pictographs	80
Conclusion	80
4: IMAGES REVEALED-SIX PECOS RIVER STYLE SITES	82
Panther Cave (41VV83)	82
Site Description	82
Photographic Analysis of the Panther Cave Pictographs	84
Photo Series PCS1	84
Photo Series PCS2	86
Photo Series PCS7	86
Photo Series PCS3	87
Photo Series PCS4	88
Photo Series PCS5	88
Photo Series PCS6	89
Curly Tail Panther (41VV18)	102
Site Description	102
Photographic Analysis of Curly Tail Panther Shelter A	103
Photo Series CTPS5	104
Photo Series CTPS20	104
Photo Series CTPS2	105
Photo Series CTPS21	106
Photo Series CTPS23	107
Photo Series CTPS6	107
Photo Series CTPS10	109

Photo Series CTPS14	109
Photo Series CTPS17	110
Photo Series CTPS3/CTPS4/CTPS22	110
Photographic Analysis of Curly Tail Panther Shelter B	111
Photographic Analysis of Curly Tail Panther Shelter C	111
Photo Series CTPS18/CTPS19	112
Photographic Analysis of Curly Tail Panther Shelter D	112
Photographic Analysis of Curly Tail Panther's Unnamed Shelter	113
White Shaman (41VV124)	134
Site Description	134
Photographic Analysis of White Shaman Shelter	134
Photo Series WSS1/WSS2	134
Photo Series WSS4	135
Photo Series WSS6	137
Photo Series WSS11	138
Photo Series WSS12/WSS21/WSS23	139
Photo Series WSS25	139
Big Satan (41VV40)	152
Site Description	152
Photographic Analysis of Big Satan Shelter	153
Photo Series BGS1	153
Photo Series BGS2	153
Photo Series BGS3	154
Photo Series BGS4	155
Photo Series BGS5	155
Photo Series BGS7	156
Photo Series BGS8/BGS9/BGS10	156
Mystic Shelter (41VV612)	169
Site Description	169
Photographic Analysis of Mystic Shelter	170
Photo Series MYST01	170
Photo Series MYST02	171
Photo Series MYST03	172
Photo Series MYST04	173
Photo Series MYST07	173
Photo Series MYST08	174
Photo Series MYST09	174
Fate Bell (41VV74)	191
Site Description	191
Photographic Analysis of Fate Bell Shelter	191
Photo Series FBLS01	191
Photo Series FBLS06	193
Photo Series FBLS03	193
Photo Series FBLS04	194
Photo Series FBLS05	194

Photo Series FBLS12	195
Results	210
UVIR Experiments	210
Over-Painting	210
Conclusion	210
5: CONCLUSIONS	212
Recording the Altered Images	212
Experiments with UVIR Photography	213
Considerations	213
Lab Work	214
Obscured Images and Conservation	214
Over-Painting within the Pecos River Style	214
Summary of Observations by Site	215
Panther Cave (41VV83)	215
Curly Tail Panther (41VV18)	216
White Shaman (41VV124)	216
Big Satan (41VV40)	217
Mystic Shelter (41VV612)	217
Fate Bell (41VV74)	217
Implications	218
UVIR Experiments	218
Over-Painting	218
Site Maintenance and Reuse	219
Conclusion	220
WORKS CITED	222

LIST OF FIGURES

FIGURE 1.1 MAP OF THE LOWER PECOS REGION AS SHOWN IN <i>THE ROCK ART OF THE TEXAS INDIANS</i> (KIRKLAND AND NEWCOMB 1996[1967]:38).	2
FIGURE 1.2 PETROGLYPHS AT THE FATE BELL SHELTER (41VV74) IN SEMINOLE CANYON STATE PARK, IN TEXAS.	5
FIGURE 1.3 PICTOGRAPHS AT THE MEYER'S SPRING SITE (41TE19) IN TEXAS.	5
FIGURE 1.4 PAINTED PEBBLES FROM THE LOWER PECOS AS SHOWN IN <i>ANCIENT TEXANS</i> (SHAFFER 1986:167; PHOTOGRAPH BY JIM ZINTGRAPH).	6
FIGURE 1.5 HISTORIC GRAFFITI AT MEYER'S SPRING.	12
FIGURE 1.6 HISTORIC PICTOGRAPHS AT MEYER'S SPRING.	12
FIGURE 1.7 RED MONOCHROME FIGURE AT THE CURLY TAIL PANTHER SITE, TEXAS.	12
FIGURE 1.8 AN EXAMPLE OF THE BOLDDLINE GEOMETRIC STYLE PROPOSED BY TURPIN.	13
FIGURE 1.9 RED LINEAR FIGURES AT CURLY TAIL PANTHER.	13
FIGURE 1.10 PECOS RIVER STYLE ROCK ART AT THE WHITE SHAMAN SITE, TEXAS.	13
FIGURE 2.1 NEWCOMB'S PROGRESSION OF THE PECOS RIVER STYLE AS SHOWN IN <i>ANCIENT TEXANS</i> (SHAFFER 1986:139; KIRKLAND AND NEWCOMB 1996 [1967]:45)	38
FIGURE 2.2 A SCRATCHED ZOOMORPH FROM HALO SHELTER(41VV1230).	41
FIGURE 2.3 AN ANTHROPOMORPH FROM FATE BELL SHELTER (41VV74) SHOWING AREAS WITHIN ITS BODY THAT LACK PIGMENT.	41
FIGURE 2.4 A U-HEADED ANTHROPOMORPH AT PANTHER CAVE (41VV83).	46
FIGURE 2.5 AN ANTHROPOMORPH WITH WING-LIKE ARMS AT HALO SHELTER (41VV1230).	46

FIGURE 2.6 SUPERIMPOSED FIGURES AT GIANT'S CASTLE ROCK ART SITE IN DRAKENSBERG, SOUTH AFRICA AS SHOWN IN <i>ANCIENT TEXANS</i> (SHAFAER 1986:202; PHOTOGRAPHED BY LEWIS-WILLIAMS).....	59
FIGURE 2.7 WANDJINAS FROM THE GIBB RIVER STATION SITE IN KIMBERLEY DISTRICT, WESTERN AUSTRALIA AS SHOWN IN <i>ANCIENT TEXANS</i> (SHAFAER 1986:205; PHOTOGRAPHED BY GOULD).....	66
FIGURE 3.1 THE LIGHT SPECTRUM AS SHOWN ON MAXMAX.COM (LLEWELLYN 2007).....	74
FIGURE 3.2 THE HUMAN EYE'S VARIANCE OF COLOR SENSITIVITY AS SHOWN ON MAXMAX.COM (LLEWELLYN 2007).....	75
FIGURE 3.3 THE SENSITIVITY OF THE HUMAN EYE AS SHOWN ON MAXMAX.COM (LLEWELLYN 2007).....	75
FIGURE 3.4 THE RANGE OF LIGHT WAVELENGTHS AS SHOWN ON MAXMAX.COM (LLEWELLYN 2007).....	75
FIGURE 4.1 VIEW OF PANTHER CAVE (41VV83).....	90
FIGURE 4.2 PCS1-VS-01	91
FIGURE 4.3 PCS1-GS-01	91
FIGURE 4.4 PCS1-FC-03.....	92
FIGURE 4.5 PCS2-VS-01	92
FIGURE 4.6 PCS2-GS-01	93
FIGURE 4.7 PCS2-GS-03	93
FIGURE 4.8 PCS2-FC-01.....	94
FIGURE 4.9 PCS7-VS-001	94
FIGURE 4.10 PCS7-GS-002 ..	95
FIGURE 4.11 PCS7-FC-001.....	95
FIGURE 4.12 PCS3-VS-01	96
FIGURE 4.13 PCS3-GS-02	96
FIGURE 4.14 PCS3-GS-03	97
FIGURE 4.15 PCS3-FC-03.....	97
FIGURE 4.16 PCS4-VS-01	98
FIGURE 4.17 PCS4-GS-02	98
FIGURE 4.18 PCS4-FC-02.....	99
FIGURE 4.19 PCS5-VS-01	99
FIGURE 4.20 PCS5-GS-02	100
FIGURE 4.21 PCS5-FC-02.....	100

FIGURE 4.22 PCS6-VS-01	101
FIGURE 4.23 PCS6-GS-01	101
FIGURE 4.24 PCS6-FC-07.....	102
FIGURE 4.25 VIEW OF CURLY TAIL PANTHER (41VV18-A, B, C, AND D).....	113
FIGURE 4.26 THE CURLY TAIL PANTHER SITE (41VV18-A).....	114
FIGURE 4.27 THE CURLY TAIL PANTHER SITE (41VV18-B).....	114
FIGURE 4.28 THE CURLY TAIL PANTHER SITE (41VV18-C AND 41VV18-D).	115
FIGURE 4.29 THE CURLY TAIL PANTHER SITE (UNNAMED SHELTER).	115
FIGURE 4.30 CTPS5-VS-001	116
FIGURE 4.31 CTPS5-GS-006, SHOWING AN ADDITIONAL FIGURE WITHIN THE ZOOMORPH'S BODY.....	116
FIGURE 4.32 CTPS5-GS-002	117
FIGURE 4.33 CTPS5-FC-004	117
FIGURE 4.34 CTPS20-VS-001	118
FIGURE 4.35 CTPS20-GS-003	118
FIGURE 4.36 CTPS20-FC-004	119
FIGURE 4.37 CTPS2-VS-001	119
FIGURE 4.38 CTPS2-GS-006	120
FIGURE 4.39 CTPS2-FC-004	120
FIGURE 4.40 CTPS21-VS-001	121
FIGURE 4.41 CTPS21-FC-005	121
FIGURE 4.42 CTPS23-FC-002	122
FIGURE 4.43 CTPS23-FC-003	122
FIGURE 4.44 CTPS6-VS-001	123
FIGURE 4.45 CTPS6-GS-002	123
FIGURE 4.46 CTPS6-FC-002	124
FIGURE 4.47 CTPS10-VS-002	124
FIGURE 4.48 CTPS10-GS-003	125
FIGURE 4.49 CTPS10-GS-002	125
FIGURE 4.50 CTPS14-VS-002	126
FIGURE 4.51 CTPS14-GS-002	126

FIGURE 4.52 CTPS17-VS-002	126
FIGURE 4.53 CTPS17-GS-001	126
FIGURE 4.54 CTPS17-FC-001	127
FIGURE 4.55 CTPS22-VS-001	127
FIGURE 4.56 CTPS3-GS-003	128
FIGURE 4.57 CTPS4-GS-002	128
FIGURE 4.58 CTPS3-FC-002	129
FIGURE 4.59 CTPS4-FC-002	129
FIGURE 4.60 CTPS22-FC-002	130
FIGURE 4.61 GEOMETRICS AT CTPS SHELTER C MAY BE ANOTHER ANTHROPOMORPH.....	130
FIGURE 4.62 GEOMETRICS ON THE BODY OF AN ANTHROPOMORPH AT BIG SATAN SHELTER.	131
FIGURE 4.63 CTPS19-VS-001	131
FIGURE 4.64 CTPS18-VS-002	132
FIGURE 4.65 CTPS18-VS-004.....	132
FIGURE 4.66 CTPS18-FC-001	133
FIGURE 4.67 CTPS19-FC-003	133
FIGURE 4.68 VIEW OF THE WHITE SHAMAN SITE (41VV124).	140
FIGURE 4.69 THE ROCK ART PANEL AT THE WHITE SHAMAN SITE (41VV124).	141
FIGURE 4.70 WSS1-VS-001	141
FIGURE 4.71 WSS2-VS-003	142
FIGURE 4.72 WSS2-GS-001	142
FIGURE 4.73 WSS2-GS-003	143
FIGURE 4.74 WSS1-FC-003.....	143
FIGURE 4.75 WSS2-FC-003.....	144
FIGURE 4.76 WSS4-VS-001	144
FIGURE 4.77 WSS4-GS-004	144
FIGURE 4.78 WSS4-GS-001	145
FIGURE 4.79 WSS4-GS-003	145
FIGURE 4.80 WSS4-FC-002.....	145
FIGURE 4.81 WSS6-VS-001	146

FIGURE 4.82 WSS6-GS-001	146
FIGURE 4.83 WSS6-GS-002	147
FIGURE 4.84 WSS6-FC-002.....	147
FIGURE 4.85 WSS11-VS-001	148
FIGURE 4.86 WSS11-FC-002.....	148
FIGURE 4.87 WSS23-VS-001	149
FIGURE 4.88 WSS23-GS-001	149
FIGURE 4.89 WSS21-GS-002	149
FIGURE 4.90 WSS12-FC-001.....	149
FIGURE 4.91 WSS21-FC-002, SHOWING THE DOT ON THE BODY OF THE RED AND BLACK ANTHROPOMORPH.....	150
FIGURE 4.92 WSS25-VS-001	150
FIGURE 4.93 WSS25-GS-003, SHOWING THE LINE FOR THE ARMS.	151
FIGURE 4.94 WSS25-GS-004	151
FIGURE 4.95 WSS25-FC-002.....	152
FIGURE 4.96 VIEW OF BIG SATAN SHELTER (41VV40).	157
FIGURE 4.97 BGS1-VS-001.....	157
FIGURE 4.98 BGS1-GS-002.....	158
FIGURE 4.99 BGS1-GS-004.....	158
FIGURE 4.100 BGS1-FC-003	159
FIGURE 4.101 BGS2-VS-003	159
FIGURE 4.102 BGS2-GS-004.....	160
FIGURE 4.103 BGS2-FC-021	160
FIGURE 4.104 BGS2-FC-0011	161
FIGURE 4.105 BGS3-VS-005.....	161
FIGURE 4.106 BGS3-GS-004.....	162
FIGURE 4.107 BGS3-FC-011	162
FIGURE 4.108 BGS4-VS-02.....	163
FIGURE 4.109 BGS4-GS-01.....	163
FIGURE 4.110 BGS4-GS-02.....	164
FIGURE 4.111 BGS4-FC-02.....	164
FIGURE 4.112 BGS4-FC-03	165
FIGURE 4.113 BGS5-VS-01.....	165

FIGURE 4.114 BGS5-GS-01.....	165
FIGURE 4.115 BGS5-GS-02.....	166
FIGURE 4.116 BGS5-FC-01.....	166
FIGURE 4.117 BGS7-VS-01.....	166
FIGURE 4.118 BGS7-GS-01.....	166
FIGURE 4.119 BGS7-GS-02.....	167
FIGURE 4.120 BGS7-FC-01.....	167
FIGURE 4.121 BGS8-VS-01.....	167
FIGURE 4.122 BGS9-VS-01.....	167
FIGURE 4.123 BGS8-GS-01.....	168
FIGURE 4.124 BGS10-GS-01.....	168
FIGURE 4.125 BGS8-FC-01.....	168
FIGURE 4.126 THE DEVILS RIVER NEAR MYSTIC SHELTER (41VV612).....	175
FIGURE 4.127 MYSTIC SHELTER ROCK ART PANEL.....	176
FIGURE 4.128 MYST01-VS-01.....	176
FIGURE 4.129 MYST01-GS-032.....	177
FIGURE 4.130 MYST01-GS-007.....	177
FIGURE 4.131 MYST01-FC-08.....	178
FIGURE 4.132 MYST01-FC-025.....	178
FIGURE 4.133 MYST01-FC-070.....	179
FIGURE 4.134 MYST02-VS-0005.....	179
FIGURE 4.135 MYST02-GS-0002.....	179
FIGURE 4.136 MYST02-FC-0008.....	180
FIGURE 4.137 MYST02-FC-0006.....	180
FIGURE 4.138 MYST03-VS-0002.....	181
FIGURE 4.139 MYST03-GS-0015.....	181
FIGURE 4.140 MYST03-GS-0011.....	182
FIGURE 4.141 MYST03-FC-0013.....	182
FIGURE 4.142 MYST03-FC-0018.....	183
FIGURE 4.143 MYST04-VS-002.....	183
FIGURE 4.144 MYST04-FC-002.....	184
FIGURE 4.145 MYST07-VS-001.....	184

FIGURE 4.146 MYST07-GS-0017.....	185
FIGURE 4.147 MYST07-FC-0035.....	185
FIGURE 4.148 MYST07-FC-0011.....	186
FIGURE 4.149 MYST08-VS-003.....	186
FIGURE 4.150 MYST08-FC-0001.....	187
FIGURE 4.151 MYST09-VS-003.....	187
FIGURE 4.152 MYST09-VS-001.....	188
FIGURE 4.153 MYST09-GS-0064.....	188
FIGURE 4.154 MYST09-GS-0041.....	189
FIGURE 4.155 MYST09-FC-0108.....	189
FIGURE 4.156 MYST09-FC-0039.....	190
FIGURE 4.157 MYST09-FC-0037.....	190
FIGURE 4.158 VIEW OF FATE BELL SHELTER (41VV74).....	196
FIGURE 4.159 FBLS01-VS-008.....	196
FIGURE 4.160 FBLS01-VS-007.....	197
FIGURE 4.161 FBLS01-VS-004.....	197
FIGURE 4.162 FBLS01-GS-033.....	197
FIGURE 4.163 FBLS01-GS-024.....	198
FIGURE 4.164 FBLS01-GS-011.....	198
FIGURE 4.165 FBLS01-FC-0024.....	198
FIGURE 4.166 FBLS01-FC-0023.....	199
FIGURE 4.167 FBLS01-FC-0013.....	199
FIGURE 4.168 FBLS06-VS-0007.....	199
FIGURE 4.169 FBLS06-GS-0008.....	200
FIGURE 4.170 FBLS06-GS-0004.....	200
FIGURE 4.171 FBLS06-FC-0027.....	201
FIGURE 4.172 FBLS06-FC-0006.....	201
FIGURE 4.173 FBLS03-VS-002.....	202
FIGURE 4.174 FBLS03-GS-0025.....	202
FIGURE 4.175 FBLS03-FC-0016.....	202
FIGURE 4.176 FBLS04-VS-0003.....	203
FIGURE 4.177 FBLS04-GS-0010.....	203
FIGURE 4.178 FBLS04-GS-0007.....	204

FIGURE 4.179 FBLS04-FC-0010.....	204
FIGURE 4.180 FBLS05-VS-0002	205
FIGURE 4.181 FBLS05-VS-0012	205
FIGURE 4.182 FBLS05-VS-0016	205
FIGURE 4.183 FBLS05-GS-001	206
FIGURE 4.184 FBLS05-GS-062	206
FIGURE 4.185 FBLS05-FC-001	207
FIGURE 4.186 FBLS05-FC-058	207
FIGURE 4.187 FBLS05-FC-105	208
FIGURE 4.188 FBLS12-VS-0002	208
FIGURE 4.189 FBLS12-GS-0008	209
FIGURE 4.190 FBLS12-FC-0011.....	209

ABSTRACT

**OVER-PAINTING AND MAINTENANCE OF
ROCK ART SITES IN THE
LOWER PECOS**

by

Sandra Kay Wier, B.A., B.A.

Texas State University-San Marcos

December 2010

SUPERVISING PROFESSOR: F. KENT REILLY

Rock art created in Pecos River Style is found on both sides of the United State/Mexico border in a geographic region referred to as the Lower Pecos. This thesis explores the implications of the data recorded during a continuing research project conducted within the area of the Lower Pecos region. The central focus of this thesis is the attempts recording pictographs obscured by over-painting or weathering. The sites discussed thesis are Panther Cave, Curly Tail Panther, White Shaman, Big Satan, Mystic

Shelter, and Fate Bell. Several types of over-painting were observed and recorded during this project. The recognition of these types of over-painting support two conclusions, 1) the groups responsible for creating the Pecos River Style rock art were revisiting and maintaining the sites and 2) some of the rock art panels were planned compositions painted by one artist or one group of artists.

CHAPTER 1: INTRODUCTION TO ROCK ART AND THE LOWER PECOS

This thesis discusses a continuing project whose objective is to record and analyze Pecos River Style rock art. Both the project and the thesis specifically address the issue of obscured and altered pictographs. The project's primary research goal is to document Pecos River Style pictographs that are obscured due to weathering or through human actions. The project also explores infrared photography, ultraviolet photography, and digital enhancement as recording tools. The final goal of this project is to address the implications of intra-stylistic over-painting observed within the Pecos River style. This thesis not only presents and discusses the project's results from six Pecos River Style rock art sites, it also explores the issue of ancient peoples' curation or maintenance of these sites over time.

This chapter introduces and defines the region under study. It provides an overview of the Lower Pecos region's rock art, as well as the types and styles of rock art found in the area. The chapter concludes with a brief description of the focus, scope, and sites that are included in this research. Subsequent chapters discuss the terminology, methodology, previous research, and the results of my analysis.

THE LOWER PECOS REGION

The confluences of the Rio Grande, Devil's, and Pecos rivers in Texas form the northern boundaries of a prehistoric cultural region referred to as the Lower Pecos

(Turpin 2001:387 and 1990:265). The southern boundaries of the region extend at least 90 miles south of the Rio Grande into northeastern Mexico (Taylor 1949:77; Grieder 1966:710; Kirkland and Newcomb 1996 [1967]:37-38; Zintgraff and Turpin 1991:10; Boyd 2003:9-11). However, the location of the region's southern boundary remains unknown at this time (Figure 1.1). Due to the logistics of access and temporal restraints, this thesis focuses on sites located within the United States' portion of the Lower Pecos geographic area.

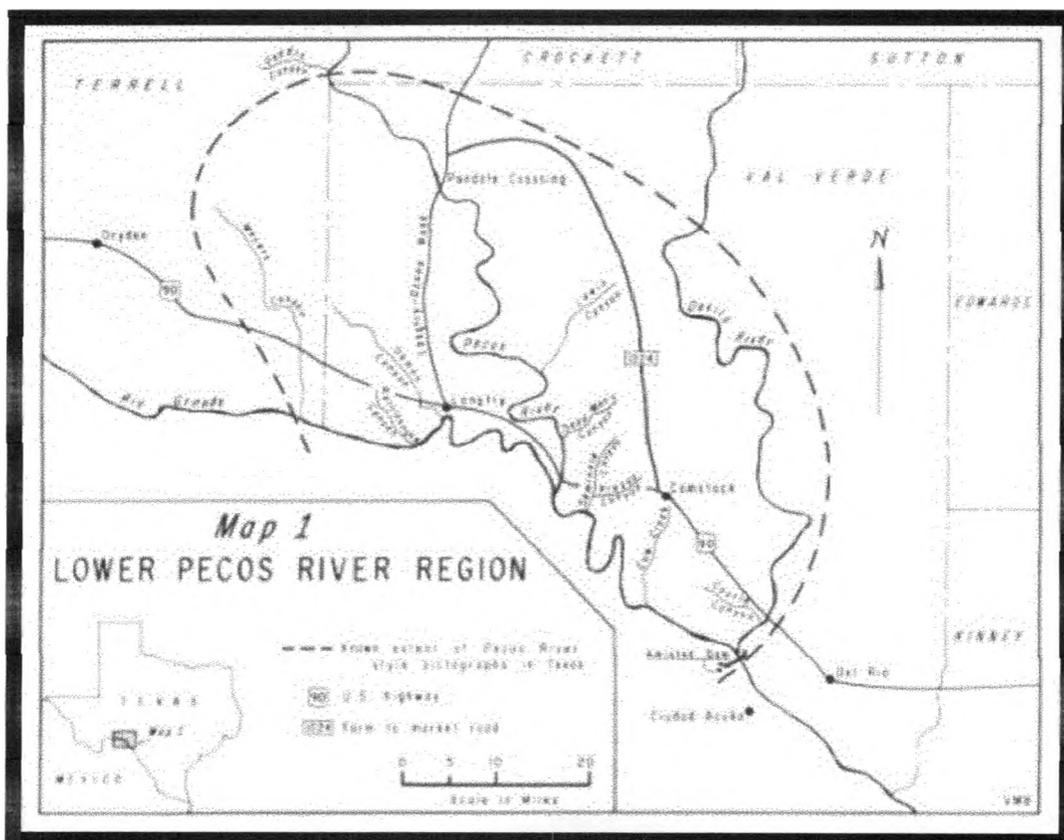


Figure 1.1 Map of the Lower Pecos region as shown in *The Rock Art of the Texas Indians* (Kirkland and Newcomb 1996[1967]:38).

DEFINING ROCK ART

Scholars in the late 1800s and early 1900s such as A.T. Jackson, J.E. Pearce, and Garrick Mallery, tended to use the term “picture-writing” when discussing the

prehistoric art found on rock outcrops, bedrock, cliff-faces, and cave and rock shelter walls (Mallery 1972 [1893]:25-30; Jackson 1938:1-3; and Pearce and Jackson 1933:18-27). Other names frequently given to art found on the natural landscape include “rock art,” “cave art,” “parietal art,” and even “hieroglyphs.” All of these terms are problematic and their use has been criticized at one time or another (Whitley 1998:11; and 2005:3). Nevertheless, the term “rock art” is used most frequently in current literature, therefore, it is the term used in this thesis.

What is considered rock art varies depending upon the researcher and the geographic location. Nevertheless, for the purposes of this thesis the definition used by David S. Whitley will suffice. According to Whitley :

Rock art is *landscape art*. It consists of pictures, motifs, and designs placed on natural surfaces such as cliff and boulder faces, cave walls and ceilings, and the ground surface. Rock art is also sometimes referred to as cave art or *parietal* (wall) art. Regardless of appellation, the defining characteristic of rock art is its placement on natural rock surfaces, thereby distinguishing it from murals on constructed walls, paintings, or carvings on canvas, wood, ceramics, or other surfaces, and free-standing sculptures [Whitley 2005:3; emphasis in original].

TYPES OF ROCK ART

There are two types of rock art in the Lower Pecos Canyon lands, petroglyphs (Figure 1.2*), and pictographs (Figure 1.3). Petroglyphs are a type of rock art wherein the figures are pecked, scratched, carved, or abraded into the rock surface. By contrast, pictographic rock art is painted or drawn onto the rock surface (Jackson 1938:4-5;

* Photographs were taken by the author unless otherwise stated

Kirkland and Newcomb 1996 [1967]:108-110; Pearce and Jackson 1933:79-87; and Shafer 1986:163-170).

Portable art such as painted and/or scratched pebbles (Turpin and Middleton 1998:51) and small clay figurines (Shafer 1975:150-156 and Chandler et al 1994:351-353) have also been found at archaeological sites in the Lower Pecos (Figure 1.4). Early researchers such as A.T. Jackson, David Gebhard, and Mark Parsons attempted sort these forms of mobiliary art into types or styles (Gebhard 1960:24-29, 1965: 4-7, 20-28; Jackson 1938:4-5; Parsons 1986:180-181; Pearce and Jackson 1933:79-87). Some, such as Jackson and Gebhard, even went so far as to draw comparisons between the rock art and painted pebbles, and used the portable art as a basis for their proposed typologies and phase of the Lower Pecos rock art (Gebhard 1960:24-29, 1965:20-28; Jackson 1938:4-5; Pearce and Jackson 1933:79-87). However, since these forms of portable art do not fit the previously stated definition of rock art, they will not be discussed further within this thesis.

Pictographs are the most common form of rock art found in the Lower Pecos region. The pictographs have been divided into five basic styles. One of these styles is considered historic and it is referred to simply as "Historic Style." The remaining four styles are prehistoric (Gebhard 1960:24-29; Grieder 1966:710-715; and Kirkland and Newcomb 1996 [1967]:37, 81, and 93; Taylor 1949:77-78). These styles, from latest to earliest, are generally referred to as, Red Monochrome, Bold Line Geometric, Red Linear, and Pecos River (Shafer 1986:138-155; Turpin 1986b:186-189). The presence of organic binder material has made it possible to obtain radiocarbon dates from the

pictographs (Hyman and Rowe 1997:1-2; Hyman et al. 1996:94-95; Ilger et al. 1994:339; Ilger et al. 1995:308-309; Reese 1994:79-81; Rowe 2003:85-86, 2009:1730-1734).



Figure 1.2 Petroglyphs at the Fate Bell Shelter (41VV74) in Seminole Canyon State Park, in Texas.

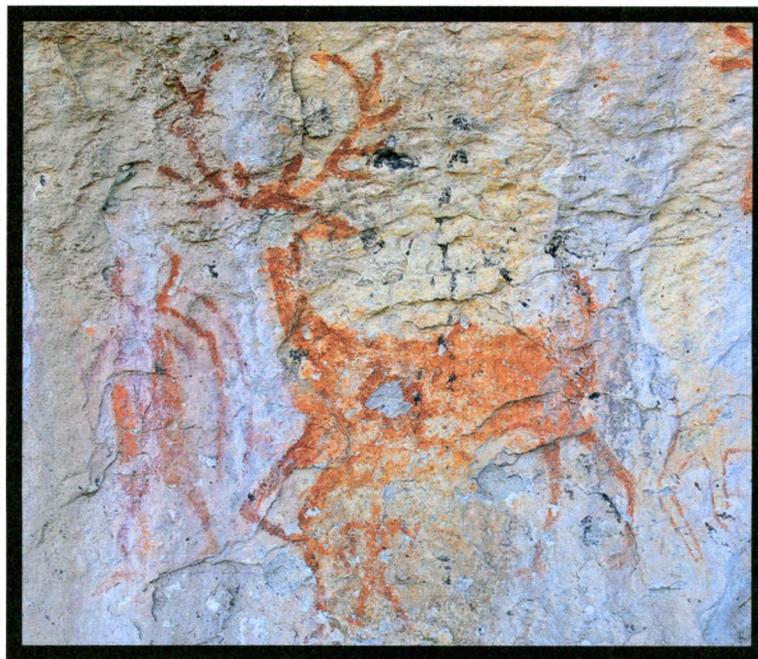


Figure 1.3 Pictographs at the Meyer's Spring site (41TE19) in Texas.



Figure 1.4 Painted Pebbles from the Lower Pecos as shown in *Ancient Texans* (Shafer 1986:167; photograph by Jim Zintgraph).

PICTOGRAPHIC STYLES

HISTORIC STYLE

The youngest style found in the Lower Pecos is the Historic style. These pictographs were painted by indigenous people after their contact with Europeans. In the southwestern portions of Texas this contact occurred during the sixteenth through the eighteenth centuries when Gaspar de Sosa and other groups of Spaniards entered the area (Turpin 1989:278-280). Although radiocarbon dates have not been established for the Historic Style pictographs in the Lower Pecos, based upon the subject content, this style post-dates European contact in the region. Historic rock art often depicts contact of Native Americans with Europeans and other outside groups that were pushed into the area (Turpin 1989:286-296, 2004:278). The symbolic elements such as shields, horses, cattle, guns, and crosses identify this style as historic (Turpin 1991:8-9). The graffiti of

European settlers and military personnel often accompanied these pictographs (Figure 1.5 and Figure 1.6). The colors used to paint the Historic Style pictographs were red, orange, yellow, and brown (Kirkland and Newcomb 1996 [1967]:100-8).

RED MONOCHROME STYLE

The Red Monochrome Style, originally called the Val Verde Flooded Shelter Style by Forrest Kirkland (1937:113-115, 1938:20), was produced during the Late Prehistoric Period (1300-500 BP) (Turpin 1984:29-31). Unfortunately, only one pictograph of this style has been dated (Table 1.1). A date of 1125±85 BP was obtained from a Red Monochrome Style pictograph at site 41VV233 (Ilger et al. 1995:302). In a 2004 publication, Solveig Turpin (2004:275) suggests that the Historic pictographs of the Lower Pecos may represent a post-contact continuation of the earlier Red Monochrome Style. Red Monochrome pictographs were realistically rendered and, as the name suggests, the figures were painted in single colors, but were never polychrome (Figure 1.7). The figures are usually red; however, the style does include monochrome pictographs in colors such as orange, yellow, and possibly black.

The figures depicted in the Red Monochrome Style include handprints and realistically rendered animals. Human-like figures, which often have their arms raised in a “stick-em-up” or splayed position are a hallmark of this style. The exaggeration of such features as hands, feet, digits, and male genitalia gives some of these pictographs a lizard-like appearance (Turpin 1986a:124). The portrayal of bows and arrows in Red Monochrome reinforces the placement of this style within the Late Prehistoric period (Kirkland and Newcomb 1996 [1967]:81). Red Monochrome shares many stylistic

elements with Historic Style rock art, but lacks elements depicting contact with Europeans (Turpin 2001:392).

BOLD LINE GEOMETRICS

In 1986 Turpin proposed an additional style referred to as Bold Line Geometrics (1986b:188, 1986c:154). Turpin indicates that this style, made up of abstract polychrome pictographs, is probably contemporaneous with that of Red Monochrome. She identifies the elements of this style to include various geometrics such as chevrons, straight lines, zigzags, herringbone, and blanket-like patterns as well as a form resembling that of an insect (Turpin 1986b:188-189). According to Turpin, this is an intrusive style that occurred in Northern Mexico and extended into the Lower Pecos (Turpin 2001:392; 2004:276).

RED LINEAR STYLE

Although it was previously noted by Herbert C. Taylor, Jr. (1949:77-78) and other researchers (Jackson 1938:362-363; Kirkland and Newcomb 1996 [1967]:93-94), the Red Linear style of pictographs was recorded and named in a 1960 publication written by David Gebhard. He indicated that all of the figures he observed within this style were painted with red pigment. Additionally, Gebhard stated that the Red Linear pictographs were small in scale (Gebhard 1960:53).

Red Linear pictographs are generally defined as small stick figures (Figure 1.9) These pictographs at first glance resemble child-like drawings (Kirkland and Newcomb 1996 [1967]:93). However, upon closer inspection the complex nature of the Red Linear Style becomes apparent. The figures depicted are dynamic (Kirkland and Newcomb 1996 [1967]:93; Turpin 1982:48; 1990:271). They are often engaged in activities such as

warfare, hunting, birth, intercourse, dancing, or other ritual-like activities (Turpin 1984:26). Although they are usually red, other colors such as black have also been observed (Grieder 1966:717-719; and Turpin 1990:271).

Turpin and others believe that the Red Linear style appeared during the latter part of the Late Archaic period (3000-1300 BP) (Kirkland and Newcomb 1996 [1967]:91-93; Turpin 2001:391). However, to date only two pictographs of this style have been radiocarbon dated (Table 1.1). The first figure dated was from 41VV162A and the results indicated an approximate age of 1280 ± 135 years B.P. (Ilger, Hyman, and Rowe 1994:343-344). The second Red Linear figure sample was taken from 41VV75 and produced a similar range of 1280 ± 80 years B.P. (Hyman and Rowe 1997; Rowe 2005:258-259).

Recent research conducted in the Lower Pecos by Carolyn Boyd brings these dates into question (Boyd and Rowe 2010). She has confirmed the existence of at least four rock art sites at which the supposedly older Pecos River style figures are superimposed over the newer Red Linear figures (Boyd and Rowe 2010). Unfortunately, until additional Red Linear pictographs can be dated, the exact age and duration of this rock art style will remain unknown.

PECOS RIVER STYLE

Although the Pecos River Style was first recognized, defined, and reported by Kirkland (Kirkland 1939:47, 75), Herbert C. Taylor (Taylor 1949:77-78), David Gebhard (Gebhard 1960:9; 1965:12-30), and others, W.W. Newcomb, Jr. gave it the name by which it is now known (Kirkland and Newcomb 1996 [1967]:37). The Pecos River Style seems to have had the longest temporal duration. According to radiocarbon dates

obtained from Pecos River Style pictographs at numerous sites (Table 1.1), this style made its first appearance around 4200 BP and continued until approximately 2950 BP (Ilger et al. 1995:300-303; Hyman and Rowe 1997:2-5; Rowe 2005:254-255,2009:1730-1734). This places the style within what is now considered to be the Late Archaic Period in Texas (Collins 2004:112-113).

Pecos River Style pictographs have a wide range of colors and variation (Boyd 2003:19-21; Taylor 1949:77-78). The artists painted the figures using a variety of application techniques including wet and dry application (Kirkland and Newcomb 1996 [1967]:100-8). The Pecos River Style is characterized by complex polychrome figures that differ considerably in size and style as well as a variety of themes and elements (Figure 1.10). Transformation, flight and/or falling, and impaled humans and animals are themes that are often depicted (Turpin 2001:389-390).

There is considerable variation in the themes, characteristics, and elements recognized and defined by researchers who study the Pecos River Style pictographs. However, in the following section I will discuss some of the descriptive terms used to discuss the Pecos River Style figures and elements mentioned in this thesis. These terms are not intended to interpret or assign meaning to a particular element; they are simply used to streamline the description of the pictographs. In those instances where an object has been recognized or interpreted as representing something, it will be noted in the definition of the term.

STYLE	SITE	UNCALIBRATED AGE BP	CALIBRATED DATE CAL BC/CAL AD	REFERENCES
PECOS RIVER	41VV75	3865±100	2650-2000 BC	RUSS ET AL. 1990
PECOS RIVER	41VV576	3000±70	1410-1010 BC	RUSS, HYMAN, AND ROWE 1992
PECOS RIVER	41VV576	1450±75	REJECTED OUTLIER	CHAFFEE, HYMAN, AND ROWE 1994
PECOS RIVER	41VV576	3355±65	1880-1840, 1780- 1490 BC	RUSS, HYMAN, AND ROWE 1992
PECOS RIVER	41VV576	4200±90	3050-2450 BC	CHAFFEE HYMAN AND ROWE 1993
PECOS RIVER	41VV576	2950±60	1380-1330, 1320-970 BC	HYMAN AND ROWE 1997
PECOS RIVER	41VV75	2750±50	1000-810 BC	HYMAN AND ROWE 1997
PECOS RIVER	41VV75	3190±60	1620-1310 BC	HYMAN AND ROWE 1997
PECOS RIVER	41VV75	2950±60	1380-1330, 1320-970 BC	ILGER ET AL. 1996
PECOS RIVER	41VV75	3580±60	2130-2080, 2050- 1740 BC	ILGER ET AL. 1996
PECOS RIVER	41VV75	3240±60	1690-1400 BC	ILGER ET AL. 1996
PECOS RIVER	41VV75	3210±60	1630-1370, 1340- 1310 BC	ILGER ET AL. 1996
PECOS RIVER	41VV75	3550±90	2140-1680 BC	HYMAN AND ROWE 1997
PECOS RIVER	41VV75	3680±60	2280-2250, 2210- 1880 BC	HYMAN AND ROWE 1997
PECOS RIVER	41VV75	3690±80	2350-1750 BC	PACE ET AL. 2000
PECOS RIVER	41VV75	3790±60	2460-2030 BC	PACE ET AL. 2000
PECOS RIVER	41VV75	3440±50	1890-1610 BC	PACE ET AL. 2000
PECOS RIVER	41VV75	2340±80	800-200 BC	PACE ET AL. 2000
PECOS RIVER	41VV75	3310±50	1740-1710, 1700- 1490, 1480-1450 BC	PACE ET AL. 2000
PECOS RIVER	41VV75	3790±60	2460-2030 BC	PACE ET AL. 2000
PECOS RIVER	41VV696	3010±100	1500-900 BC	UNPUBLISHED DATE, TAMU
PECOS RIVER	41VV124	2420±80	790-380 BC	UNPUBLISHED DATE, TAMU
PECOS RIVER	41VV124	1960±60	1100 BC-AD 220	UNPUBLISHED DATE, TAMU
PECOS RIVER	41VV124	1970±80	170 BC-AD 230	UNPUBLISHED DATE, TAMU
PECOS RIVER	41VV124	1460±80	AD 420-720	UNPUBLISHED DATE, TAMU
RED LINEAR	41VV162	1280±150	AD 400-1050	ILGER, HYMAN, AND ROWE 1994
RED LINEAR	41VV75	1280±80	AD 620-900	HYMAN AND ROWE 1997
RED MONOCHROME	41VV233	1125±85	AD 680-1041	ILGER, ET AL. 1995
PRS-MEXICO	SAN VICENTE	1930+170/-480	400 BC-AD 1200	UNPUBLISHED DATE, TAMU
PRS-MEXICO	SAN VICENTE	2500±255	1300 BC-AD 100	UNPUBLISHED DATE, TAMU

Table 1.1 Dating Results on Rock Art from the Lower Pecos (After Rowe 2005:254-255).

PECOS RIVER STYLE PICTOGRAPHIC ELEMENTS

Although there is considerable variation amongst the Pecos River Style pictographs, anthropomorphic figures, animals, and non-representational forms are the most common types of figures represented within this style. A fourth, but less common figure type is the handprint. Anthropomorphs are figures that display human-like characteristics. Anthropomorphs that are human-like but also have some animal-like attributes, such as fur and antlers, are referred to interchangeably as either anthropomorphs or therianthropes. Figures that are animal-like are referred to as zoomorphs (Boyd 1996:153-5; 1998b:50-51; and 2003:28-30). The definition of non-representational forms is more complex and will be addressed in a subsequent section.

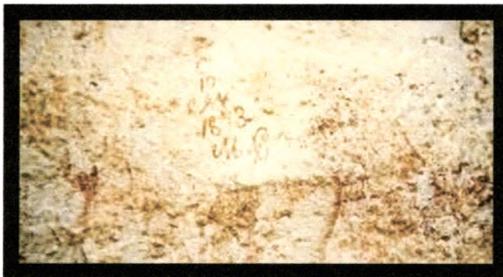


Figure 1.5 Historic Graffiti at Meyer's Spring.



Figure 1.6 Historic Pictographs at Meyer's Spring.



Figure 1.7 Red Monochrome figure at the Curly Tail Panther site, Texas.



Figure 1.8 An example of the Boldline Geometric Style proposed by Turpin.

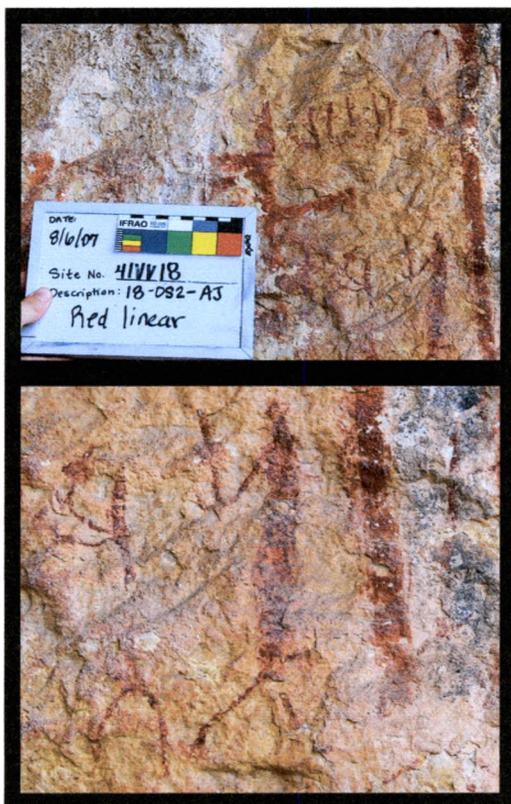


Figure 1.9 Red Linear figures at Curly Tail Panther.

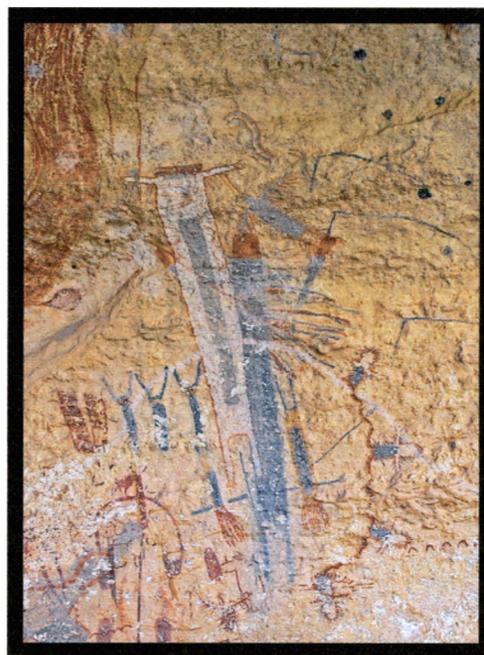


Figure 1.10 Pecos River Style Rock Art at the White Shaman Site, Texas.

ANTHROPOMORPHS/THERIANTHROPES

Anthropomorphs are figures that display human-like characteristics. In the Pecos River Style, the anthropomorphic figures are stylized representations of the human form. The trunk of the body is elongated and their arms and legs are often disproportionately short. The Pecos River Style anthropomorphs vary considerably in size, color, and other characteristics. They range from a few centimeters to several meters in length. Their color varies; and they may be monochromatic or polychromatic.

As previously stated, anthropomorphs with animal-like attributes are often referred to as therianthropes. While they retain the elongated human-like bodies typical of the Pecos River Style anthropomorphs, therianthropes also display various animal-like features. These features include antlers, rabbit ears, wing-like structures, and fur. Although some therianthropes have only one animal attribute, many of them display multiple animal-like characteristics. Additionally, some therianthropes appear to be an amalgamation of several different animals, retaining the human-like body, but displaying the animal attributes of multiple animal species. All therianthropes are anthropomorphs but not all anthropomorphs are therianthropes. For the purposes of this thesis however, the terms anthropomorph and therianthrope are used interchangeably to describe anthropomorphs with animal attributes.

In the Pecos River Style, there is considerable variation in the attributes and elements associated with anthropomorphs. Although it is not the primary focus of this thesis, the following section provides definitions for a few of the more common anthropomorphic characteristics. In 2009 Carolyn Boyd launched an intensive rock art recording project in the Lower Pecos entitled the Lower Pecos Rock Art Recording and

Research Project. The purpose of this project is to gather data for an attribute analysis of the Pecos River Style anthropomorphs (Boyd 2010 personal communication). Many of the terms I will define in the following section are taken from the forms issued during the recording project.

Contrastyled/Noncontrastyled

Contrastyled anthropomorphs and/or zoomorphs have patterns and/or colors within the central portion of their bodies (Boyd 2003:28-29). These patterns include straight lines, rectangles, squares, circles, dots, single-pole ladders, curvilinear lines, and other forms. Colors or patterns differentiate the interior of the body from the rest of the figure. Noncontrastyled anthropomorphs lack this type of decoration. They were painted either in a single solid color or have a thin outline of one color and bodies that were completely in-filled with a differing color (Boyd 2003:28-29).

Some rock art researchers refer to contrastyled anthropomorphs as “skeletonized” or “x-rayed” anthropomorphs (Turpin 2001:390; Flood 1997:268; Keyser 2004:80-82; Wellmann 1975:137). However, both of these terms are problematic for Pecos River Style rock art because they imply that the patterns shown within the body of the figure represent the skeleton or internal organs of that figure (Flood 1997:268-269). Therefore, for the purposes of discussing Pecos River Style rock art, I prefer to use the more neutral term “contrastyled.”

Hip Clusters/Feathered Hip Clusters

Long, cylindrical or feather-like objects that extend from the midsection of the anthropomorph were originally interpreted simply as feathers and recorded by Jackson (Jackson 1938:370-372). This element is now referred to as hip clusters or feathered hip

clusters (Boyd 2003:36; and Kirkland and Newcomb 1996 [1967]:49). The number of anthropomorphs depicted with hip clusters is limited, therefore; it is difficult for scholars to interpret the meaning of this element (Boyd 2003:42-43; Harrison 2004:113, 123-124; and Kirkland and Newcomb 1996 [1967]:49).

Masked

A masked anthropomorph has an area within its head that was painted using two or more colors. This difference in coloration is separate and/or different from that of the anthropomorph's body (Boyd 2007).

Antlered

Multi-pronged or branched objects that are attached to an anthropomorph's head are currently interpreted as deer antlers (Boyd 2003:41; and Jackson 1938:370).

U-Headed or U-Shaped Head

U-Headed anthropomorphs have short parallel extensions on either side of the head and many have cat-like characteristics. Turpin (1994a:77) believes that these figures represent an anthropomorph undergoing transformation into a feline or that they may represent humans wearing feline headdresses. However, some of these figures are more difficult to characterize as feline since the extensions on the head are square rather than rounded.

Rabbit-Eared

Rabbit eared therianthropes have either one or two protrusions extending from the head (Turpin 2001:389). These protrusions resemble exclamation points and if there are two they converge at the narrow end (Harrison 2004:3). The heads and occasionally the bodies of the rabbit eared therianthropes often appear to be painted in profile.

Plumes

Plumes resemble feathers and are often referred to in the literature as such (Jackson 1938:370; Kirkland and Newcomb 1996 [1967]:56). They have a straight central line with numerous smaller lines that are perpendicular to it. They appear above or near the head of an anthropomorph (Harrison 2004:2-3).

Ecstatic Scalp/Ecstatic Hair and Halo-like Objects

The ecstatic scalp, sometimes called radiant hair, refers to a figure whose hair appears to defy gravity by standing straight above the figure's head (Turpin 1994a:77-78). Occasionally anthropomorphs appear to have a halo-like object above their heads. Harrison (2004:3-5) believes that the halo represents a stylized version of the ecstatic scalp.

Atlatls and Spears

During his efforts to record the rock art of Texas, A.T. Jackson noted representations of spear-throwers, spears, and other tools in the pictographs of the Lower Pecos (Jackson 1938:388-389). Spear-throwers, referred to as atlatls, are depicted in the Pecos River Style by a thin line with a hook at the top. These atlatls are typically connected to (or associated with) another thin line that usually forms a 45 degree angle with the atlatl. The lines associated with the atlatls represent spears or darts (Jackson 1938:388-389; Kelley 1950:72-74; Taylor 1949:77-81). These lines often have a small circular shape at the top that may represent spear fletching. Occasionally the artists depicted the atlatl and spear in a stylized manner. In these cases, atlatls are depicted with additional details such as notches, weights, and finger loops; and spears are shown with lines on their tips (Koenig 2010).

Spiny Oval/Datura

Another accoutrement that is often associated with the anthropomorphs has been described as, “a staff-like object with an enlarged distal end” (Campbell 1958:158). “The enlarged distal end of the staff-like object is most frequently depicted as an ovular or circular object with numerous spinescent protrusions; however, stylized versions of the motif are also present” (Boyd 2003:90-91). Researchers have interpreted this object as numerous things including a gourd rattle (Campbell 1958:158), a fish (Grieder 1966:717-9) and a prickly-pear pouch (Kirkland and Newcomb 1996 [1967]:49-52). It has also been referred to as a “shaman’s flying bag” (Jones 2005:161-3). Boyd uses data from a variety of disciplines such as archaeology, ethnography, neuropsychology, and botany to support her argument that this spiny oval represents a datura pod (Boyd 2003:90-105). Although researchers disagree over what this object depicts, this paper will refer to the “spiny oval” as a datura pod.

ZOOMORPHS

Zoomorphs are a common element in most rock art styles. In Pecos River pictographs, the most common zoomorphs are identified as deer and felines (Kirkland and Newcomb 1996 [1967]:40). However, images such as birds, reptiles, and insects have also been identified (Shafer 1986:138-146). Some zoomorphic figures are difficult to classify. While they are clearly animal-like, they lack characteristics that would definitively identify them. These figures are referred to as quadrupeds or enigmatic zoomorphs. There is an obvious absence of bison related imagery within the Pecos River Style (Turpin 2004:272). The lack of large game animals in the Pecos River Style pictographs helped early researchers develop a temporal placement for the style based on

the knowledge that bison were absent in the Lower Pecos region during the Middle Archaic (Grieder 1966:719-720; Kirkland and Newcomb 1996 [1967]:40; and Taylor 1949:85-86).

NON-REPRESENTATIONAL FORMS

“Non-representational” or “non-objective” forms are very abstracted figures. These forms do not obviously represent or refer to anything within the external physical world (Delahunt 2008; Gardner et al. 1991:559; Read 1984:242). Terms such as “non-representational,” and “non-objective,” are problematic particularly when they are applied to prehistoric art. The difficulty stems from the fact that these terms often refer to figures which *may* represent something to the artist(s) or the intended audience but which is unrecognizable to the modern viewer. This is further complicated by disagreement over the application of these terms to geometrics such as squares and circles (Delahunt 2008; Read 1984:242).

For the purposes of this thesis I will use the term non-representational to refer to figures or elements found within the rock art that do not have an obvious correspondence with or resemblance to objects found within the natural external environment of the Pecos River Style artists. Therefore, non-representational forms will include both enigmatic and geometric figures.

Enigmatic Figures

Enigmatics are abstract shapes, that are neither anthropomorphic or zoomorphic. They include, honeycomb-like patterns, paint splatters, whorls, spirals, letter-like figures, and other designs that are non-geometric (Boyd 1998b:50-51; 2003:29; and Jackson 1938 432).

Letter-Like Shapes

Originally recorded by Jackson, Letter-like shapes are enigmatics that resemble the letters of the English alphabet for which they are named. These figures include: C-shapes, U-shapes, and W-shapes (Jackson 1938:443). The Pecos River Style artists painted the letter-like shapes using a variety of techniques. Some of the figures have a simple linear appearance, while others have a blocky or globular quality. These shapes may be monochrome or polychrome and they are often quite elaborate. A U-Shape is a line that curves back upon itself. The curve of the line is narrow and the line's terminal ends are parallel. C-shapes are similar in appearance to the U-shapes, but the curve in the line of a C-shaped geometric is not as tight. Therefore C-shapes have a crescent-like appearance. W-shapes have either a single straight line connecting three smaller perpendicular lines or; they have a single curved line (similar to that of the U and C-shapes) with a single smaller line in the center.

Comb Shapes

Comb Shapes (also referred to as "comb-like shapes") were originally referred to as rake-like elements by Jackson (1938:441). As their name implies, comb shapes have a comb-like appearance. They are similar to W-shapes in that they have a single line that connects several smaller lines. The smaller lines are perpendicular to the longer line and the longer line may be straight or curved. In contrast to the W-shapes, comb shapes have four or more small lines connecting to the larger line. Comb shapes range in complexity from simple linear figures to elaborate designs (Jackson 1938:441).

Geometrics

Similar to enigmatic figures, geometrics are non-representational forms, which are neither anthropomorphic or zoomorphic. However, the term “geometrics” refers to figures such as circles, squares, and undulating or straight lines (Boyd 1998b:50-51; 2003:29; and Jackson 1938:432).

Arch and Circle

Initially recorded by A.T. Jackson, straight and wavy lines that curve to form a V-shape are common in the Pecos River style (Jackson 1938:432-441). These lines often have a circle at the center where the bend occurs. Depending upon its characteristics, this type of geometric may be referred to as an arch, a crenellated arch, an arch and circle, or a crenellated arch and circle (Boyd 1998b:77-83; 2003:45-48; Jackson 1938:432-441; and Turpin 2001:389-390).

Boxes and Squares

Square shapes, referred to as boxes, are also frequent in the Pecos River style. These boxes may be a single solid color or they may contain several colors. Often the boxes have a short line that extends from each lower corner (Jackson 1938:224-225; and Pearce and Jackson 1933:20).

Single-Pole Ladders

Another geometric commonly found in Pecos River style rock art is a single straight line intersected by a series of smaller straight lines. Initially observed on painted pebbles and described by J. E. Pearce and A. T. Jackson as “pole-ladders” these designs appear frequently in Pecos River Style rock art (Pearce and Jackson 1933:86-87). In a later work by A.T. Jackson the terms “pole-ladder” and “single-pole ladder are used

interchangeably to describe this type of geometric (Jackson 1938:146-238 and 432-437). Although their exact meaning remains unknown, these figures are now generally referred to as “single-pole ladders” or “single-pole ladder-like designs ”

HANDPRINTS

Although A.T. Jackson indicates that handprints are rare at older pictographic sites, handprints are sometimes found in Pecos River style pictographs (Jackson 1938:374-377). Handprints can be positive, negative, or stylized (Boyd 2003:28-9).

RESEARCH FOCUS: OBSCURED IMAGES AND ALTERED FIGURES

The level of complexity and variation among the Pecos River Style pictographs of the Lower Pecos region suggest that its artists shared a complex belief system that had a lengthy duration (Turpin 2004:267). Of the four pictographic styles of rock art found in the Lower Pecos region along the Texas/Mexico border, the Pecos River Style is believed to be the oldest (Gebhard 1960:9; 1965:12-30; Grieder 1966:713-715; Kirkland 1939:47, 75; Taylor 1949:77-78; Turpin 2001:391). Thus far, the radiocarbon dates obtained from the region’s pictographs have confirmed the antiquity and duration of the Pecos River Style (Ilger et al 1995:300-303; Hyman and Rowe 1997:2-5; Rowe 2005:254-255, 2009:1730-1734).

Considering the age of the Pecos River Style pictographs, they seem remarkably well preserved. However many of the Pecos River Style figures are obscured due to various processes. In the next chapter I will elaborate on the processes that obscure Pecos River Style rock art, as well as review the relevant literature and ethnography. In Chapter 3 of this thesis I discuss the techniques used to record, reveal, and analyze the pictographs. The fourth chapter explains the results obtained from the following six rock

art sites: Panther Cave, Curly Tail Panther, White Shaman, Big Satan, Mystic Shelter, and Fate Bell. The final chapters discusses the implication of the results.

CHAPTER 2: TERMINOLOGY AND LITERATURE REVIEW

This chapter provides a brief discussion about the natural and human processes that often alter the appearance of the Pecos River Style pictographs. In this chapter, I discuss these processes and provide definitions of the types of artistic alterations made to the paintings. This chapter also includes a brief review of the literature on photo-processing and rock art research that pertains to over-painting.

NATURAL PROCESSES IMPACTING ROCK ART VISIBILITY

Several natural processes reduce the visibility of rock art, such as spalling, flaking, insect nests, debris, mineral seepage, coatings of various substances, and abrasion by dust flora and/or fauna. Spalling, a process by which large and small sheets of the rock surface separate from the parent rock, results in the loss of sections of pigment. Flaking of the pigment degrades the images within the panel. Insect nests and debris often cover the pictographs reducing their visibility and accelerating deterioration. Minerals that seep through the rock wall cover the images with a milky film referred to as calcium carbonate. At many Pecos River Style sites, a dust-like substance clings to the pigment of some of the figures and coats the lower portion of the panel (Silver 1985:9-23). In 1996 researchers analyzed this coating and attributed it to the formation of whewellite and calcium oxalate on the shelter walls (Russ et al. 1996:30-34; Russ et al. 1999:94-100; Russ et al. 2000:32-36). These processes create challenges for researchers who want to record the pictographs as accurately as possible.

HUMAN ALTERATIONS AND ROCK ART VISIBILITY

Pictographs altered through human actions may present additional challenges for researchers (Turpin 1982:100). Images at Pecos River Style sites often completely or partially overlap each other. Some of the figures look as though they have been altered through the addition of paint or by other means. In many cases, the alterations were made within the same stylistic tradition, and possibly even by the same artist. However, describing the alterations objectively is very difficult.

DEFINITION OF TERMS

Difficulties often arise due to a lack of terminology that describes the alterations observed, without making implications as to the meaning or intention of the artist. This thesis borrows vocabulary from several disciplines in order to discuss the rock art, therefore, it is important to define a few key terms. The terminology used for this paper may seem subjective, however; I have attempted to provide definitions for these terms based on observable characteristics in the rock art.

STYLE

The term “style” is difficult to define, particularly when referring to art. Gardner’s *Art Through the Ages* defines style as, “A manner of treatment or execution of works of art that is characteristic of a civilization, a people, or an *individual*; also, a special and superior quality in a work of art.” (Gardner, et al. 1991:I:561; emphasis added) Whereas F. Kent Reilly states that, “style encompasses the formal qualities of a work of art which links that work of art to other works of art” (Reilly 2008, Personal Communication). For the purposes of this paper, the term “style” refers to both the

characteristics of individual images within a Pecos River Style rock art panel and the general characteristics of the rock art.

INTRA-STYLE/INTRA-STYLISTIC

The term “intra-style” refers to an observation that occurs within the same or similar style. Based upon similar uses of color and design, I believe that the Pecos River Style figures under observation were probably over-painted by artists within the same stylistic tradition, therefore, I refer to it as “intra-stylistic” over-painting.

MOTIF

A motif is a consistent and/or repetitive element, such as an image, figure, and/or design. Motifs may reoccur in a consistent form or in a similar form with variations (Delahunt 2008). For the purposes of this thesis, motifs are “repeated themes or dominant features in the rock art that are composed of two or more pictographic elements” (Boyd 2003:41).

ELEMENT

Elements are one of the literal qualities of a creative work. They are the most basic, simplified component of a work of art. Color, value, line, shape, form, texture, and space are all considered elements of art (Delahunt 2008). For the purposes of this thesis, I define an element as the most simplified portion of a rock art figure.

THEME

A theme is a topic, subject, or idea that unifies a body of work (Delahunt 2008)

COMPOSITION/COMPOSITIONAL

Composition is “the plan, placement, or arrangement of the elements of art in a work. Composition can also refer to the area of a [sculpture, canvas, print or,] sheet in which the design appears in a drawing or print” (Delahunt 2008). Gebhard states that “each of the panels appear to constitute a single overall design” (1960:33) which indicates that he saw the Pecos River Style panels as compositions. Boyd’s work seems to confirm that at least some of these panels were planned compositions. She indicates that, “the vast majority of the images in the White Shaman panel are part of a well-organized composition – not simply a random placement of pictographic elements” (Boyd 2003:67). The term “compositional element” as it is used in this thesis, describes the intent of the artist to include an element or motif into or as part of a larger composition. For example in a traditional Crucifixion scene, the Jesus’ body would superimpose the cross. Since this type of over-painting represents a device used by the artist to indicate one object in front of another, it would be considered compositional over-painting.

OVER-PAINTING

The term over-paint usually refers to a final coat (or coats) of paint superimposed on another layer of paint (Smith 1987:205-7). Although the archaeological literature generally refers to it as “superimposition” or “superposition,” I use the terms “over-painting,” “superimposition,” and “overlay” interchangeably to refer to a pictograph that covers another pictograph. I also use these terms to refer to the act of painting one image over another.

OVERLAP

In contrast to over-painting, the term “overlap” usually refers to a figure that partially covers another figure and conveys depth. It may also convey the spatial relationships between several figures (Delahunt 2008). I use the term overlap to refer to figures that partially cover each other. The purpose of overlapping Pecos River Style figures is often unclear. Nevertheless, in some cases, it is possible to determine if the overlapping was intended to be part of the overall composition. This can be accomplished by examining the stylistic variation between the figures as well as their execution.

UNDER-PAINTING

“Under-painting” is defined as an initial layer of paint applied to the support. It is generally part of the artist’s preparatory work and may serve as a guide for the development of the final painting (Delahunt 2008). Generally, the artist paints over this initial coating of pigment with a subsequent layer (or layers) of paint (Mayer 1981:161-162). Although it is generally considered preparatory, the under-painting in a composition may be visible through the final layer of paint. This visibility is sometimes intentional on the part of the artist. More often, however, the artist initially obscured the under-painted images with subsequent layers of paint and the under-painting only becomes visible after the deterioration of the painting’s upper layers (Palmer 1984:88-94). In this thesis, I use the term under-painting to refer to a layer or layers of paint beneath the visible image. These under-painted images may or may not be visible through the last layer of paint.

UNDER-DRAWING

Art historians use the term “under-drawing” to refer to artist’s preliminary drawing made on the support (Read 1984:252). The artist later incorporates the marks into the figure or composition (Delahunt 2008). These marks represent the preliminary preparation work or sketching of the composition (Mayer 1981:630). In the current discussion, I use the term under-drawing to refer to small marks or drawings that are completely covered with larger applications of paint. These small marks *may* represent the Pecos River Style artists’ preparatory sketching of the have been painted over preparatory marks or figures that are drawn, painted, or incised onto the panel.

INPAINTING

Art conservators define “inpainting” as repainting or retouching a damaged part of a painting. According to this definition, inpainting is usually done by someone other than the original artist and it is done with the intention of repairing the painting (Delahunt 2008).

Inpainting as the term is used in these pages refers to small alterations of the pictograph that do not completely obliterate or change the original image. These changes are the same style as the original but may vary slightly in color or execution. These variations indicate that the pictograph was altered from its original form by the artist(s) or subsequent artist(s) within the same stylistic tradition. It is possible that this type of change represents an attempt to repair or alter the original image. However, the precise intention of the artist(s) remains unclear. It is for this reason that I use the term inpainting instead of retouch or repair.

CONTOUR/OUTLINE ORIENTED

The term “contour oriented” is often used when referring to a two dimensional rendering of a three dimensional object. It is normally differentiated from “outline oriented” drawing because contour lines define the shape of the object and create the illusion that an object has mass, whereas outlines simply illustrate the outer shape of an object (Gardner, et al. 1991:I:555). However, I use the terms “contour oriented” and “outline oriented” to refer to Pecos River style pictographs that were painted or drawn in such a way as to emphasize the borders of the subject. These figures have a very definite outline. This effect results either from painting the outline in a different color than the body or from outlining it in a slightly darker value. The exact techniques that the Pecos River style artists’ used are unknown at this time. However, this type of pictograph gives the impression that the artists painted them “from the outside in.”

LITERATURE REVIEW

The focus within this chapter section is divided between discussion of the technical aspects of recording obscured Pecos River Style rock art, and discussion of cultural processes that altered the figures’ original appearance. Therefore, I have divided the literature review into two sections. The first section reviews literature directly related to the application of the photographic techniques used to obtain more accurate rock art data. The second section addresses publications from the Lower Pecos and abroad that are relevant to the data recorded through the application of these photographic techniques. Some researchers, such as Solveig Turpin, are discussed in both of the literature review sections because they have made contributions to both topics.

REVIEW OF PUBLICATIONS ON PHOTOGRAPHIC AND IMAGE ENHANCEMENT TECHNIQUES

Unfortunately, publications that focus specifically on the technical aspects of photographing rock art are rare and in some cases outdated. There are also inconsistencies within the published literature regarding the efficacy of some photographic techniques. In some instances, these inconsistencies may be the result of a lack of experience with digital equipment. It is also important to note that conditions such as lighting are highly variable at rock art sites. These conditions affect digital photography and cause inconsistent results. It is possible that, as more researchers become familiar with digital photography, the confusion surrounding its use will subside

Peter G. Dorrell

Published in 1994, Peter G. Dorrell's book, *Photography in Archaeology and Conservation* is already slightly outdated. Dorrell focuses almost entirely on film-based photography. Chapter 11 in Dorrell's book is devoted entirely to UV and IR photography. Although the author concentrates on film based photography, much of the information is applicable to digital based photography. Dorrell explains the different methods and types of UVIR photography as well as their application in the field of archaeology. He discusses the use of UVIR photography on ceramics and manuscripts but also briefly covers applications for rock art research (Dorrell 1994:198-207).

Glen Fredlund and Linea Sundstrom

In their 2007 article Glen Fredlund and Linea Sundstrom, discuss their experiences from with digital infrared (IR) photography in Big Room Cave, Minnesota; Big Horn Basin, Wyoming; and Black Hills, South Dakota (Fredlund and Sundstrom

2007:737-740). The authors begin by giving a description of IR photography and they list several potential applications for its use. Nevertheless, they stress that the effectiveness of IR photography depends on the ability of the pigment to reflect IR light as well as the IR transparency of the substance covering the pigment. The article includes the techniques used by the authors, equipment, and a few examples of the results (Fredlund and Sundstrom 2007:733-4).

The article provides an easy to read overview of the IR photography techniques useful to rock art researchers. Furthermore, the article provides useful information about the equipment and processing software, as well as including instructions about grayscale conversion of IR images. The authors indicate that it is sometimes possible to record red pigments with IR photography. However, the article's emphasis on other pigments (particularly black) leaves the impression that IR photography cannot record red pigments. The article does not provide information on any camera filters other than the Hoya R72[®]. If the authors had experimented with filters that blocked the shorter IR wavelengths, such as Hoya R90[®], they may have had better results with red pigments. The authors also indicate that ultraviolet (UV) photography might give better results on red pigments; however, they did not include any UV results. They discuss converting the IR images to grayscale and make only a brief mention of color IR processing and false-color images. In spite of these issues, the article provides a good introduction to the use of IR photography in rock art recording (Fredlund and Sundstrom 2007:736-7).

Robert Mark and Evelyn Billo

Programs such as Adobe Photoshop[®] and Image-J[®] dramatically improve the visibility of rock art in photographs (Mark and Billo 2006; 2002). Robert Mark and

Evelyn Billo of Rupestrian Cyber Services have developed numerous techniques that help researchers enhance photographs of rock art and reveal figures that are not visible at the site. Mark and Billo have worked in various locations worldwide, including the Lower Pecos Region of Texas. They create both false-color images and grayscales. Mark and Billo have been generous enough to share their techniques with other rock art researchers. Their journal articles provide valuable instructions on the use of software programs, as well as examples of their work (Mark and Billo 2006; 2002).

David Gebhard

In a 1960 publication for the Roswell Museum and Art Center of Roswell, New Mexico, David Gebhard documented his extensive field research of Lower Pecos rock art. The fieldwork for the project was conducted during 1958 and 1959 as part of the Inter-Agency Archaeological Salvage Program. The project was sponsored by the National Park Service in conjunction with the Roswell Museum and Art Center. Referring to the area as the “Diablo Region,” Gebhard focused his recording efforts on the areas that were to become part of the Diablo Dam (now known as Amistad Dam) and its reservoir (Gebhard 1960:4-5).

Gebhard and his field crews documented fourteen rock art sites within the Lower Pecos. In his report, Gebhard states that he tried several recording techniques in order to determine which method would be best for a complete survey of the region’s rock art. He indicates that the following three methods were used to record the rock art: color and grayscale free-hand drawings; color tracings of the rock art using acetate sheets; and both color and black and white photography (Gebhard 1960:15-16).

Gebhard states that during his 1958 field sessions, his crew experimented with different types of black and white and color photographic films. He also indicates that they tried to photograph the rock art using camera filters of various colors. These photographic experiments were intended to determine if the colored filters and differing film types would increase the visibility of the rock art pigments. Although he discovered that the color filters did indeed enhance the visibility of some pigments, they often decreased visibility of others. Eventually, he abandoned the use of the camera filters and proceeded by photographing the rock art using only the color and black and white films (Gebhard 1960:17-18). Unfortunately, he also resorted to spraying the rock art with kerosene to increase the visibility of the pictographs (Gebhard 1960:16). Although the application of the kerosene probably improved the appearance of the figures that Gebhard photographed, in the long-run, the use of this technique may have accelerated the deterioration of the rock art.

Gebhard's decision to discontinue the use of the color filters and other types of photography may have been due in part to the logistical difficulties of using them with film based photography. Although most, if not all, of the digital photography and processing techniques presented in this paper can also be produced using film and a darkroom, the process of doing so would be time consuming and costly. As is the case with film photography, the use of color filters (including infrared) in digital photography does at times enhance one pigment color at the expense of another. However, the information gained from these images can be useful to researchers who want to reveal under-painted images or examine the method of paint application. It is also important to

note that unlike some of the other methods employed to increase the visibility of rock art, the use of specialized photography is non-destructive.

Gebhard's contribution to rock art research is significant. Like Grieder (1966:710-715) and Newcomb (Kirkland and Newcomb 1996[1967]:46-49), he developed several typologies based upon the characteristics of the pictographs as well as their location on the rock art panel. Although Gebhard did observe and document over-painting at several sites, he did not directly address it other than to use it as a partial justification for his typology and relative chronologies (Gebhard 1960:16).

Solveig A. Turpin

In her 1982 dissertation, Solveig A. Turpin briefly discusses her field crew's use of stereophotogrammetry, infrared (IR) film, and other types of experimental film photography (Turpin 1982:56, and 64). Stereophotogrammetry is a method of photography that can be used to record a three-dimensional image of an archeological feature (Turpin et al. 1979:329). Turpin's main goal in using these techniques was to reveal pictographs that are covered with what she refers to as lichens and other substances. Turpin indicates that the results were variable. The field crew's use of IR film photography for the Red Monochrome at 41VV72 was not effective in revealing the obscured pictographs. However, their work with the same film at 41VV77 resulted in a significant improvement in the photographic images. Turpin recommended the continuation of experimental photography until the problems with deterioration are resolved (Turpin 1982:80-81).

During her work with Michael W. Davis in 1989 on the Devil's River State Natural Area, Turpin obtained help from Jim Zintgraff and other professional

photographers. Under Turpin's supervision, these photographers utilized large format cameras as well as various polarized flashes and filters in order to increase the visibility of the rock art in the images (Turpin and Davis 1993:49-50). Unfortunately, it appears as though some of these photographers may have sprayed the pictographs with water (Zintgraff and Turpin 1991). Although probably less detrimental than kerosene, repeatedly soaking the pictographs with water accelerates the accumulation of microflora as well as other substances that obscure and ultimately deteriorate the pictographs.

REVIEW OF OVER-PAINTING IN ETHNOGRAPHIC AND ARCHAEOLOGICAL LITERATURE

The early rock art researchers, such as Forrest Kirkland whose recording efforts consisted mainly of watercolor renderings or sketches, probably found the overlapping figures quite frustrating to record. Gebhard, Grieder, Kirkland, and Newcomb all took note of the over-painted Pecos River Style images that they observed while working in the Lower Pecos. Some scholars, such as Pearce and Jackson (Pearce and Jackson 1933:20; Jackson 1938:166), simply state that the figures are over-painted without explaining the observation, while others, such as Gebhard, Grieder, and Newcomb have attempted to discuss its implications (Kirkland and Newcomb 1996 [1967]:43-57, 65).

Unfortunately, there is very little published literature that addresses the over-painting of rock art images other than as a means of establishing a relative chronology. Although the over-painting of different styles at some sites may provide chronologies, the application of this type of dating is region and site specific. Researchers should not apply it to every type of over-painting at every rock art site (Keyser 2001:123-5).

The use of intra-stylistic over-painting to establish relative chronologies for a specific style is tenuous at best. Additionally, some researchers imply that the subsequent artists were vandals or that the presence of intra-stylistic over-painting indicates that the art was only of momentary importance to those who created it (Kirkland and Newcomb 1996 [1967]:33-36). These speculations ignore other possible explanations of over-painting and often contradict the data (Lewis-Williams 1972:57-60).

W.W. Newcomb

Scholars such as Newcomb used their observations as a basis for relative dating. In 1967 he developed a timeline and stylistic periods for the Pecos River Style based largely on the superimposition and variation of figures (Kirkland and Newcomb 1996 [1967]:43-60). During his efforts to document the Pecos River Style rock art, Newcomb developed a series of sub-styles for Pecos River Style rock art. Newcomb divided the art into four periods, which he believed to be chronological. These sub-styles are designated Period 1, Period 2, Period 3, and Period 4 (Figure 2.1). Newcomb developed these tentative periods based on the increased stylization of the anthropomorphic figures (Kirkland and Newcomb 1996 [1967]:44). He also considered other factors such as the condition of the images, over-painting, and the complexity of the figures (Kirkland and Newcomb 1996 [1967]:46-9).

According to Newcomb, the oldest of these, Period 1, is characterized by cylindrical or rectangular figures that are stretched out lengthwise. The figures tend to have arms, but are lacking heads and legs. They were usually painted in red (Figure 2.1).

Newcomb indicates that Period 2 pictographs feature larger figures, some of which are over six feet in length, with bodies outlined in red or orange. Most were

depicted frontally and sometimes the body was filled in with a different color. The heads are not visible, however they sometimes have a headdress. Newcomb also observed that many of the Period 2 figures appeared to be costumed and were shown with objects resembling feathered darts and bags.

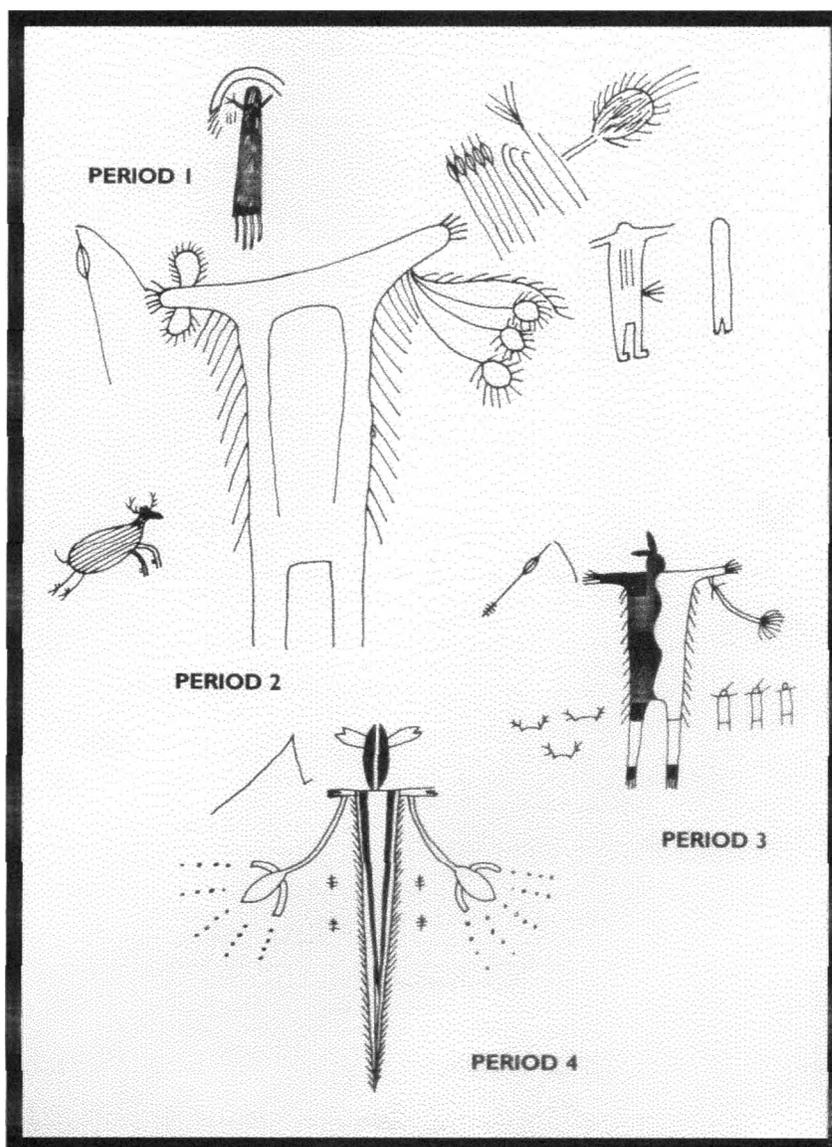


Figure 2.1 Newcomb's progression of the Pecos River Style as shown in *Ancient Texans* (Shafer 1986:139; Kirkland and Newcomb 1996 [1967]:45).

Period 3 features polychrome figures with the color black being more dominant.

Newcomb indicates that these pictographs are smaller in comparison to Period 2 and that

most of them have heads. Fingers and feet are also frequently shown and accessories are stylized.

Period 4 is believed to be the most recent of the sub-styles and it is also the most abstract. It features highly stylized polychromatic human figures with circles decorating the body (Kirkland and Newcomb 1996 [1967]:56-58).

Although Newcomb proposed four periods, he states that there were few images that represent Periods 1 and 4. Period 1 was based upon a few very faded images (Kirkland and Newcomb 1996 [1967]:46-7). Additionally, there was one less faded group uncovered by a trench excavation in Kelley Cave (41VV165) rock shelter (Kelley 1950:72-73) which Newcomb assigned to Period 1 (Kirkland and Newcomb 1996 [1967]:46-7). Period 4 is equally problematic and has few examples. The images attributed to Period 4 did not seem to fit with the images of any of the other periods, but were clearly Pecos River in style. Newcomb attributed these images to Period 4. He considered them the latest in the progression of the style, because they are more elaborate and are not superimposed by other Pecos River Style pictographs (Kirkland and Newcomb 1996 [1967]:56-8).

As was previously stated, some scholars, such as Solveig Turpin, now disagree with Newcomb's chronology because it is based entirely upon the superimposition of these sub-styles and the assumption that Pecos River style rock art began with simple figures and progressed to more elaborate abstract elements (Turpin 2004:267-272). Nevertheless, the variations within the style may be sufficient to support the division of the pictographs into sub-styles.

Newcomb also suggested that these figures were only of significance at the time that they were painted. He asserted that over-painting of images demonstrates that they were only of temporary importance; later individuals did not hesitate to paint over earlier images. Newcomb uses this argument to support his hypothesis that the anthropomorphic figures represented shamans rather than deities or supernatural beings (Kirkland and Newcomb 1996 [1967]:65-80).

Although his work was significant, Newcomb seems to have made some potentially erroneous assumptions. Even if the upper layer of paint is the most recent, the “upper layer” could have been produced only moments after the image underneath it. The current dating methods, such as accelerator mass-spectrometry (AMS), indicate that the Pecos River Style figures tested, range in age from 4200 BP to 2950 BP (Russ et al. 1996; Boyd 2003; Rowe 2009). Their age and the number of sites containing pictographs would seem to suggest that Pecos River Style rock art does not fade quickly. It is likely that the people who created these pictographs were aware that they did not fade. If their significance was transitory, I believe it is unlikely that they would have continued to use paint that was permanent.

Terence Grieder

While recording pictographs in the Lower Pecos, Terence Grieder observed that, the walls of the shelters were painted repeatedly. He uses the overlapping figures as part of a seven-step method, to establish a relative stylistic chronology for Pecos River Style rock art. Grieder also states that the earlier images do not appear to have been “scratched off,” rather they were simply painted-over (Grieder 1966:710-11). He, like Newcomb, also asserts that the act of painting was more important than the visual impact of the

paintings themselves since the later paintings superimpose earlier ones (Grieder 1966:710-5).

His statements are problematic for several reasons. First, there is some evidence that the Pecos River Style pictographs were altered at least on a small scale by scratching (Figure 2.2). There are some sites where the contours of the rock surface follow large voids in the pigment (Figure 2.3). This could suggest that these areas originally contained pigment that was later removed by some abrasive action (Silver 1985:11-2). Although the pigment may have been removed through natural processes, there is not enough data to rule out human involvement. Grieder's arguments also ignore the fact that the artist may have overlapped the images intentionally.



Figure 2.2 A scratched zoomorph from Halo Shelter(41VV1230).



Figure 2.3 An anthropomorph from Fate Bell Shelter (41VV74) showing areas within its body that lack pigment.

Constance S. Silver

From April 19th through April 26th of 1980, Silver examined nine rock art sites within Seminole Canyon State Park (Silver 1985:3-5). Although her primary research goal was to assess deterioration and make recommendations for conservation, Silver's work on the rock art in Seminole Canyon State Park includes discoveries that are relevant to this thesis. Her research included all four of the previously mentioned rock art styles found in the Lower Pecos.

Silver's research involved the removal and analysis of 2-3 mm long samples of the pictographs. She also analyzed larger samples that were collected from spalls on the rock shelter floors. In addition to analyzing the larger spalls herself, Silver sent them to Seymour Lewin at New York University and Richard Tollo at the University of Massachusetts, Amherst whose laboratory analyses included determining the material components of the pictographs (Silver 1985:9-10).

The results of Silver's analyses revealed that the pictographs are layered. Her report also states that test results imply that a white preparation identified as gypsum underlies the pictographs. According to Silver:

This white stratum was observed in the cross-section samples by Lewin, who identified the mineral as gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) possibly applied to the stone as a prepared surface for the pigments. It does not seem likely that a gypsum stratum could develop naturally [(Lewin 1981) Silver 1985:11].

Silver states that the application of a base layer between the stone and pictographs is not unusual in Native American rock art. She cites her previous research on the

Courthouse Wash pictographs in Arches National Park, Utah where she discovered a similar white layer under many of the figures.

According to Silver, some researchers believe that the clay layer represents a preparatory sketch or under-drawing made by the artists prior to painting the mural. Silver states that these preparatory sketches are common among mural painters worldwide. This type of under-drawing aids mural artists by allowing them to evaluate the placement and execution of the images within the composition.

Silver states that additional research is necessary before the function of the gypsum stratum at Seminole Canyon is fully understood (Silver 1985:12). Examination of a sample of the gypsum stratum from Fate Bell shelter (41VV74), revealed the presence of a calcium oxalate salt referred to as whewellite. Silver indicates that this may have been a part of the original preparation, or it may be the result of micro-flora such as algae (Silver 1985:16-20). She also states that the gypsum preparation contributes to the overall instability of the pictographs because the stratum does not adhere well to the shelter walls (Silver 1985:11, 16-20).

During her research at Seminole Canyon, Silver also noted that many of the pictographs had more than one layer of paint visible in the sample cross-sections. She also noted that at Panther Cave (41VV83), lines have been scratched into some of the images. Silver states that these may represent a form of ritual obliteration or that they may have been an attempt by artists to “rough up” the figure before superimposing a new image. Abrading murals is a technique that artists often employ to ensure that the new images adhere to pre-existing figures. Silver cautions that more research is necessary to determine the purpose of the scratches. However, she also states that, “The overall

execution technique of the Seminole Canyon pictographs may be more complex than has been previously thought and should be studied further” (Silver 1985:12).

Solveig A. Turpin

Solveig A. Turpin’s 1982 Ph.D. dissertation was based upon archaeological field research that she conducted in Seminole Canyon (Turpin 1982:1-3). Her fieldwork encompassed rock art sites as well as other types of archaeological sites. Her later fieldwork on the Devil’s River State Natural Area during the Texas Archaeological Society’s (TAS) 1989 field session was a similar multi-faceted project that involved both traditional archaeology and rock art recording (Turpin and Davis 1993:1-4).

In both of these projects she attempts to address the impact of environment and culture on settlement patterns and ideology within the Lower Pecos (Turpin 1982:56-64; and Turpin and Davis 1993:7-8). During her extensive fieldwork in Seminole Canyon, Turpin observed numerous examples of over-painting (Turpin 1982:64). Her project included pigment analysis and after a few initial successes with a general analysis of the pigment, she decided to analyze the paint from some of the superimposed pictographs. Turpin’s decision was based on the desire to determine if a stratigraphy could be observed and if so whether the layers of paint would have the same mineral composition (Turpin 1982:56-64). She chose Panther Cave (41VV83) due to the extensive amount of over-painting that she observed at that site. In regard to the experiment, Turpin states:

Flecks of red paint of similar shade from obviously superimposed figures were submitted. Taken from two separate yet adjacent areas, and from two layers [levels] of painting. The four samples produced two sets of identical patterns equitable to the level. That the pigments from each level were identical sets,

distinguished by level, suggests that the under-paintings were drawn as a unit, then at a later date were painted over by a second mural [Turpin 1982:103-105].

Turpin indicates that the pigment samples were taken from a deer superimposed by the hip clusters of the anthropomorph shown in Figure 2.4 (Turpin 1982:101-102). She acknowledges the limited nature of testing such a small number of samples as well as the need for this type of testing at other Pecos River Style rock art sites (Turpin 1982:105). Both of the samples for Turpin's pigment analysis were taken from the same area of the rock art panel. The fact that the superimposed pictographs in this small area of the panel represent separate painting episodes does not indicate that this is the case for all of the over-painted figures at Panther Cave. Nevertheless, Turpin's efforts to analyze the layers of superimposition at Panther Cave demonstrates the potential applications of pigment analysis as well as the type of information that may be gained from analysis of over-painting.

Turpin states that the permanence of the Pecos River Style pictographs can help rock art researchers and traditional archaeologists reach their mutual goal of reconstructing the past (Turpin 1994a:79-80). In one of her 1994 publications Solveig Turpin addresses transformation imagery found in the Pecos River Style pictographs (Turpin 1994a:75). The focus of her article centers on the U-headed anthropomorph, which is a recurring element within the Pecos River Style (Figure 2.4). Referring to them as "were-cougars," Turpin believes that these pictographic figures represent a human-to-animal transformation, which is one of the key features of shamanic religion (Turpin 1994a:76). She argues that the geographic distribution of the were-cougar pictograph is

an indicator that the region was occupied by a group of people who shared a belief system.

In a second publication in 1994, Turpin again addresses what she believes to be evidence of a shared shamanic belief system within the culture that created the Pecos River Style (Turpin 1994b:73). She indicates that one of the core elements of shamanic religions is the belief in the “bird-like flight of the soul (Turpin 1994b:73-74).” She cites multiple examples of bird-like anthropomorphs (Figure 2.5), which she believes are representations of the shaman’s flying spirit (Turpin 1994b:73-78). Additionally she states that this type of imagery was intended to describe the sensation of flying during trance to the uninitiated. Turpin argues that the paintings served to educate the group about their shared worldview, their society, and the shaman’s role as the group’s religious practitioner (Turpin 1994b:91-93).

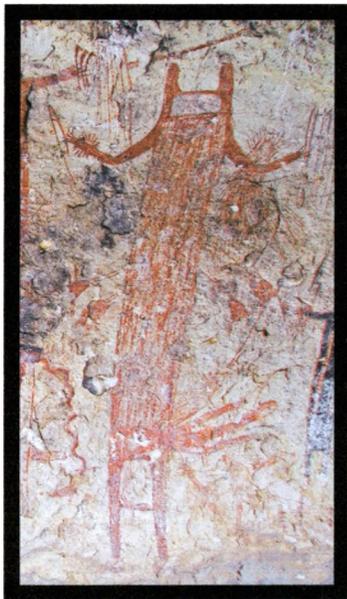


Figure 2.4 A U-headed anthropomorph at Panther Cave (41VV83).



Figure 2.5 An anthropomorph with wing-like arms at Halo Shelter (41VV1230).

Carolyn E. Boyd

In *Rock Art of the Lower Pecos*, Carolyn Boyd argues that many of the Pecos River Style rock art panels are planned compositions; *not* random collections of images (Boyd 2003:67). Several of the pictographic sites that she discusses in her book contain evidence of over-painting or superimposition. The artists of the panels used superimpositioning of images as an intentional component in the creation of these rock art compositions (Boyd 2003:27). Boyd, an artist and archaeologist, produced full panel renderings of five Pecos River Style rock art sites. During her analysis of these sites, she identified three reoccurring motifs. Boyd defines a motif as “a recurring theme in the rock art that contains two or more pictographic elements” (Boyd 2003:41-2). Boyd refers to the Pecos River Style motifs that she isolated as Motifs A, B, and C. Each of these motifs represent patterns within the archaeological record.

Motif A consists of a crenelated arch with an opening in the center. A centrastyled anthropomorph is associated with the crenelated arch. The arch and circle may be located above or below the anthropomorph, however in some examples the artist superimposed the anthropomorph over the arch. The anthropomorph is either associated with or has characteristics of an animal (Boyd 1996:154-6, 2003:41-2).

The characteristics of Motif B include anthropomorphs with antlers, and deer and dots impaled with spears or darts. The anthropomorphs also have dots on their antlers or bodies (Boyd 2003:43).

Motif C features an anthropomorphic figure holding the staff-like object with an oval. The oval often has a spiny or furry appearance and; as stated in the previous chapter, this object most likely represents *datura* (Boyd 2003:90-4).

Boyd identified, described, and placed into context these patterns or motifs. She used ethnographic information to create bridging arguments linking the past to the present, and to formulate her hypotheses regarding the function and meaning of these motifs. She then tested her hypotheses against other aspects of material culture and data from cognitive neuroscience, ethnology, and other disciplines.

There is very little ethnographic information about the Native Americans living in the Lower Pecos. Therefore, Boyd reviewed ethnographic data of several Native American and Mesoamerican groups. These included the Aztecs, Huichol, Yaqui, and Pueblo Indian peoples (Boyd 1996:154-9, 1998a:239-43, 1998b:88-96, 2003:50-4). In addition to this, she studied archaeological data from the area including burials found in caves, rock shelters, and vertical shafts such as Seminole Sink (Boyd 1998a:239-43, 2003:63).

Boyd builds upon the research of earlier researchers such as Turpin (Turpin 1994a; 1994b) and Newcomb (Kirkland and Newcomb 1996 [1967]:79-82). By combining her data with that of these previous researchers, Boyd argues that the Pecos River style motifs along with the rock art panels likely functioned as an indirect form of instruction in a culture where direct instruction was avoided (Boyd 2003:45-66). She maintains that these motifs are indicative of certain ritualistic practices (Boyd 2003:90). As did Turpin (Turpin 1994a:76; 1994b:91-93), Newcomb (Kirkland and Newcomb 1996 [1967]:79-82), and Campbell (Campbell 1958:157-158), Boyd argues that these practices may have involved the ritual use of hallucinogens in order to achieve an altered state of consciousness (ASC). She presents data that indicate that the hallucinogens used were

likely peyote and datura. These may have been used by groups in the Lower Pecos as a gateway into the spirit world

There are some similarities between Boyd's Motifs A and B. Anthropomorphs are often depicted with both motifs and it is possible that in the Lower Pecos shamans used both plants (Boyd 2003:90-105).

The motifs and panels produced by the Pecos River style artists were probably much more than a representation of a ritual or a myth. Boyd indicates that the art performed numerous functions that were crucial to the survival of the group. The groups who created them may have seen it as a means of ensuring the continuation of various seasonal cycles that were necessary to their survival. The creation of these panels would have required tremendous effort and sacrifice of every member of the group and this communal effort may have encouraged cooperation and cohesion on the part of the group's members (Boyd 2003:106-13).

Although the elements depicted may have been inspired by the visions seen while in an ASC, Boyd stresses that the artists were not intoxicated when the rock art was painted. The art was most likely painted after the effects of the drug dissipated. The artwork depicted on Pecos River style panels was carefully planned and executed. It could not have been painted while the artist was experiencing the visions (Boyd 2003:67-76).

David A. Kaiser and James D. Keyser

Working in the Northwestern Plains of North America in 2005, David A. Kaiser and James D. Keyser recorded Northwestern Plains Ceremonial Tradition rock art at the Bear Gulch site in central Montana (Kaiser and Keyser 2008:38). The Northwestern

Plains Ceremonial tradition rock art is defined by the following three motifs: shield bearing warriors, V-necked anthropomorphs, and boat-shaped animals. All three motifs are present at Bear Gulch, however, in their 2008 article titled “Symbolic Superimposition: Shield Bearing Warriors at Bear Gulch,” the authors focus exclusively on the shield bearing warriors involved in superimpositions. The article does not indicate whether the other two motifs are ever superimposed.

The shield bearing warrior motif is characterized by a standing human holding a circular shield in front of its torso. These figures have a decidedly rounded appearance and they often have elaborate details. Images of shield bearing warriors may be scratched and/or painted onto the rock surface (Keyser and Klassen 2001:196-201).

Kaiser and Keyser recorded 755 examples of the “shield bearing warrior” motif at Bear Gulch and they noted numerous occurrences of superimposition among these images. After analyzing over 2000 figures, the authors found 46 examples of superimposition (Kaiser and Keyser 2008:38). Kaiser and Keyser identified and defined three types of superimposition involving shield bearing warriors at Bear Gulch. They define “simple overlaps” as occurring when two or more shield bearing warriors partially overlap. ““Significant overlap,” occurs where a distinctly different shield bearing warrior was intentionally placed directly over a preexisting one so that all but a weapon or a leg are contained within the other figure.” In some instances the artist used the original figure as a template and superimposed a subsequent shield bearing warrior over the older one. The authors refer to this third type of superimposition as “direct conjoined overlay” (Kaiser and Keyser 2008:44-47).

Kaiser and Keyser argue that the redrawing of older shield bearing warriors was a means of accessing the power connected to the original figure. In this way, the artists would rework older images by adding or changing ritual regalia. The authors indicate that superimposing one figure over another may have been done in order to renew the power of the first image or it may have been an attempt to acquire the power associated with the previous image. They also state that the variety of detail observed at Bear Gulch suggests that some shield bearers were altered by the original artist while others were reworked by subsequent artists. However, they stress that, "In either case, the communication here is between the artist and the supernatural, with little import attached to the real-life viewers of this art" (Kaiser and Keyser 2008:56). Furthermore, Kaiser and Keyser argue that the Bear Gulch site was frequently reused by the artists of Northwestern Ceremonial tradition rock art, who often reworked the older images of shield bearing warriors. They also state that this reuse occurred in a structured and systematic way. Additionally, the authors indicate that artists reworked these images in order to renew the supernatural power of the figures and the site (Kaiser and Keyser 2008:55-56).

Klaus F. Wellmann

Following a previous study on African rock art that was published by Harald Pager in 1976, Klaus F. Wellmann attempted to analyze the superimpositioning of elements observed within the Coso Range petroglyphs of California (Wellmann 1979:546). Wellman analyzed color photographs of 106 complete rock art panels. He divided the sample into nine figure categories which, included: boat-shaped sheep, other sheep, patterned body humans/anthropomorphs, other humans/anthropomorphs, dogs,

medicine bags, shields, atlatls, and other elements (abstract geometrics). Wellmann states that:

The following data were determined: (1) the numerical structure of the sample by categories; (2) the absolute numbers of representations in superimposition (*overlying and underlying elements*); (3) the numbers of cases of superimpositions; and (4) the numbers of paired motifs in superimposition” [Wellmann 1979:547-549; emphasis in original].

According to Wellmann, the most common superimposition encountered in the Coso Range petroglyphs is that of the “boat-shaped sheep” over “patterned-body anthropomorphs”. Additionally, boat-shaped sheep, non-patterned anthropomorphs, dogs, and “medicine bags” are rarely observed as the underlying element. Wellmann’s results also show that the abstract motifs of the “other elements” category rarely overlie any of the other figures but are often superimposed by them (Wellmann 1979:552-553).

Wellmann claims that the results of his statistical analysis indicate that the superimpositions among the petroglyphs of the Coso Range were deliberate rather than random. Although he indicates that there may be other explanations for the superimpositions, he seems to favor the theory that they are linked to a form of ritual activity aimed at increasing the number of game animals within the area. He states that these superimpositions may have been part of a hunting magic cult designed to gain power over and slow the disappearance of the big horn sheep (Wellmann 1979:554-555).

Benjamin Valdez, Juan Cobo, Michael Schorr, Roumen Zlatev, and Leonel Cota

In a research project similar to that of Constance Silver, authors Benjamin Valdez, et al. analyzed the polychrome pictographs located in the arid and mountainous region of

Baja California, Mexico. Valdez et al. analyzed samples of the paint that they collected from the images. They used the results from the chemical analysis of the pigments to make inferences about the techniques employed by prehistoric artists.

Valdez et al. focused their efforts on the rock art sites of El Vallecito near the village of La Rumorosa. The pictographs at these sites were painted on the porous, rough surface of hard granite. In order to analyze the pigments, they removed 10 mm² samples of paint from pictographs at several of the area's rock art sites. After the samples were prepared, the authors analyzed them using scanning electron microscopy (SEM), to examine their morphology; energy disperse x-ray spectroscopy (EDS), to obtain the chemical composition; and Fourier transform infrared spectroscopy (FTIR) technique with an attenuated total reflectance (ATR) device, to test for traces of organic components (Valdez, et al. 2008:131-2).

As was the case with the previously mentioned pictographs at Seminole Canyon, the authors' tests revealed the presence of an under-painted layer of white minerals. The under-painted stratum consisted of calcite, gypsum, and kaolin. According to Valdez et al., this preparation was probably a base coat intended to support the paint or may have been used to lighten the color of other pigments.

They also state that the paints were probably prepared in round bedrock bowls similar to the *molcajetes* used by the Nahuatl speakers and common among many Mesoamerican cultures. At the La Pintada cave site, which contains a large pictographic mural, these bedrock mortars contain traces of various colors of paint. Valdez et al. perceived that this archaeological evidence indicates that the artists prepared and applied

the pigments on location using very small amounts of liquid. The artists mixed the paint into a thick paste or slurry and then applied it to the rock surface.

The lines of paint that form the images are between 5 and 10 mm wide. The authors believe that this width indicates that the artists were applying the paint with their fingers. However, they also state that the painters may have used small narrow brushes formed from the fibers of cactus leaves. The artists applied the thick paint within lines that they incised or sketched onto the rock surface.

Based on the archeological evidence and their analysis of the chemical characteristics of the paints, Valdez et al. concluded that painting was likely a special activity. They imply that the creation of these murals was an important event involving the entire group (Valdez, et al. 2008:134-5).

Patricia Vinnicombe

Patricia Vinnicombe has done field research in both Africa and Australia. During her work in the Drakensburg area of South Africa, Vinnicombe developed a methodology for recording and classifying the rock art of that region based on a list of twenty-three attributes (Vinnicombe 1967:129). This list included attributes that described the characteristics and the subject matter of each figure such as, height, sex, color, and proportion. Additionally, Vinnicombe included attributes that described the condition of the rock art panel itself. These attributes included execution, composition, and superimposition (Vinnicombe 1967:130-140).

Each of the attributes were recorded on a punch card and later hand sorted. Vinnicombe indicates that the punch card method was chosen because of the ease with which certain attributes could be assessed (Vinnicombe 1967:140). She admits that this

method does have its limitations, which include the time consuming nature of recording the attributes and the fact that the information obtained from their analysis does not provide an adequate indication of how the rock art actually *looks*. However, Vinnicombe insists that even though it is difficult to reduce art to a series of objective attributes, it is necessary to do so in order for rock art research to achieve the same level of legitimacy as other fields of archaeology (Vinnicombe 1967:141).

In another publication, Vinnicombe attempts to assess the two most popular interpretive theories, “art for art’s sake” and “sympathetic magic” (Vinnicombe 1972:192). Finding both theories to be over simplistic, Vinnicombe indicates that religion was one of the primary motives for creating the art (Vinnicombe 1972:194). She states that the rock art in southern Africa had a function in that it communicated information about the social framework within which it was created. Additionally by illustrating rituals and social practices, the rock art imparted a feeling of unity and cohesion within the group responsible for its creation (Vinnicombe 1972:200-202).

Jo McDonald

Working in both the Sydney Basin (McDonald 1998:319-320; 2008:1-3) and the Western Desert (McDonald 2005:117) of Australia, Jo McDonald has documented the ritual use of sites in both locations. In both regions, she combined her analysis of the rock art with other archaeological data from the region. She also examined the ethnographic and archaeological data from other areas within Australia’s arid zone to formulate hypotheses about the two regions that she examined (McDonald 1998:323-327; 2005:119-125; 2008:229-231).

In the Sydney Basin, McDonald recorded and performed a multivariate analysis on the superimpositions. One of her objectives was to isolate evidence of changes throughout time (diachronic changes) within the rock art of the Sydney Basin (McDonald 2008:236-238). She documented 65 sites in the Mangrove Creek Valley of the Sydney Basin. After evaluating the superimpositioning as well as motif preference, and multivariate analysis of motif and technical variables she determined that there were three phases of art production within the area (McDonald 2008:242). She indicates that these phases can be broadly correlated with other archaeological materials from the area whose ages have been determined through absolute dating methods. McDonald's results indicated an intensification of art production corresponding with an intensification of stone tool use. However, she also indicates that the art of the region did not experience any appreciable diachronic change during the main period of art production (McDonald 2008:242-343).

In her 2005 publication titled "Archaic Faces to Headdresses: The Changing Role of Rock Art Across the Arid Zone," McDonald discusses her work in the Western Desert. As was the case with her research in the Sydney Basin, one of McDonald's research objectives was to track diachronic changes in the rock art. She discusses how changes in the use of art correlate with changes in tool assemblages and subsistence strategies (McDonald 2005:118-119). McDonald uses a specific artistic motif referred to as the "archaic face" to demonstrate spatial and temporal changes. Her research indicates that the archaic peoples living within the Western Desert ritually maintained and reused the rock art sites (McDonald 2005:121-127). She states that some rock art locations functioned as aggregation sites where small bands or groups would coalesce at various

intervals. McDonald also argues that the multi-phase rock art assemblages clearly supports the claim that these sites were aggregation locales. The evidence that she presents in her article indicates that these sites were revisited, reused, and maintained (McDonald 2005:134-137)

J. David Lewis-Williams

Although he is better known for his application of the Neuropsychological Model, J. David Lewis-Williams has also addressed the topic of over-painting of rock art in South Africa within the San's artistic tradition. He conducted research in the Barkly East District and Giant's Castle areas of South Africa (Figure 2.6).

Lewis-Williams took a linguistic approach in order to discuss the over-painting that he observed at San rock art sites. He used a language structure model developed by Noam Chomsky, and referred to as the Finite-state Grammar (Lewis-Williams 1972:49-51, 1974:93-5). According to Chomsky's model, language is analogous to a machine with a set number of internal stages or states. As the machine cycles through each state, it produces a symbol, such as a word. The machine generates a series of symbols, or word sequence such as a sentence. After the sentence is produced, the machine stops in its final state. Therefore a finite-state grammar is capable of generating an infinite number of sentences through the use of a finite set of rules that are imposed upon a finite vocabulary. Chomsky refers to languages that use the Finite-state Grammar model as Finite-state Languages (Chomsky 2002[1957]:18-25; Fabisz 2009).

According to the Finite-state Grammar model, sentences are produced through a series of choices made from left to right. The initial word chosen places limitations on the second and subsequent words until the sentence is completed. According to Lewis-

Williams, the over-painted images may act in a similar manner with the primary figure placing limitation on the secondary and/or terminal image.

The method through which the data set was gathered involved recording each figure within a panel on a separate card, however Lewis-Williams discourages this practice. He indicates that it removes the figure from its context within the panel. He identifies three basic syntactic structures within the rock art. These structures are scenic relationships, superpositioning, and juxtapositioning (Lewis-Williams 1972:57, 1974:102). Unlike many other researchers, he rejected the relative chronologies postulated for the sites because the data did not support them. Lewis-Williams states that the analysis of superimposed images cannot establish a chronology of the rock art at these sites (Lewis-Williams 1974:99). He argues that researchers should work toward understanding the function of the rock art rather than the intention of the artist (Lewis-Williams 1972:57).

Lewis-Williams claims that data from 1,355 rock paintings in the Giant's Castle area indicate that the superimpositioning of images is not random as previously thought. His data reflect only figures superimposed directly over another figure (Lewis-Williams 1974:93). The field crews did not record rock art figures that only partially overlapped because they did not know if the overlapping was accidental. The data was compared to other data sets from the surrounding area and the results were similar (Lewis-Williams 1974:94-6).

Lewis-Williams found that the pictographs had multiple layers that he referred to as "chains." The results of the analysis indicate a patterned sequence in the layers of over-painted elements with the human figures often forming the initial layers (Lewis-

Williams 1974:97-8). The author claims that the San did not use superpositioning to show spatial perspective but does not indicate how he arrived at that conclusion (Lewis-Williams 1972:57).



Figure 2.6 Superimposed figures at Giant's Castle rock art site in Drakensberg, South Africa as shown in *Ancient Texans* (Shafer 1986:202; photographed by Lewis-Williams).

The two most common chains observed by Lewis-Williams were eland on eland and eland on the human figure. He also reports that a third chain, rhebuck on human figure, was observed less often but was still common. Although there were 25 observations of the eland on eland chain, there was only one rhebuck on eland. Lewis-Williams indicates that the rhebuck is less common in superpositioning. He also states that human figures rarely appear on the upper most layers of the pictographs. He also states that the eland is the most common figure (Lewis-Williams 2002:30-5).

Myths function as a means of explaining human beings' relationship with nature, validating social action, and relieving group anxiety (Lewis-Williams 1972:61).

According to Lewis-Williams, San rock art and San mythology both served similar functions, however the one was not necessarily an illustration of the other. The juxtapositioning and superpositioning of the eland and other animals, over humans in the rock art is indicative of the San's relationship with nature. Like the myths, the rock art encourages cooperation through its depictions of group activities and relieves group stress through the repetition of symbols (Lewis-Williams 1972:63-4).

Lewis-Williams indicates that the Barkly East research established that San rock art was a "signifying system" with rigid rules controlling placement of figures (Lewis-Williams 2002:49). Although Lewis-Williams' work is compelling, he failed to fully explain the condition of the under-painted images or how he was able to view them. All three of his works cited here would have benefited from some additional illustrations.

The Neuropsychological Model

Much of the world's rock art has been attributed to ancient groups of hunter-gathers. Researchers have often observed the co-occurrence of certain elements in the art of cultures that have no historical, cultural, or geographic connection with each other. Humans and animals, human-animal composites, geometrics, and seemingly non-representational designs or fragmented figures are common in many styles of rock art (Biesele 1986:200-201). However, in areas where it cannot be directly linked to ethnohistoric data, rock art is difficult to interpret (Lewis-Williams 2001:332).

In his later research, Lewis-Williams and his student and later colleague, Thomas A. Dowson, began to focus on linking modern rock art with those of Upper Paleolithic

Europe Like prehistoric rock art in other areas, that of Europe's Upper Paleolithic lack direct historical or ethnographic data. Many previous rock art researchers tried to explain prehistoric art by making vague ethnographic comparisons. Others avoided interpretation altogether by only presenting empirical data (Lewis-Williams 2001:332-3; 2002:163-4).

Lewis-Williams and Dowson, studied neuropsychological data, as well as ethnographic and historical information gathered from various geographic regions. Drawing from a model developed by previous researchers such as Ronald K. Siegel, they developed and refined their research theory (Lewis-Williams 2001:336-7). Their refined model represents an attempt to categorize the phenomena experienced by individuals during an altered state of consciousness (ASC). The methods of inducing an ASC are too numerous to name, however some of the most common include: ingestion of psychotropic substances, sensory deprivation, auditory and/or rhythmic driving, pain, hyperventilation, sleep deprivation, extreme hunger, and physical exertion (Lewis-Williams 2002:140).

The Neuropsychological Model is made up of three stages. During Stage One, individuals may experience a variety of abstract geometric forms that are often referred to as entoptic phenomena. In Stage Two, individuals begin to group the entoptics into meaningful forms (Lewis-Williams and Dowson 1988:203-4; Lewis-Williams 2001:337-9; 2002:179). As individuals transition to Stage Three they experience a vortex or gridded tunnel. Iconic images usually begin to appear along the walls of the vortex (Lewis-Williams 2001:339; 2002:180). During Stage Three subjects experience iconic images, transformations, as well as peripheral and integrated entoptic phenomena. According to Lewis-Williams, these stages are not necessarily exclusive, nor are they

sequential. Nevertheless, since Lewis-Williams chose to refer to them as “stages,” the same terminology is used here (Lewis-Williams 2002:180).

In addition to the three stages of ASC, Lewis-Williams and Dowson proposed seven principles of perception. These principles categorize the entoptic phenomena experienced during Stage One and the hallucinations experienced during Stage Three. The seven principles of perception include: replication, fragmentation, integration, superpositioning, juxtapositioning, reduplication, and rotation (Lewis-Williams and Dowson 1988:203-4; Lewis-Williams 2001:337-41; 2002:177-83).

According to Lewis-Williams and Dowson, the Neuropsychological Model is applicable to temporally remote rock art as well as to those of a later time (Lewis-Williams 2001:336-7). In addition, they used it to argue that Upper Paleolithic cave art was created by groups who practiced shamanism. They discuss the co-occurrence of representational figures and non-representational geometric forms found in many styles of rock art. In addition they cite the observed similarities between Upper Paleolithic cave art and the art of more recent shamanic groups such as the San of South Africa (Lewis-Williams and Dowson 1988:201-3; Lewis-Williams 2002:163-4).

Their argument hinges on several assumptions. First, that the human brain and nervous system is physiologically, similar regardless of culture. It follows then that humans in an ASC, will have similar experiences. Secondly, it is assumed that the art was inspired (at least in part) by the experience of the ASC. According to Lewis-Williams, the entoptic phenomena are particularly significant because they are not culturally driven. All humans, have the potential to experience them. However, Lewis-

Williams also emphasizes that although, “The forms themselves are universal; their selection and meanings are cultural (Lewis-Williams 2001:337-9).”

ETHNOGRAPHIC INFORMATION

Ethnographic research may provide some clues that would explain the function of some types of over-painting. Modern indigenous peoples that produce rock art often view it as a continuing process, rather than as a static object (Yates and Manhire 1991:9-10). They constantly interact with the images and modify them through scraping, touching, and repainting (Loubser 2001:82-3).

The historical accounts of Native Americans in the Lower Pecos written by de Sosa and other early explorers primarily involve observations made from a distance rather than from direct contact. There were a few exceptions, nevertheless, most European narratives that discussed Texas Indians were sparse in their details. The few historical accounts that discuss rock art provide very little information about the practice of over-painting images.

It is not ideal to make cross-cultural comparisons, however where direct historical evidence is lacking, it is helpful to examine ethnographic data (Layton 2001:324-5). The ethnographic information discussed in this thesis was gathered from groups with similar social and economic structures as those that existed within the Lower Pecos. Although these groups are increasingly rare, there are a few groups who, like the people of the Pecos River Culture, practice hunter-gatherer subsistence. Several of these groups also produce rock art and some are at times known to paint over pre-existing images. Ethnographic studies of the relationship between the San of Africa and their rock art sites indicate that the San shamans revisited these sites and added to the pre-existing images

(Deacon 1988:133-8). Additionally, the Australian Aborigines of the Kimberleys region of western Australia, who have been carefully documented since the time of their European contact, have a similar tradition of maintaining and repainting their rock art sites. Although the environmental conditions in which this group lives is not identical to that of the Lower Pecos, there are enough ecological similarities to merit some discussion.

AUSTRALIA

Australia is home to several groups of Aborigines, many of whom have maintained their traditional culture. Several of these groups continue to paint rock art and researchers have often observed that over-painting is common. The significance and meaning of the rock art itself varies among the different groups and geographic regions.

Mowanjum of the Kimberleys

Researchers such as Richard Gould (1986:205-207) believe that among some Aboriginal groups the site itself is more important than the rock art that it contains. They claim that an examination of the superimposed images at these sites reveals that the artists did not attempt to retouch the older images. Additionally these groups do not attempt to blend the newer figures with the existing rock art (Gould 1986:205-7). However, ethnographic data from the Aborigines of the Kimberleys region in north western Australia reveals that over-painting may serve a different purpose (Utemara and Vinnicombe 1992:25; Clottes 2002:84-5).

It is important to note that the Kimberleys region is one of a few areas worldwide where the indigenous rock art tradition has continued without interruption (Taçon

2001:534-44). The rock art of this area is characterized by polychrome murals. These murals feature anthropomorphs, zoomorphs, and geometric designs.

The most obvious motif is that of the Wandjinas (Figure 2.7). These mouthless images are represented as either anthropomorphic figures with oversized heads or simply by a large round disembodied head. They typically have large oval or round eyes and elaborate halo-like hair or headdresses. The Wandjinas' hair, faces, and bodies (if present) are often decorated with geometric elements. Frequently, they are accompanied by smaller zoomorphs, geometrics, anthropomorphs, and therianthropes.

The Wandjinas are painted by a group of Aborigines known as the Mowanjum people. The Mowanjum community is comprised of three language groups the Worora, Ngarinyin, and Wunumbal (Utemara and Vinnicombe 1992:25). The Wandjina motif is specific to the Kimberleys. Mowanjum elders indicate that the images are extremely powerful and only initiated members of their community who have permission should paint the Wandjinas (Barunga 2003).

According to ethnographic information, the Wandjinas represent the ancestors of the Mowanjum group that controls the land on which the rock art site exists (Utemara and Vinnicombe 1992:25). The Mowanjum of the Kimberleys believe that Wandjinas are supernaturals linked with creation (Utemara and Vinnicombe 1992:25-26; Vinnicombe 1992:10). These supernaturals originally traveled throughout the region. However, they eventually each came to inhabit a particular territory, which they placed in the care of a clan. Then the Wandjinas painted their images on rocks located within their respective territories, and to insure the continued fertility of the clan, they placed the spirits of the

clan's unborn children in pools of water nearby (Walsh 1992:49-50; Clottes 2002:84-5,102-17; Layton 2001:313).

The Wandjinas are also associated with rain, fertility, and creation. The Mowanjum believe that these images are alive and that they are extremely powerful (Mowaljarlai 1992:8). Additionally they believe that when the paint flakes off or fades the images' power diminishes. Therefore, the Mowanjum maintain these sites in an effort to refresh the power of the figures. This maintenance includes periodically touching up and repainting the Wandjinas as well as the figures associated with them. The maintenance of these sites often involves the work and support of the entire clan. In this way retouching the paintings helps reinforce cohesion among the group's members (Utemara and Vinnicombe 1992:26; Vinnicombe 1992:10-11; Walsh 1992:50; Layton 2001:313-5; Lewis-Williams 2002:261).

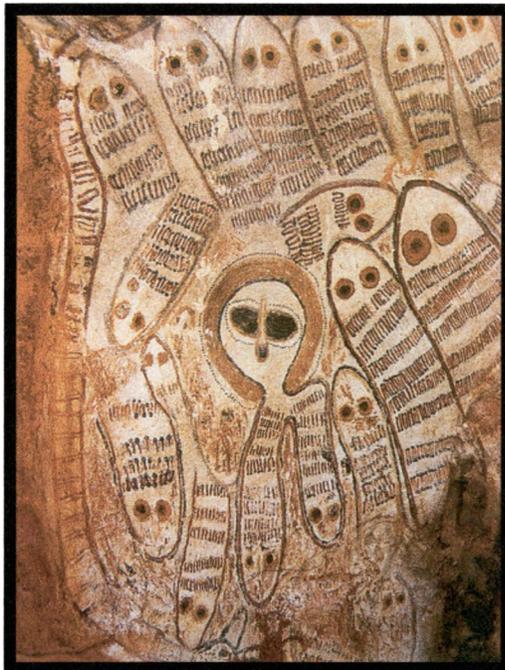


Figure 2.7 Wandjinas from the Gibb River Station Site in Kimberley District, Western Australia as shown in *Ancient Texans* (Shafer 1986:205; photographed by Gould).

NORTH AMERICA

Although many New World rock art sites show evidence of over-painting, there is very little ethnohistorical data on the topic. Nevertheless, there is some evidence that at least some groups, such as the Modoc, Chumash, and Yokuts were continually interacting with and repainting their rock art.

Many of the Giant Mural paintings in Baja California show evidence of having been repeatedly outlined or in-filled. In the Columbia Plateau, the shaman's assistant would maintain and repaint the rock art of the Modoc and Klamath. Linguistic and ethnographic evidence indicates that the Kutenai word for pigment (*nameeta*) may have also meant power as it is closely linked to the word *mupeka* which in the Kutenai's language means supernatural power (Keyser and Klassen 2001:38-9; Layton 2001:313).

Chumash

In 1542 when their initial contact with the Spanish occurred, the Chumash occupied southern coastal portions of what is now California (Grant 1993[1965]:8). Their territory included San Miguel, Santa Rosa, and Santa Cruz, which are three of the Santa Barbara Channel Islands located along the California coast (Grant 1993[1965]:3-5). After contact with Europeans, the entire Indian population of California began a steady decline and the Chumash population in particular was decimated (Grant 1993[1965]:23-24). In 1602 while traveling with explorer Sebastian Viscaïno, Father Ascension indicated that the Chumash area was "thickly populated" (Grant 1993[1965]:9). At the beginning of the mission period (approximately 1770), Chumash population estimates on the mainland were between 10,000 and 20,000 people (Grant 1993[1965]:33). By 1839 only 246 Chumash remained in the Santa Barbara area (Grant 1993[1965]:21). The last

known full-blood Chumash died in 1952. Although some Chumash of mixed heritage survived and remain on reservations, they were completely assimilated into the culture of the whites (Grant 1993[1965]:23-24).

Ironically, much of the ethnographic information about the Chumash comes primarily from the written diaries, journals, and mission records of the Europeans that contributed to their demise. According to these accounts, the Chumash on the mainland tended to be sedentary and lived in semi-permanent villages. Those on the channel islands, however, were semi-nomadic (Grant 1993[1965]:33-37). Although their settlement pattern was sedentary, the Chumash subsistence practices primarily consisted of hunting/fishing and gathering edible plant materials (Grant 1993[1965]:68-71).

Chumash rock art contains multiple examples of superimposition. Campbell Grant (1993[1965]:74-76) who visited over 70 Chumash rock art sites, noted the over-painted pictographic images. He also indicates that the rock art images may have been periodically “refreshed” or “touched up” (Grant 1993[1965]:93-96). Ritual items and regalia have been recovered from these sites (Grant 1993[1965]:89-92). This evidence would seem to indicate that the rock art sites may have been reused.

Keyser and Klassen (2001:38-9) indicate that for the Chumash, repainting was considered a part of maintaining the sacred site. Since this practice refreshed the image, it also refreshed its power. The rock art is believed to have been inspired by the shaman’s visions, which were received during an ASC. Likewise, the older rock art images at these sites probably influenced the shaman’s visions. The repetition of the experience may have encouraged the retouching, and in some cases the alteration, of the

composition. Therefore, the figures may have served a reciprocal function among the shamanic groups who created them (Keyser and Klassen 2001:38-9).

Yokuts

The Yokuts are closely related to the Chumash, both geographically and linguistically. However, there is more ethnographic data available on the Yokuts (Turpin 2001:366-367). Johannes Loubser (2001:90-1) indicates that while working in California, a Wuckhumni (Yokuts) informant showed him how their paintings were periodically refreshed by reapplications of pigment. However this spokesperson also indicated that the practice was discontinued about eighty years ago.

CONCLUSION

Natural and cultural processes affect the visibility of the Pecos River Style pictographs and may skew the data collected. The discussion of cultural alterations may be problematic due to a lack of neutral terminology. However, I have attempted to use and define terms based on observable characteristics within the rock art. Additionally, a review of both the technical literature as well as publications that address over-painting reveals that there is a need for additional research on both topics. In subsequent chapters, I will provide information about my research methods and discuss the photography in each case. In the final two chapters, I will lay out the research results and observations.

CHAPTER 3: RECORDING AND DOCUMENTING OBSCURED PICTOGRAPHS

This chapter discusses the methods used to record over-painted and obscured and analyze pictographs using infrared and ultraviolet (UVIR) photography and digital enhancement tools. I explain the types of equipment used and provide a detailed discussion of the photographic techniques and methods of analysis. I describe how I processed the information with particular attention to the electronic data.

All of the recording methods used in this project are non-destructive. Substances such as chalk, tape, water, kerosene, and other chemicals, when applied to the rock art and/or shelter walls, expedite the deterioration of the figures. Additionally, these substances may have a negative impact on tests used in dating and pigment analysis. Therefore, neither my field crew nor I applied any substances to the rock art or the rock shelter walls.

PHOTOGRAPHY

The pictographs at each site were recorded using two types of photography. One type involved taking photographs using visible light. These are referred to as visible spectrum (vis-spec) photographs. Vis-spec photography captures images produced by reflected light that is visible to the unaided eye. The other type of photography involved recording images in infrared and ultraviolet (UVIR). While these photographs may

capture some light that is visible to the naked eye, they also capture light reflected in the ultraviolet (UV) and infrared (IR) ranges. These ranges are not visible to the human eye. These methods will be described in detail in subsequent sections. For each photograph I documented the following information: photographer, camera, photo number, unit number (if applicable), date, time, weather conditions, and camera settings.

PHOTOGRAPHIC EQUIPMENT

CAMERAS

I photographed the pictographs using a Panasonic Lumix FZ30[®] 8 megapixel (mp) digital camera. At some sites, I also used either a Fuji Finepix S5600[®] 5 mp or a Fuji Finepix IS-1[®] 9 mp camera. Both of these cameras are capable of capturing multispectral or full spectrum light.

A private company modified the Fuji S5600 so that it can capture UVIR light. This modification involved removing an internal filter referred to as an infrared cut filter (IRCF) or internal hot mirror filter. The Fuji IS-1 is manufactured by Fuji without an IRCF. The IRCF is a tiny filter inside the digital camera. Most camera manufacturers place this filter over the camera's image sensor to block infrared light that would affect the quality of the image produced. In both the Fuji S5600 and the IS-1, a clear glass filter replaces the IRCF. This clear filter allows the IR and UV light to pass through it to the camera's image sensor. Since both cameras lack the IRCF they are both capable of capturing the full spectrum of light. This full spectrum includes wavelengths that are not visible to the human eye such as IR and UV.

At the Curly Tail Panther site, three additional photographers worked with me to capture the vis-spec images. In each case, the photographers used their personal cameras

Photographers Angel and Jack Johnson used a Nikon Cool Pix L4[®] and Kathleen Burgess used a Canon EOS Rebel XT[®].

OTHER PHOTOGRAPHIC EQUIPMENT

The majority of the vis-spec photographs were taken with a hand held camera. Initially, for the UVIR photographs, I used a generic tripod to steady the camera during long exposures. The tripod also allowed me to take a series of identical photographs of the same pictograph utilizing different filters. Each of these series of photographs could later be combined to create a composite UVIR/Vis-spec image. In order to create these composites it was important that the camera remain stable. The slightest shift in camera position would make it impossible to align the images when creating the composites; and essentially render the photo series useless. Therefore, a light weight carbon fiber Sunpak[®] Pro 325P tripod was added to the equipment.

I experimented with several different external filters including Tiffen[®] Red 1 (A25), Tamron[®] P01 (green), and Tamron[®] Y2. I used the Suntec[®] R750, Hoya[®] R72, generic 850, generic 950, B+W[®] 403, and Tiffen[®] standard hot mirror most frequently. When I transitioned from using the Fuji 5600 to the Fuji IS-1 camera, I also added several other filters to the equipment. These new filters included: B+W 099, Lee[®] 87, Cokin[®] P002, Cokin P003, and Cokin P007. Each of these filters is designed to transmit specific wavelengths of light while blocking others.

PHOTOGRAPHY TYPES

VISIBLE SPECTRUM

The vis-spec photographs were taken in the JPEG and Tiff formats. These formats created high quality images that were sharp but not grainy. It is also important to note that all images “degrade” or deteriorate slightly when they are digitally manipulated. This is may be due to file compression that occurs when the image is re-saved, as well as other factors. The result is that the more an image is manipulated and re-saved the more information is lost resulting in images that get progressively less detailed. Often images that have degraded appear blurry or grainy. This graininess is commonly called digital noise. Digital manipulation of an image may also result in “artifacts.” These may be caused by compression or from the process of manipulation. Artifacts often show up as tiny pinpoints of white within the image (occasionally referred to as hot pixels) or they may appear as blurry or indistinct areas within the photograph. The JPEG and Tiff image formats were chosen because in comparison to other formats, JPEGs and Tiffs do not experience as much compression and deterioration during the manipulation process. In most cases, the images were recorded without using a tripod. I digitally processed these photographs using Adobe Photoshop CS2[®]. The techniques used to process the photographs will be explained in a subsequent section.

FULL SPECTRUM PHOTOGRAPHY

The range of visible light varies from one individual to another. There is considerable variation in the eye’s sensitivity to different wavelengths of light. The eye’s sensitivity does not remain static; it changes depending on the type of lighting available (Llewellyn 2007). Humans generally perceive light that is between 400 nanometers (nm)

and 700 nm. Wavelengths outside of this range are beyond the visible spectrum (Figure 3.1; Figure 3.2; Figure 3.3; and Figure 3.4). Full spectrum photography not only captures images in the visible spectrum but also in those that are invisible to the human eye. My composite photographs combine a vis-spec image with either an IR or a UV image and occasionally they include all three types.

Unlike the vis-specs, I used a tripod for the UVIR photographs. The tripod was often required, even while recording single image UVIR photographs that are not used to create composites. This was largely due to the reduced light and the slower shutter speeds necessitated by the UVIR filters. In order to create false colors from UVIR composites, it was necessary to take multiple photographs of the same pictograph. This had to be done without moving the camera in between shots so that each photograph within the series was identical. Therefore, the tripod was required for the UVIR photo series. The first photograph in the series was typically unfiltered or vis-spec. I then repeated the exposure using the various IR and UV pass filters.

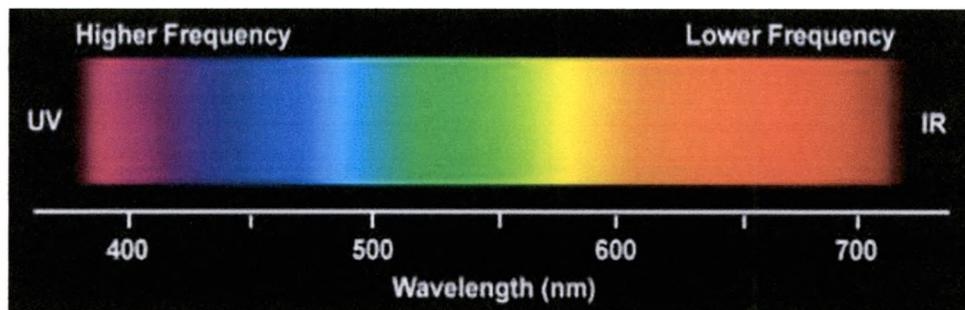


Figure 3.1 The light spectrum as shown on MaxMax.com (Llewellyn 2007).

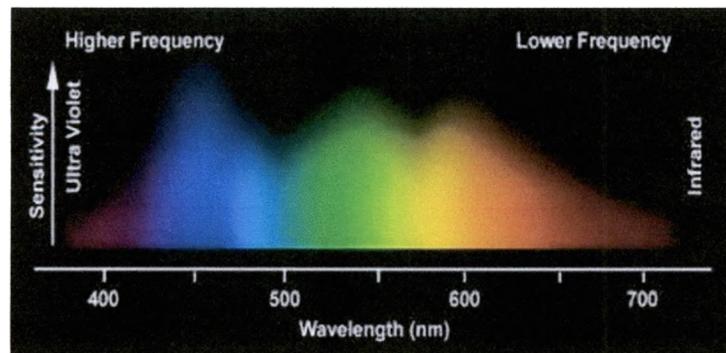


Figure 3.2 The human eye's variance of color sensitivity as shown on MaxMax.com (Llewellyn 2007).

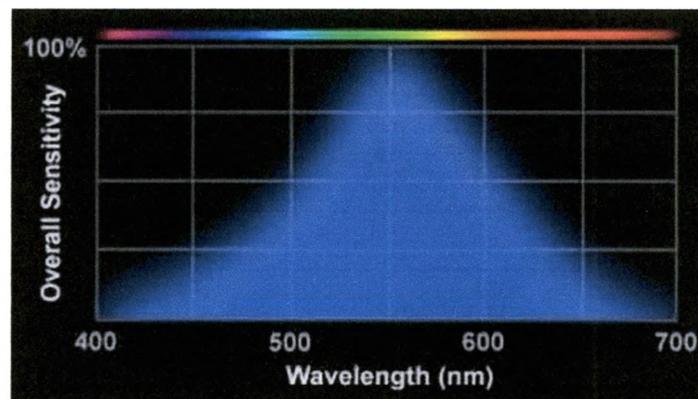


Figure 3.3 The sensitivity of the human eye as shown on MaxMax.com (Llewellyn 2007).

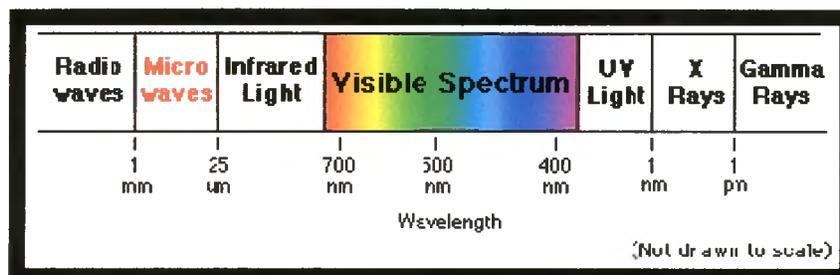


Figure 3.4 The range of light wavelengths as shown on MaxMax.com (Llewellyn 2007).

Infrared

The infrared spectrum ranges from approximately 700 nm to 1200 nm (Farace 2007:50-1). The IR photographs I used for this project recorded wavelengths between 700 nm and 950 nm. Contrary to popular belief, IR digital photography does not record heat. Thermal luminescence cameras can measure radiated heat, however the

wavelengths recorded are much longer than those recorded with standard digital or film cameras (Guy 2007).

Infrared images can be recorded in one of two ways. The first, referred to as IR fluorescence, records images of substances whose chemical properties cause them to “glow” when exposed to an IR light source. The second, referred to as IR reflectance, records images of subjects that reflect infrared light. The second type of IR photography is the kind used for this project.

Ultraviolet

The UV spectrum ranges from 0 nm to 400 nm. It is divided into three bands: UVA (320 nm to 400 nm), UVB (280 nm to 320 nm), and UVC (100 nm to 280 nm). Like IR images, UV images may record subjects that fluoresce under UV light or those that reflect it (Dorrell 1994:198-203). Ultraviolet fluorescence requires the use of a UV light source. I used only the reflective type of UV photography to record the rock art because the use of alternative light sources was not logistically feasible. It is also important to note that light sources that emit UVB bands may fade pigments, burn skin, and damage eyes (Williams and Williams 2002).

IMAGE PROCESSING

In this section, I will discuss the different types of enhancements used to process the photographs. As previously stated, I used Adobe Photoshop CS2 software to develop the photographs. Enhanced images included vis-spec and UVIR images; both may reveal figures that are obscured by over-painting, dust, and fading.

Each of the photographs required different processing techniques, therefore the methods described in this section might not have been applied to every image. It is also

important to note that I did not use subjective tools such as erasers or paint brushes to enhance the photographs. I saved the original photographs in a separate file and used copies to make the enhancements. I documented the changes made to each photograph and saved the enhanced images with information in the file name that indicates the changes made.

PROCESSING VISIBLE SPECTRUM PHOTOGRAPHS

Many of the techniques that I use to enhance the vis-spec photographs are adapted from those discussed by Robert Mark in his publications (Mark and Billo 2006; 2002) and through personal communications (Mark 2007 personal communication). The first step for enhancing the vis-spec images was to increase the contrast. In some cases, I also adjusted the hue, saturation, and lightness (HSL). Adobe CS2 provides several different color “modes.” Each mode separates and/or combines the colors within the image and sorts them into what Adobe refers to as color channels. A channel is a grayscale image that is the same size as the original color image but each channel is made up of a single primary color. By adjusting the histogram levels of each color channel individually, it is possible to increase the visibility of specific items within the photograph. The color modes are: Red, Blue, Green (RGB) and Cyan, Magenta, Yellow, Black (CMYK). Color spaces by contrast, sort the colors within the image into various combinations of colors. The Lab color space in Adobe CS2 separates the Lightness in an image into the “L” channel while combining the red and green portions into the “a” channel and the blue and yellow portions into the “b” channel.

In order to process the vis-spec images, I adjusted the levels in either RGB, CMYK, or Lab. Other techniques used included inverting one or all of the color channels

within the image. These techniques increased the contrast and visibility of the images and created “false-color” (FC) images. A false color image depicts the image in colors that differ from those that a normal photograph would show. I also created gray-scale (GS) images by separating the individual channels. Occasionally I also used layering and color assigning techniques, however these methods were better suited to UVIR images.

PROCESSING INFRARED AND ULTRAVIOLET PHOTOGRAPHS

Due to their unusual properties, unprocessed IR and UV images often have an odd appearance. Infrared images are usually red or purple monochrome, and the ultraviolet images have an orange/blue colorcast. Although the unprocessed UVIR images can be immediately converted to gray-scales, a gray-scale conversion at this point generally does not enhance the visibility of the pictographs. It is only after other digital enhancements are made to the contrast of the image that the gray-scales begin to show more detail.

Some of the methods utilized for vis-spec image processing were also applied to the UVIR images. However, I also used three alternative methods of processing these photographs. Each technique can be used to create gray-scales or false-color images.

The technique that I used most often was called “assigning channels.” This method involves opening a vis-spec and an IR or UV photograph of the same subject. I then used the copy and paste commands to insert the IR photograph into one of the color channels in the vis-spec photograph.

The second technique, called “channel swapping”, involves duplicating the IR image. The channels of the duplicate image are pasted into opposite channels of the original image. For example, in the RGB color space, I typically swapped the red and

blue channels. Another method of channel swapping is to manipulate the sliders of the individual channels in the channel mixer.

A third option is to create a new layer in a vis-spec image and paste the IR photograph into the layer. After the opacity of the layer is adjusted, the image is flattened and saved.

PHOTOGRAPH LABELS

The photographs are catalogued according to the rock art site at which they were taken. Each site has several series of photographs that I labeled with a three-part alphanumeric abbreviation. I embedded the photo labels into the images. The labels include an abbreviation for the site name and a sequential photographic number for the series. The photographs also have an abbreviation for the photograph type, and a sequential photographic number. The four photograph types and their abbreviations are as follows: visible spectrum (VS), grayscale (GS), false color (FC), and unprocessed infrared and/or ultra-violet (UVIR). For example, the first vis-spec photograph in the first photo series from Panther Cave (41VV83) is labeled as PCS1-VS-1. Due to the large number of photographs included in this paper, I left these alphanumeric labels on the images.

FIELD NOTES

Detailed field notes were included in the field notebook. The information collected in the field notebook included orientation of the site, approximate GPS location, and recording conditions (such as lighting and weather). Lighting in particular was important to note since the results of the UVIR photographs may differ depending upon lighting conditions. Additional information included in the field notebook included the

photographic numbers assigned by the camera, the location of the pictograph on the panel, approximate shelter size and height, as well as occasional sketches.

SELECTION OF PICTOGRAPHS

The pictographs chosen for UVIR and enhanced photography were selected based on several criteria. Pictographs that seemed to have a thick impasto of paint or whose dimensions appeared to have been altered were given priority as were overlapping figures. Due to the experimental nature of the UVIR photography, those figures that were obscured by whewellite, calcium carbonate, and other natural substances were also prioritized. Prior to revisiting a site, the images taken during previous visits were reviewed in order to determine which areas might need additional photographs and close-ups. Additionally, recommendations from the field crew were also taken into consideration.

CONCLUSION

Although I did sketch some of the figures, my research goals necessitated the use of photography as the primary method of documentation. I found that the photographic filters that worked best with the UVIR were the Suntec[®] R750, Hoya[®] R72, generic 850, generic 950, B+W[®] 403, and Tiffen[®] standard hot mirror. The two processing methods that seemed to work best on the UVIR images were the “channel assigns” and “channel swaps.” Although many photographers prefer the layering method, I have not had as much success with it. Additionally the grayscale images created from the individual color channels often provided more information than the images containing color. The next chapters will discuss the results of the research and the conclusions.

As previously stated, the purpose of my research was to document over-painted and obscured pictographs. This process also involved the evaluation of various photography methods to determine their efficacy as tools in rock research. It is important to note that the recording methods that I use are non-destructive and do not require the application of foreign substances to the rock art or its substrate. The use of UVIR and digitally enhanced images help improve the visibility of obscured pictographs without damaging the rock art or the shelter walls.

CHAPTER 4: IMAGES REVEALED-SIX PECOS RIVER STYLE

SITES

The results of this project are preliminary. Additional sites must be added to the project before these results are considered conclusive. However, in this chapter, I present the initial results of the data collected at six rock art sites. These results include a general description of each site, as well as detailed information concerning the pictographs. This chapter will also discuss the implications of the results.

PANTHER CAVE (41VV83)

SITE DESCRIPTION

Panther Cave is a Pecos River Style rock art site located at the mouth of the Rio Grande tributary that forms Seminole Canyon (Figure 4.1). There are several other shelters containing rock art nearby, including one that is directly across the canyon from Panther Cave. Prior to the construction of the Amistad Dam, the shelter's entrance was well above the canyon floor. The dam raised the water level of the Rio Grande and created Amistad Reservoir. As a result of the higher water level within the reservoir, Panther Cave can only be accessed by boat.

The shelter is located within Seminole Canyon State Park (SCSP). Park officials have attempted to protect the site from vandals by installing a chain link fence across the shelter's entrance. Unfortunately, they cannot protect the pictographs from the weather

and other natural processes. Many of the Pecos River Style pictographs at Panther Cave contain spalls. The increased humidity brought on by the site's proximity to the water may be contributing to an acceleration in the rate of spalling. Some of the figures at this site are obscured due to minerals such as calcium carbonate that cling or seep from the shelter wall. Additionally, other accumulations of debris such as dust; a naturally occurring organic substance called whewellite (Russ et al. 1996:27-28; Russ et al. 1999:91-93); and other floral and faunal residues decrease the visibility of the pictographs.

In 1938 when A.T. Jackson published his seminal work titled *Picture-Writing of the Texas Indians*, he referred to Panther Cave simply as "Site No. 84." About Panther Cave, Jackson writes that it, "probably contains more superimposed paintings in a given area than any other in Texas (Jackson 1938:213)." Although his statement is debatable, there is no doubt that the Pecos River Style pictographs at Panther Cave overlap each other in numerous places on the panel. This overlapping is particularly evident on the viewer's left and toward the center of the panel. The far right portion of the panel exhibits less overlap and seems to contain fewer pictographs. It is interesting to note however, that many of the images in this area of the panel are quite large (over 1.5 m tall).

Both David Gebhard (1965) and Solveig Turpin (1982) comment on the number of superimposed pictographs at this site. The over-painting at Panther Cave was of particular interest to Gebhard in his efforts to develop a stylistic chronology for the rock art in the Lower Pecos (Gebhard 1965:7). As previously mentioned, Turpin's dissertation research included pigment analysis of two pictographic samples. Each sample was taken

from an over-painted area of the panel and each contained at least two layers of pigment. Although the results of her analysis seemed to indicate that the two layers were applied during two separated and temporally distinct painting episodes, the results are questionable since only two samples were taken (Turpin 1982:103-105).

I visited Panther Cave for the first time during The Shumla School's October 2007 Pecos Experience (Figure 4.1). I was there from approximately 11:00 AM until 2:30 PM with a group of visitors and volunteers. During the visit, I was able to photograph most of the site in vis-spec as well as several panels in UVIR. In my field journal I noted the approximate location on the panel and the original photograph number assigned by the camera. The site abbreviation on the labels for the Panther Cave photo series is PCS.

PHOTOGRAPHIC ANALYSIS OF THE PANTHER CAVE PICTOGRAPHS

Photo Series PCS1

Photo Series PCS1 refers to the area of the panel closest to the gated entrance of the shelter. This section of the panel, contains a red contrasty anthropomorph, a red and black anthropomorph, a feline, and several enigmatic figures. The red contrasty anthropomorph is located near the entrance of Panther Cave and, although it has not been over-painted, a thick accumulation of debris that is believed to be whewellite, covers its arms. It is on the viewer's left and is one of the first visible anthropomorphs on that side of the shelter. It has red diagonal stripes across its body that resemble the stripes of a candy cane. At least five of these stripes are visible, but it is difficult to determine their exact number since dust and weathering have obscured parts of the figure. The area between the stripes does not appear to contain pigment. The figure's arms are partially

obscured by calcium oxalate and dust. A large number of crenelated lines radiate out from beneath the anthropomorph's arms. It has two slender objects extending from the top of its head that resemble elongated ears. It is oriented so that it is in profile and it faces a similarly oriented anthropomorph (Figure 4.2 through Figure 4.4).

The second anthropomorph, in contrast to the first, has a red vertical stripe running down its back. Its arms and the rest of its body appear to be grey-green, which is likely the result of weathering; its original colors were probably black and red. This figure's body has numerous spalls however; enough pigment remains for its shape to be easily discerned. It has a red oval and two lines in the middle of the lower half of its body. The figure's hands are red with four digits visible on the right hand. The area around the left hand has spalled but at least three digits are visible. Pigment near the spalled area indicates that the figure probably had four digits on the left hand. The red and black anthropomorph is in profile with both arms bent at the elbow and extended in front of the body.

Both figures have red paint splatter around the head/mouth area. The figures have several objects between them, including: an atlatl loaded with a spear, approximately seven additional spears, two lobed sticks, and a spinney datura pod (Boyd and Dering 1996:258; Boyd 2003:90-91) attached by three lines to a vertical line. There is also a small red oval, which may be pierced by the spear on the atlatl. All of these objects are solid red in color except for the fletching on the spears which are outlined in red but do not appear to be filled with pigment. The bottom quarter of the datura pod contains a heavy application of red pigment. The upper portions also have red pigment and some

black smudges. It is difficult to tell if the black smudges are pigment or if they are stains from some other source (i.e. mold, fire, etc.).

It is unclear whether the substance covering the arms of the red anthropomorph is dust, mold, or some type of mineral secretion. However, the unprocessed vis-spec photographs of the figure do show that there is a considerable amount of it covering the pigment. It is so thick that it obscures the anthropomorph's hands and forearms. After processing the infrared photographs taken at the site, I was able to determine that the red anthropomorph's arms and hands are in a similar position to those of the red and black anthropomorph. The images in photo series PCS1 (Figure 4.2 through Figure 4.4) are wide-angle photographs of both anthropomorphs.

Photo Series PCS2

Photo series PCS2 (Figure 4.5 through Figure 4.8) shows a close-up of the red anthropomorph's hands. Photo Series PCS2-GS (Figure 4.6 and Figure 4.7) and PCS2-FC (Figure 4.8), are the results of merging the channels and enhancing the infrared photographs. Both the grayscale and the false color photographs, clearly show the red anthropomorph's hands and arms. These photographs reveal that the red anthropomorph has at least four fingers on one hand and five on the other. It has bi-lobed raised wrist adornments similar to those found on other anthropomorphs in the shelter. The position of the arms and the streamers at the elbows give the impression of movement, but their exact meaning and purpose remains unknown.

Photo Series PCS7

PCS7 refers to the same area of the panel as PCS1 and PCS2, however PCS7 shows a lower portion of the panel (Figure 4.9). Like many Pecos River Style figures,

the previously discussed red anthropomorph is outline oriented. This is clearly demonstrated in photo series PCS7. Both the grayscale (Figure 4.10) and the false color (Figure 4.11) in this series show that the anthropomorph has a heavy outline of paint around the body that is slightly darker than the body itself. With the aid of enhanced photography, the artist's brush strokes are clearly visible (Figure 4.10). There are also marks and lines visible within the paint. Some of these appear to be brush strokes; however, some of these marks may represent under-drawings made by the artist.

A large red zoomorph, which is probably a feline, shown in PCS7, is located behind the striped red anthropomorph. The feline is extremely faded but it is associated with other geometric designs directly below. These geometrics are coated with dust and mineral deposits. Infrared photographs were not taken in Photo Series PCS7 however, after the digital enhancement of the vis-spec images, many of the geometric figures become visible (Figure 4.10 and Figure 4.11). Additionally the grayscale emphasizes the outline of the feline and indicates that it is also outline oriented (Figure 4.10). The grayscale and false color image revealed the brush strokes that the artist made while painting the zoomorph (Figure 4.10 and Figure 4.11). The grayscales in particular make the details of the figures more apparent (Figure 4.10). These enhancements also minimized the appearance of the staining on the shelter walls.

Photo Series PCS3

The pictographs shown in PCS3 are also near the entrance but are several meters to the viewer's right from the previously mentioned Photo Series (Figure 4.12 through Figure 4.15). The solid red anthropomorph in Photo Series PCS3 displays wrist and elbow adornments. This figure was painted over a natural depression in the shelter wall

(Figure 4.12). Large white streaks of calcium carbonate surround this anthropomorph on both sides. These accretions have almost completely obscured the pictographs in this area of the shelter. The large red anthropomorph is the only figure that is clearly visible at the site. Also visible without photo enhancements are portions of a red zoomorph, a red and black anthropomorph, the faint outline of a red anthropomorph, as well as several enigmatics.

However, the UVIR photographs have revealed some of the pictographs beneath (Figure 4.13 through Figure 4.15). The grayscales make the zoomorph more visible and they enhance the outlines of two anthropomorphs (Figure 4.13 and Figure 4.14). The false color image brings out the geometrics in the lower portions of the panel (Figure 4.15). Both the anthropomorph on the viewer's right and the zoomorph on the left are barely visible at the site today.

Photo Series PCS4

Photo series PCS4 (Figure 4.16 through Figure 4.18) is a close-up view of some of the mineral deposits shown in PCS3. Portion of the red zoomorph and the enigmatics below it are partially visible at the site. The enhanced grayscale photograph shows the faint outline of another anthropomorph (Figure 4.17). The false color image also enhances this anthropomorph as well as additional details hidden by the mineral deposits (Figure 4.18).

Photo Series PCS5

Series PCS5 shows several overlapping enigmatics located in the central portion of the panel (Figure 4.19 through Figure 4.21). These figures may have been inpainted at one time or another however, the overlapping here may also be compositional. The

grayscale in particular reveals that some of the figures were painted on top of one another (Figure 4.20). It also appears that the figures in the center of the photograph may have been scratched to create the figures on top (Figure 4.21). This also gives the illusion of transparency and allows the under-painting to show through the superimposed figure

Photo Series PCS6

PCS6 is located in the central portion of the panel and shows several large anthropomorphic figures as well as some zoomorphs (Figure 4.22 through Figure 4.24). A large red and black oval shaped figure with arms and legs emerging from the central black area is visible at the site. It is apparent that this figure likely covers several smaller pictographs, but the details of these smaller figures are not visible at the site. The oval has a wide red outline and a black interior. Parallel red lines extend vertically from the top of the oval and terminate at a red horizontal line. There are numerous red dots above and below the oval. These dots have lines around them and some of these dots are impaled. The arms seem to protrude from the upper sides of the oval. At the bottom of the oval near the legs, there are two red objects that resemble tails. The figure is surrounded by lines that resemble spears. There are three anthropomorphs immediately left of the oval. The red anthropomorph on the far left is the largest. Its arms and head are darker than the rest of its body and its head is U-shaped. Its face appears to lack pigment, but may have been in filled with black or gray originally. It has several long slender objects, referred as hip clusters (Boyd 2003:36; and Kirkland and Newcomb 1996 [1967]:49) attached at its hip. It holds an atlatl in its right hand that is outside the frame of the this Photo Series. There are also several spear-like objects, a staff-like object, and

a datura pod in its left hand. The U-headed anthropomorph's feet are surrounded by small zoomorphs.

Between the U-headed anthropomorph and the oval figure are two more anthropomorphs. The first is a red anthropomorph impaled by numerous spear-like objects. The second is a small, centrastyled anthropomorph with a box-like shape on its head. This anthropomorph is red, black, and yellow. It has wrist adornments on the right wrist and it is holding an atlatl loaded with a stylized spear. Near the left hand of the anthropomorph is a red vertical line and two horizontal lines that extend into the oval shape.

The outline of the red/black/yellow anthropomorph's stylized datura pod is only partially visible. The grayscale and false color photographs reveal more of the details of the datura pod (Figure 4.23 and Figure 4.24). The UVIR photographs also reveal more of the anthropomorphic figure that is superimposed by the oval. Since the hands and feet were left in place, the superimposition of the oval on the anthropomorph may be compositional.



Figure 4.1 View of Panther Cave (41VV83).

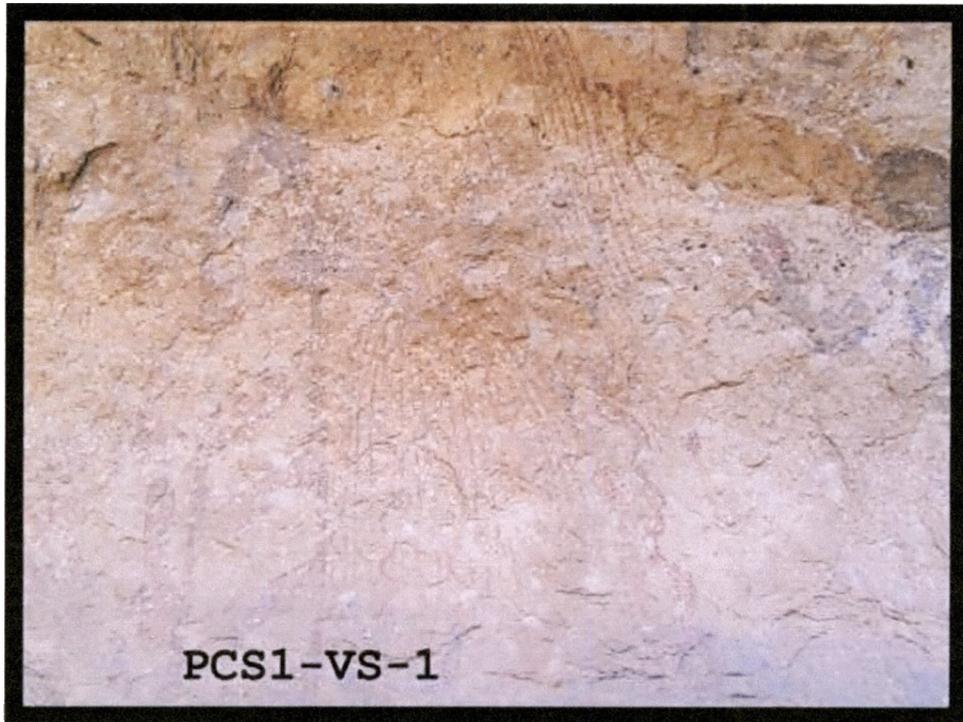


Figure 4.2 PCS1-VS-01.

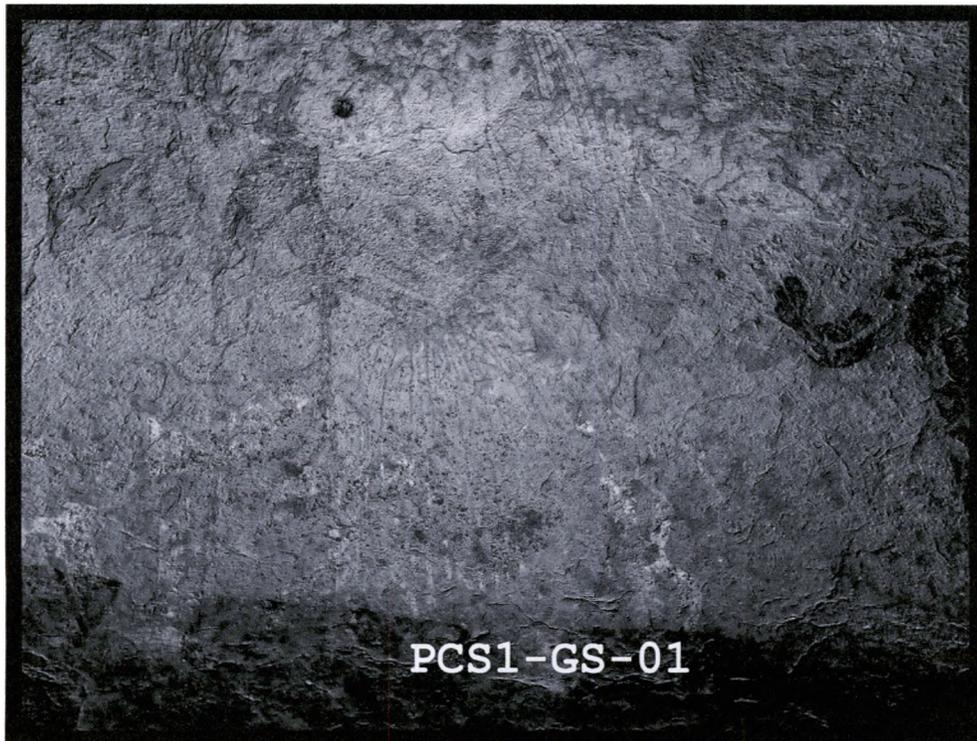


Figure 4.3 PCS1-GS-01.

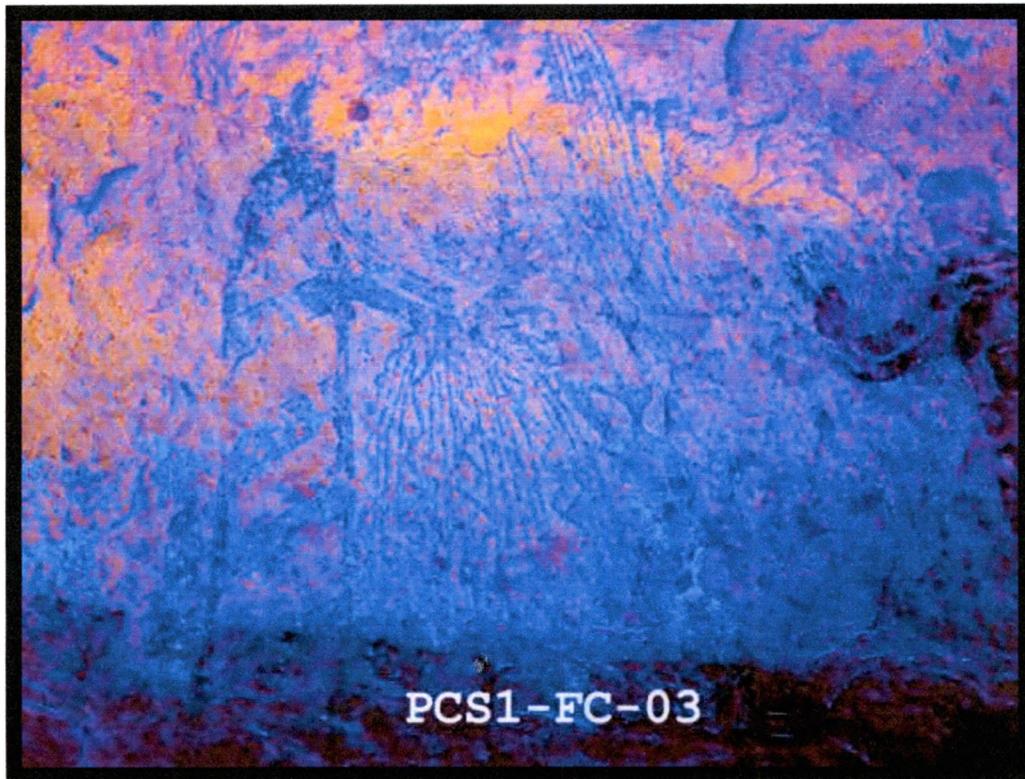


Figure 4.4 PCS1-FC-03.



Figure 4.5 PCS2-VS-01.

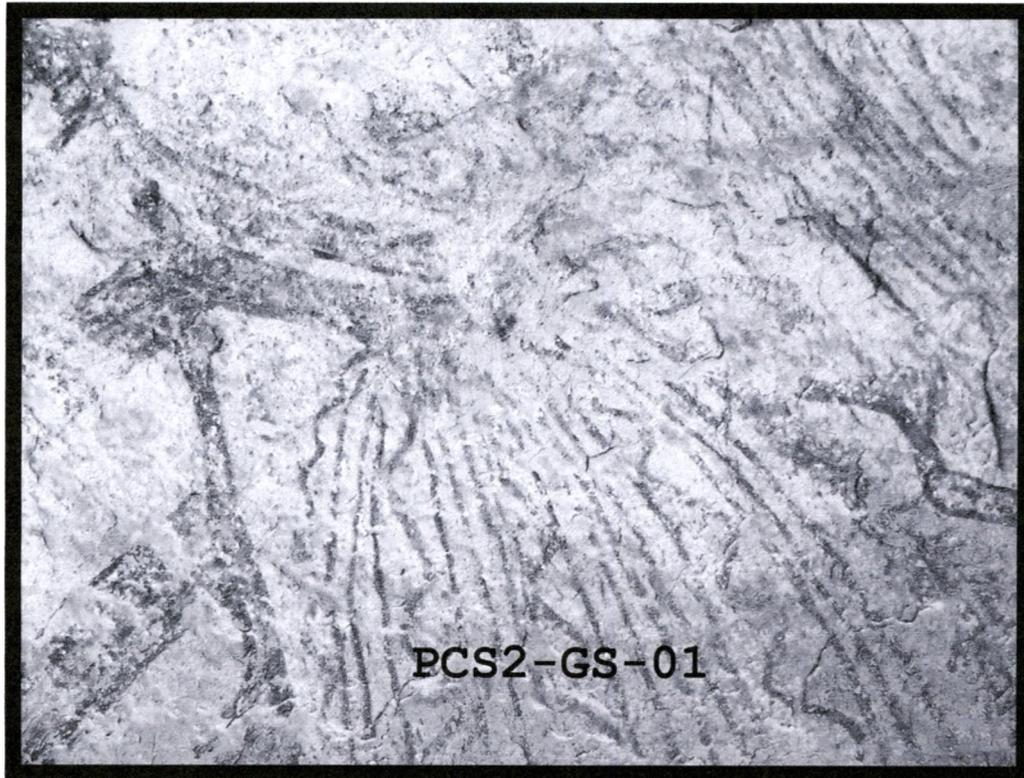


Figure 4.6 PCS2-GS-01.

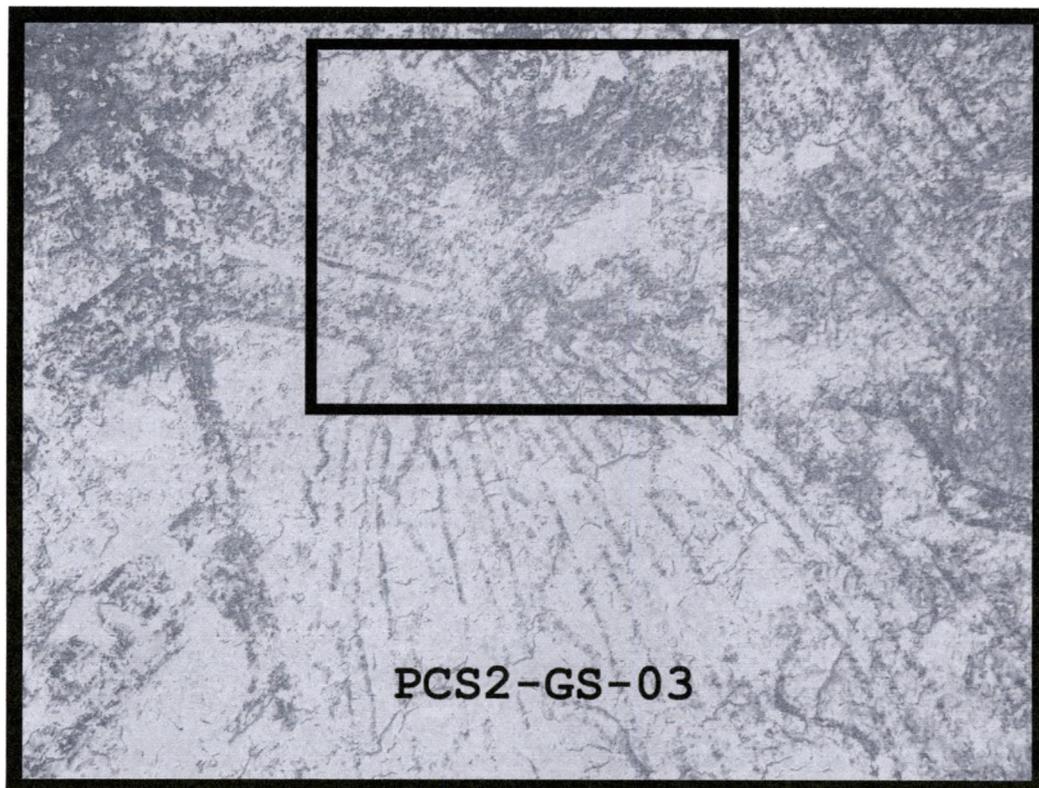


Figure 4.7 PCS2-GS-03.

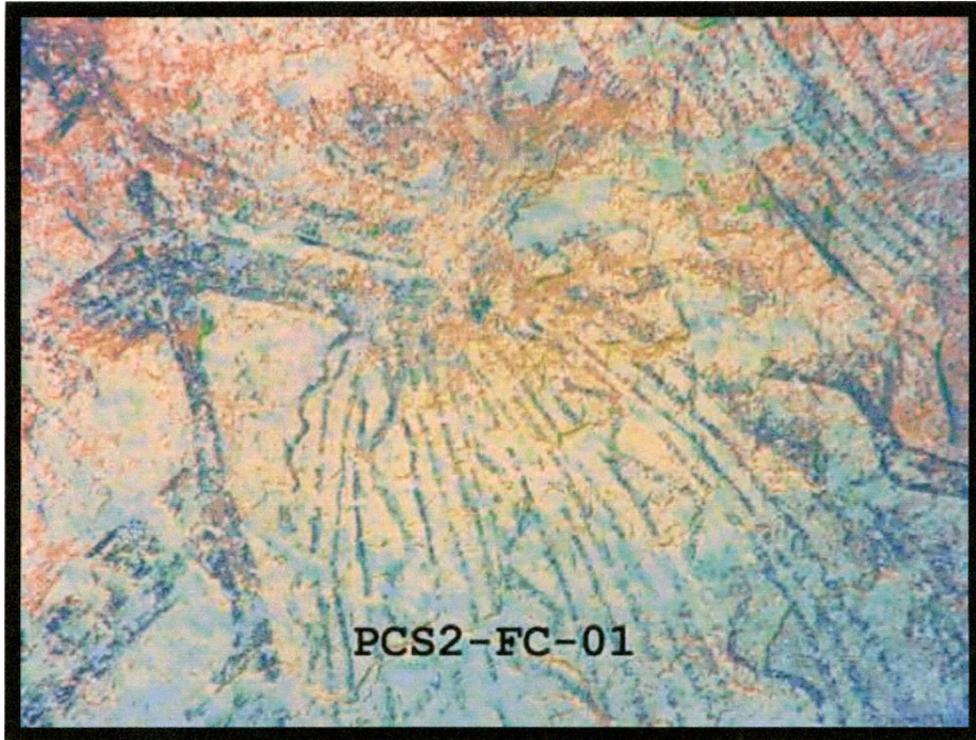


Figure 4.8 PCS2-FC-01.

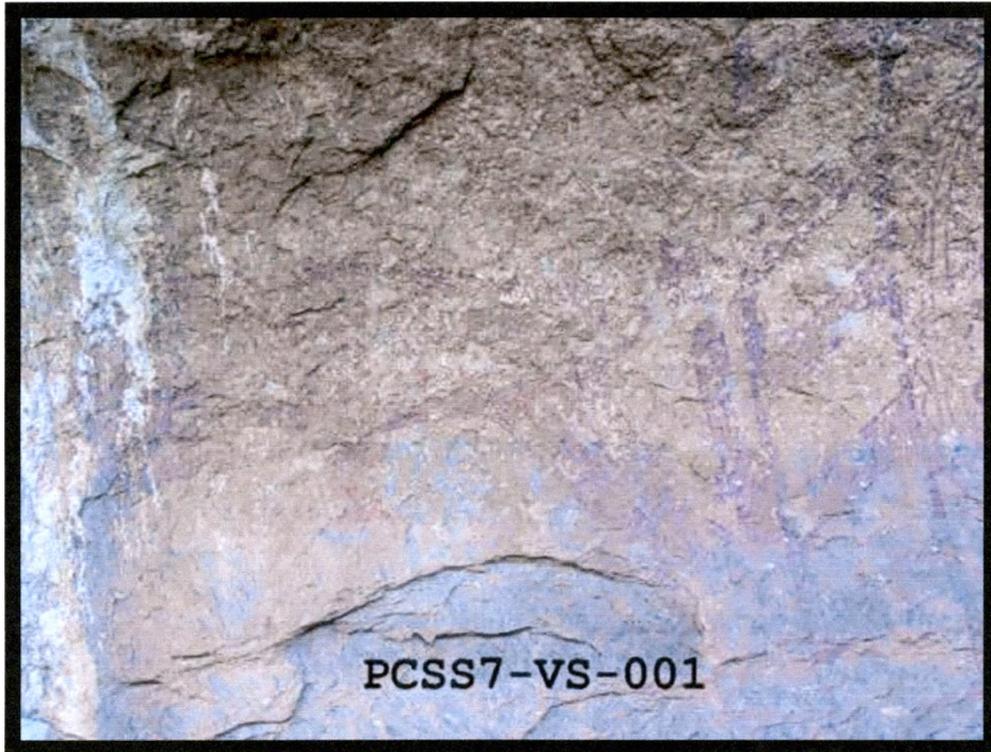


Figure 4.9 PCS7-VS-001.



Figure 4.10 PCS7-GS-002.

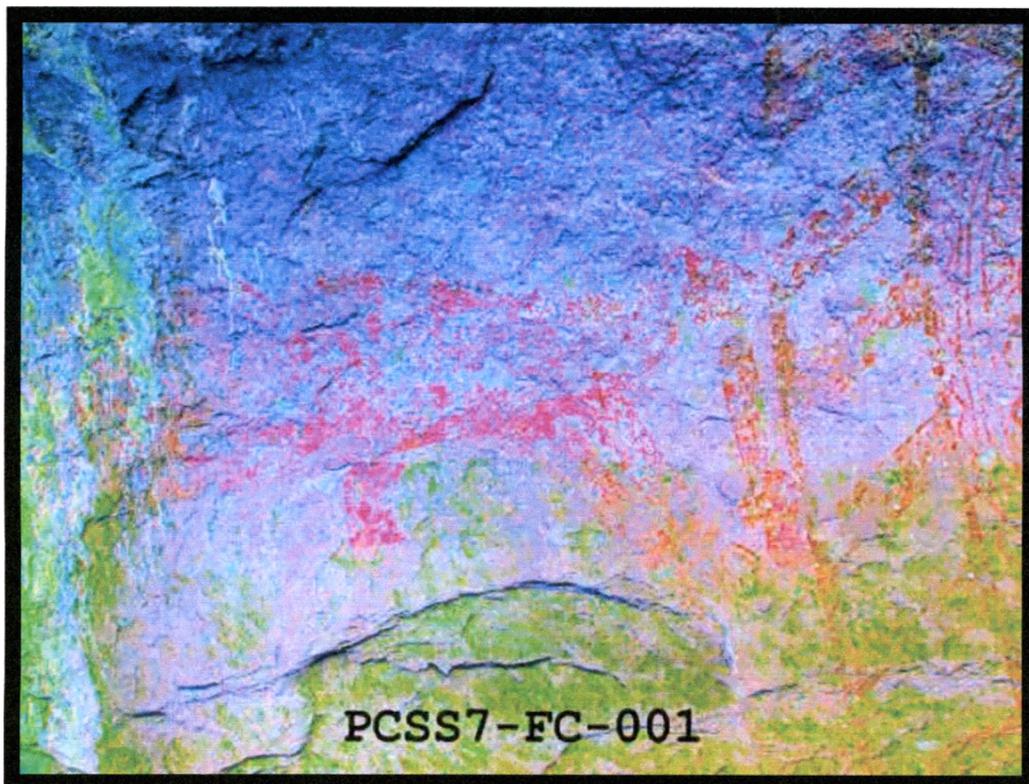


Figure 4.11 PCS7-FC-001.



Figure 4.12 PCS3-VS-01.

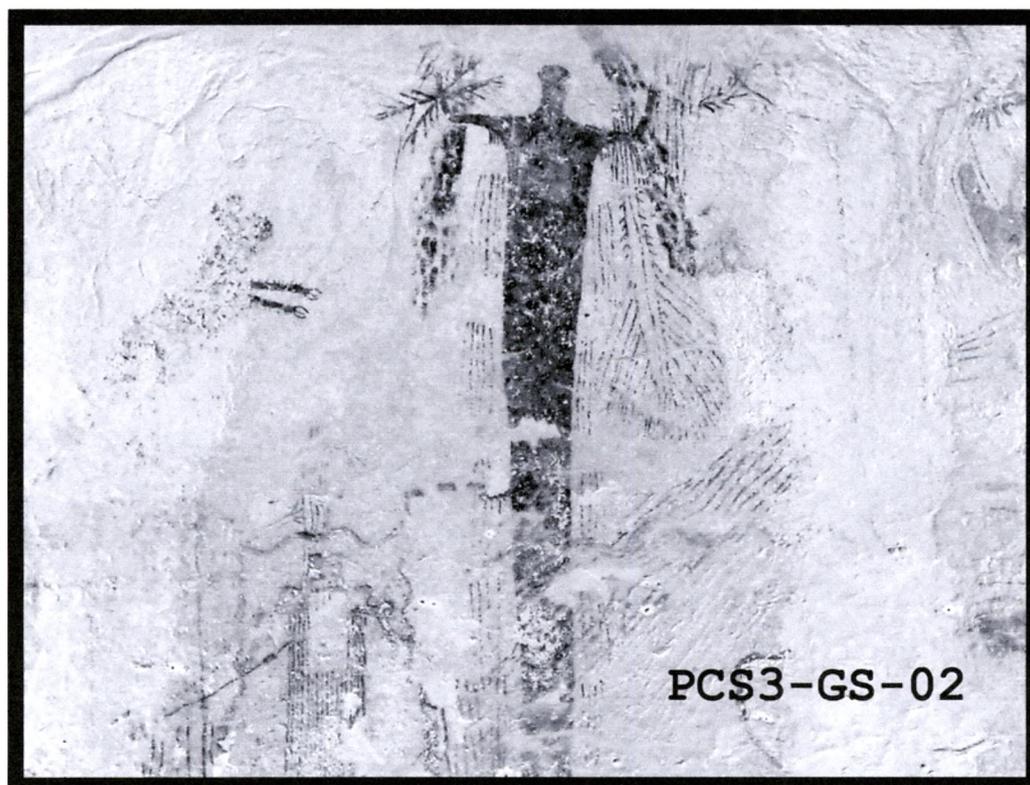


Figure 4.13 PCS3-GS-02.



Figure 4.14 PCS3-GS-03.



Figure 4.15 PCS3-FC-03.



Figure 4.16 PCS4-VS-01.

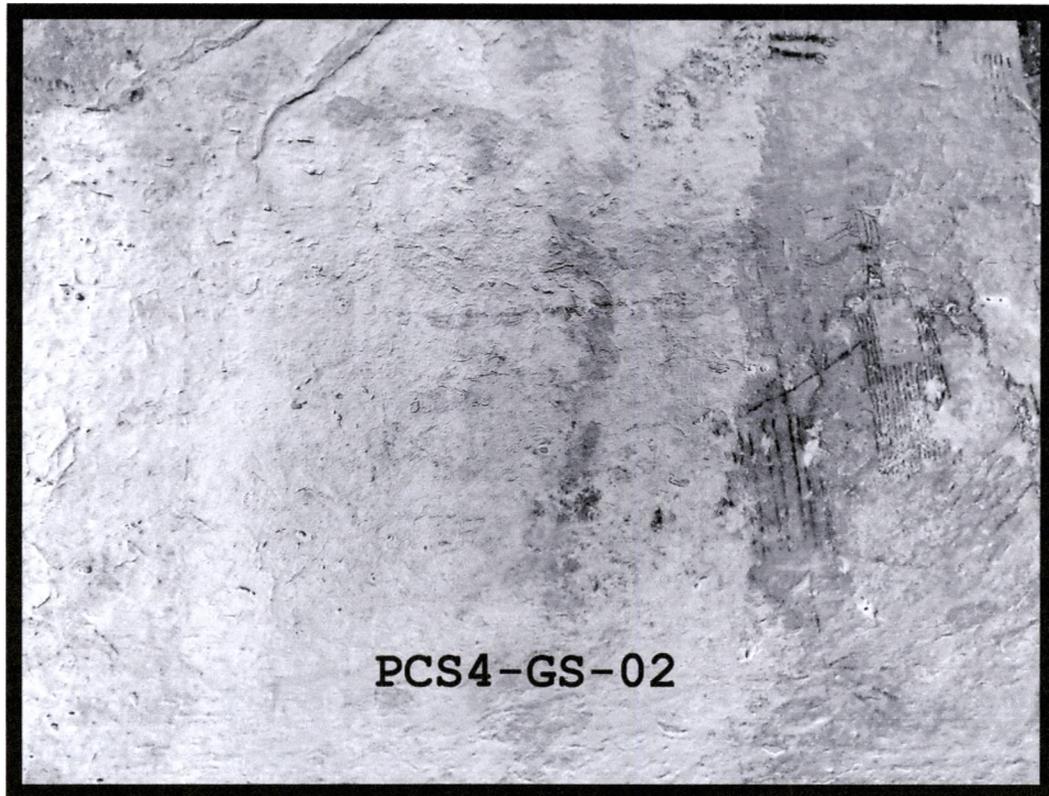


Figure 4.17 PCS4-GS-02.

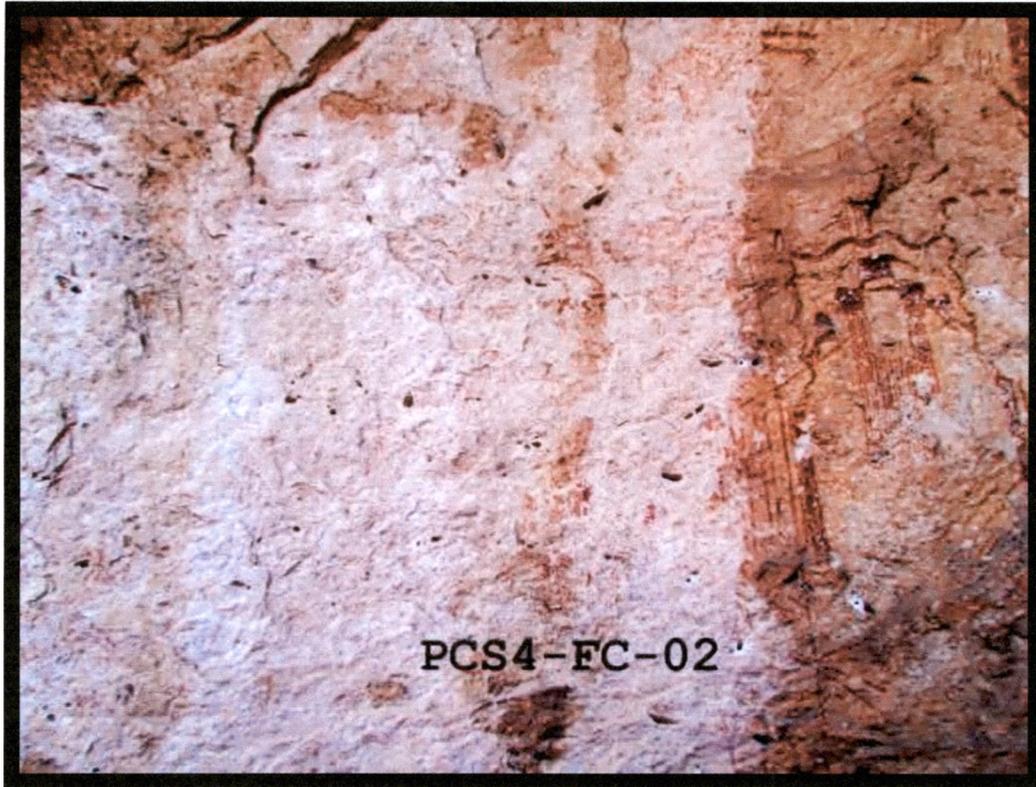


Figure 4.18 PCS4-FC-02.

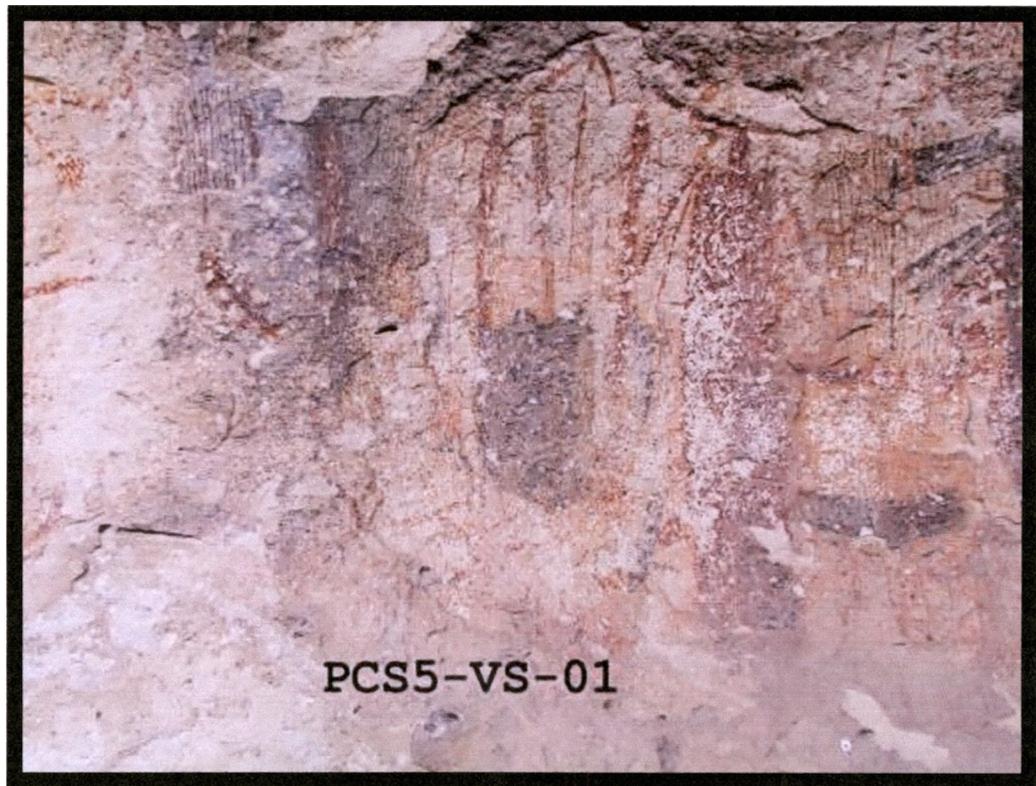


Figure 4.19 PCS5-VS-01.

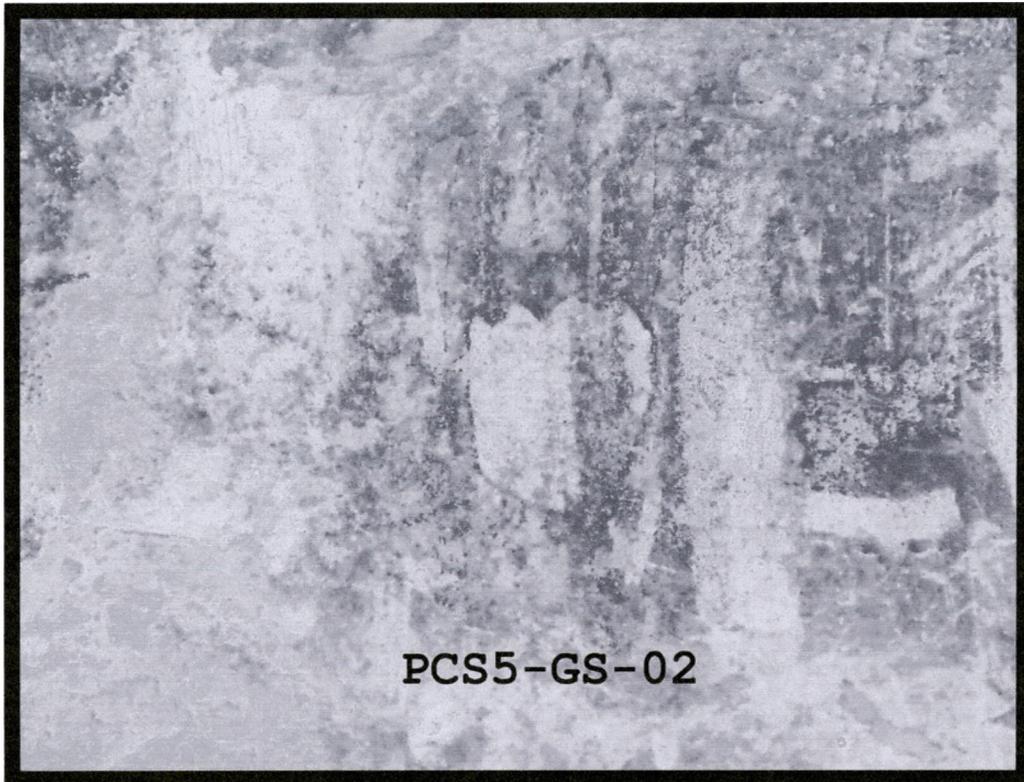


Figure 4.20 PCS5-GS-02.

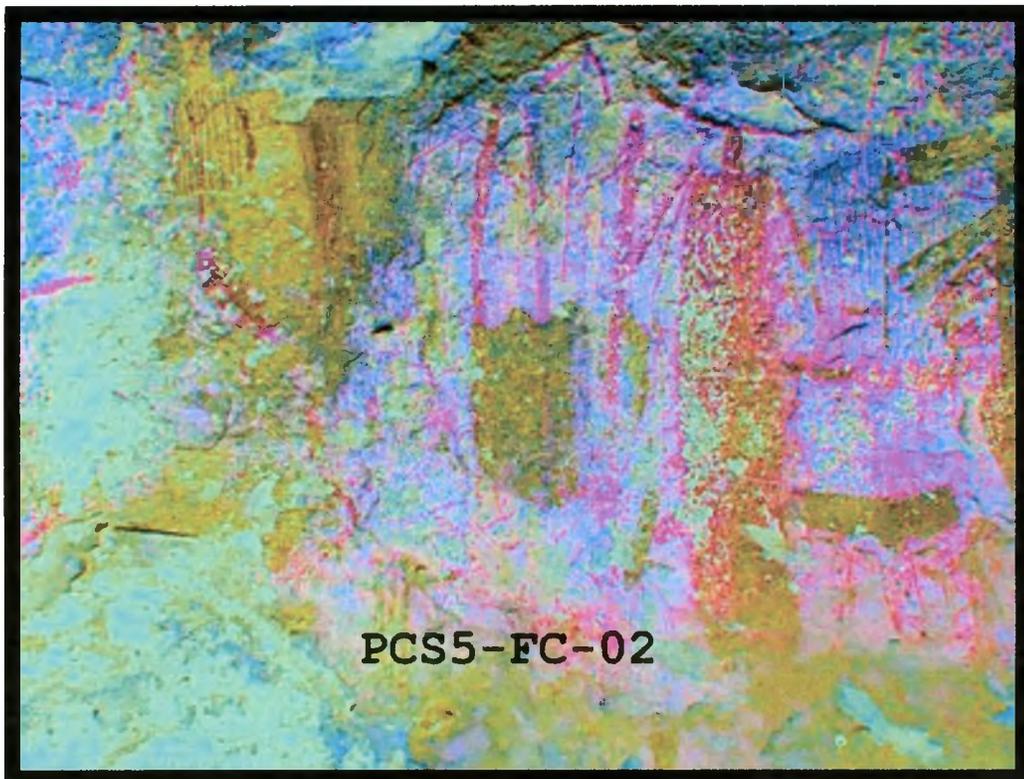


Figure 4.21 PCS5-FC-02.



Figure 4.22 PCS6-VS-01.

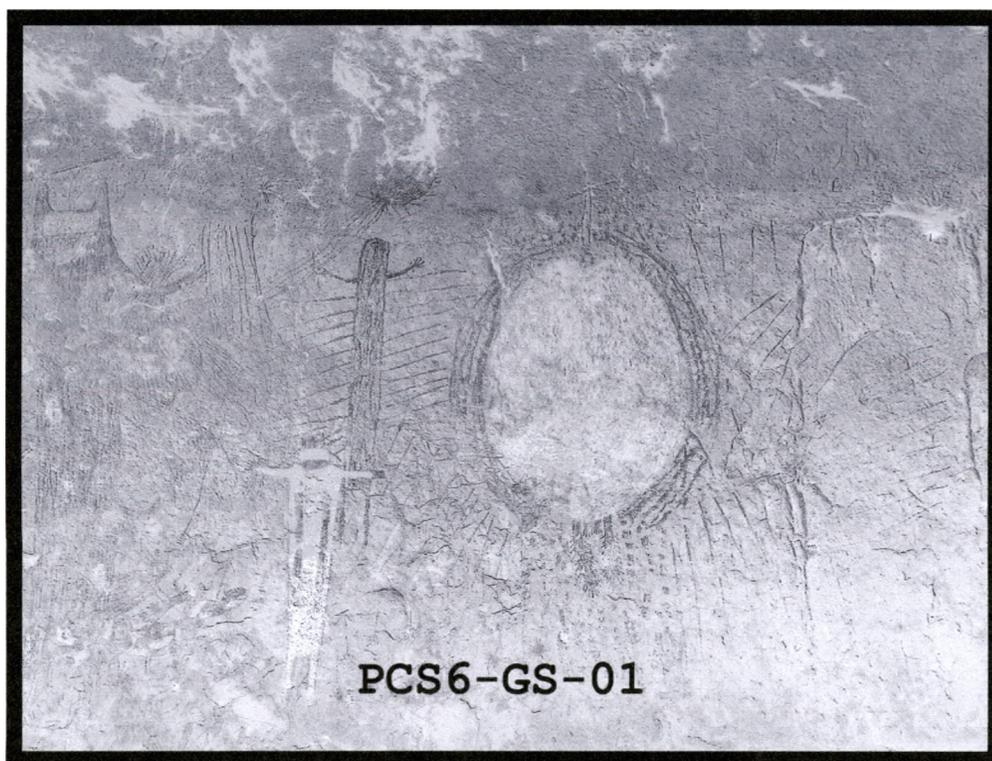


Figure 4.23 PCS6-GS-01.

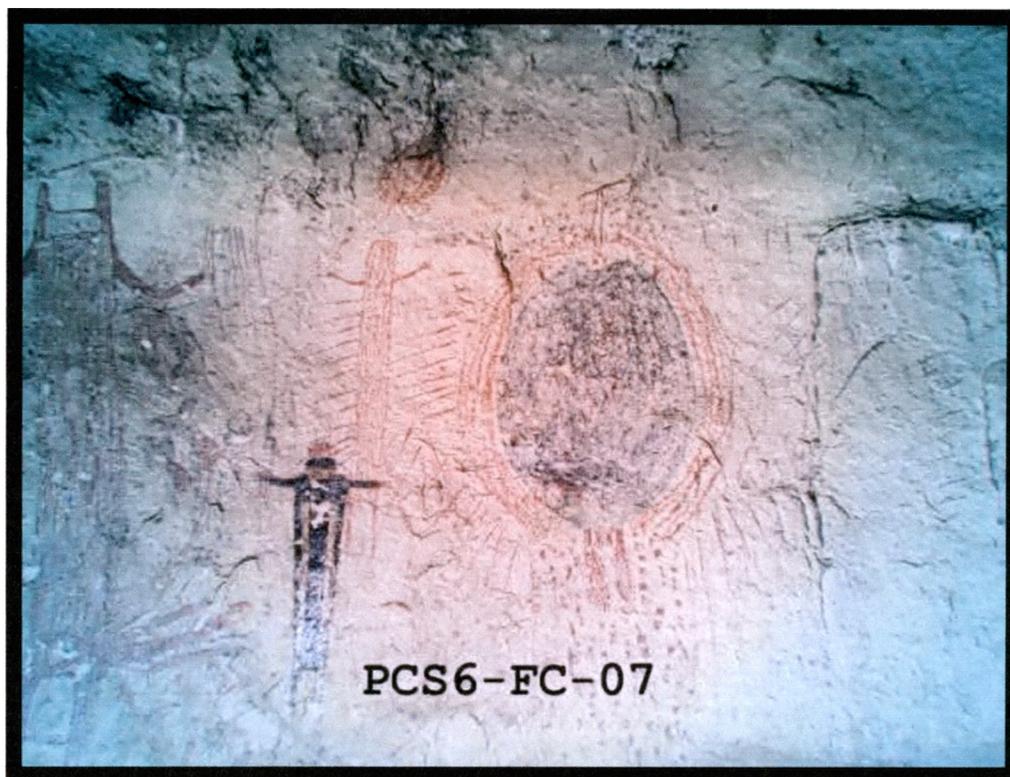


Figure 4.24 PCS6-FC-07.

CURLY TAIL PANTHER (41VV18)

SITE DESCRIPTION

The Curly Tail Panther site is located on a cliff overlooking the Devil's River and it is approximately 100 feet above the water (Figure 4.25). The site is made up of several small, shallow alcoves that contain rock art (Figure 4.26 through Figure 4.29). One of the alcoves contains a few petroglyphs but the majority of the rock art figures are pictographs. The site contains several pictographic styles including Pecos River Style, Red Linear, and Red Monochrome.

The field research at the Curly Tail Panther site consisted of two trips each lasting several days. During these sessions, I collected data by sketching, measuring, and writing detailed notes about my observations. I took vis-spec and UVIR photographs of

the figures using digital cameras. The site abbreviation on the labels for the Curly Tail Panther photo series is CTPS.

The small shelters that make up the Curly Tail Panther site are designated VV18-A, B, C, and D. There is also a small shelter located near the entrance to the main shelter (41VV18-A) whose designation is unknown, nevertheless it is considered part of the site (Figure 4.25 through Figure 4.29).

Shelters A, B, C, and D do not contain any habitation debris, however there is a small amount of habitation debris in the unnamed shelter (Harrison 2004: 53; Rock Art Foundation 2005; Texas Beyond History 2006). A portion of the cliff near Shelter A projects outward toward the water. Many of the Pecos River Style figures within Shelter A are clearly visible from this cliff. Additionally, several of the pictographs at Curly Tail Panther are large enough that they can be seen from the river below.

PHOTOGRAPHIC ANALYSIS OF CURLY TAIL PANTHER SHELTER A

The most distinguishing features of 41VV18-A (Figure 4.26) are the three large felines located at various points along the walls of the shelter. The least visible of these three is the middle feline. Unfortunately, the photographic results for the middle feline were inconclusive therefore; they are not included in this thesis. In addition to the zoomorphs, several anthropomorphs in Shelter A show evidence of alteration. Some appear to have been in-painted while others appear to overlay other figures. Additionally, the Pecos River Style anthropomorphs at the upstream end of the shelter near zoomorph 18Z3 have Red Linear and Red Monochrome figures associated with them.

Sadly, several of the Pecos River Style pictographs located in Shelter A are faded or spalled. Others are obscured from view due to accumulations such as whewellite and calcium carbonate on the limestone walls. It is probable that the site originally contained many more Pecos River Style pictographs that are no longer visible due to a combination of these processes.

Photo Series CTPS5

One of the most visible figures at the site is a large feline with a spiraling tail, which is located at the upstream end of Shelter A (Figure 4.30). Its body is red and it has large black bands around its limbs just above its claws. The feline's large spiraled tail, for which the site is named, curves over its back and head. Through the use of UVIR and digitally enhanced photography, I have been able to determine that this figure was probably repainted at least twice. The size of the original feline is unknown. However, based on the grayscale and false color images, it appears that the original feline may have been much smaller than its present version (Figure 4.31 through Figure 4.33). In its current condition the large red feline is clearly visible from the cliff (Wier and Johnson 2007).

Photo Series CTPS20

Photo Series CTPS20 refers to the same area of the panel as CTPS5, however CTPS20 shows the head and front limbs of the feline with the spiral tail (Figure 4.34). This feline contains two different shades of red. The area in the center of the body is several shades lighter than that of the outer portions. This difference in pigmentation is easy to discern, however it becomes even more apparent with the help of IR photography and image enhancement (Figure 4.35 and Figure 4.36). Digital enhancement of the

center of the feline revealed what appears to be the body of another smaller feline (Figure 4.36). Upon close visual and photographic inspection of the feline's limbs, one can see that although they appear disconnected, there are remnants of paint in the area between the body and limbs (Figure 4.34). Due to their placement and shape, these appear to be the remains of the limbs from the previously discussed smaller zoomorph. The original subject matter (the feline) seems to have remained consistent. Therefore it is possible that the superimposition constitutes inpainting or a form of retouch maintenance. It is also possible that the smaller feline is part of the artists under-drawing. However additional research is necessary before this can be considered conclusive.

Photo Series CTPS2

Repainting is also apparent in the body of the third feline, which is located at the viewer's right. This feline is red with an elongated body. Its tail curves up and away from its body but due to spalling its entire length and shape are not known. The feline has an oval shaped area in the center of its head. This area lacks pigmentation. The lines painted around the oval indicate that the shape did not occur from natural processes but rather that it is part of feline's composition (Figure 4.37 through Figure 4.39).

While recording this third feline the field crew noticed that it appeared to have two sets of ears. They also noted that there is a change in pigment color near the head of the feline as well as a second outline within the figure. Photographs of it revealed small areas of darker pigment within the body of the zoomorph. These darker areas resemble dots (Figure 4.38 and Figure 4.39).

Several small vertical lines are scratched into the area near the feline's head. Additionally, the center of the feline's body appears considerably more faded than the

rest of its body. Upon closer inspection, however, this faded area has a smooth, worn appearance. It is possible that this worn area was caused by animals or that it is a result of natural weathering. Nevertheless, its location would likely be too high for most animals and the rest of the figure does not appear as faded. Another possible explanation is that these worn areas may have been caused by humans rubbing the center of the feline's body. At this time, it is difficult to determine if these scratched and worn areas are the result of cultural activity.

Photo Series CTPS21

The large Pecos River Style anthropomorph shown in Photo Series CTPS21 and CTPS23 is located at the upstream end of Shelter A near the large feline with the spiraling tail. The anthropomorph's body is red and black (Figure 4.40 through Figure 4.43) and its contrasted patterning truly gives it an "X-rayed" appearance. Its body is dark red with a black outline and two black rectangles at the top of the figure's head give it the appearance of having eyes (Wier and Johnson 2007). The center of its body contains a black rectangle that runs from the top of the shoulders to the area below the waist. At the waist, this rectangle becomes indistinguishable from the dark pigment within the waist. The anthropomorph is associated with two wavy lines on the outside of the body. The line on the left side is red with a black outline. The line on the right side is red and has a small area (approx. 5 cm) of black pigmentation. The figure's feet are not visible. The UVIR and enhanced photography increased the visibility of this anthropomorph, including the details within its body. The images indicate that the anthropomorph may overlay additional figures, including geometrics and possibly another anthropomorph (Figure 4.41). The fingers are clearly visible on the left hand of

the figure, but the right hand is obscured by calcium carbonate and is difficult to see.

Nevertheless, the UVIR and enhanced digital photography helped increase the contrast on this figure and make some of these details more visible including the right hand and fingers (Figure 4.41).

Photo Series CTPS23

Photo Series CTPS23 shows the lower portion of the centrastyled anthropomorph in CTPS21 (Figure 4.42 and Figure 4.43). Unfortunately, the enhanced photography in CTPS23 was unable to increase the visibility enough to reveal the anthropomorph's feet. Nevertheless, the UVIR images of this anthropomorph do indicate that it overlays some geometrics. The anthropomorph's waist is much darker than the rest of the body and there is a wide "zigzagging" line painted within it (Figure 4.42 and Figure 4.43). The enhanced photographs of the anthropomorph's waist increase the visibility of the line painted through it as well as the pigment beneath it. It appears that the over-painting on this portion of the panel simply added to the original image rather than destroying or covering it completely.

Photo Series CTPS6

Photo Series CTPS6 (Figure 4.44 through Figure 4.46) shows an anthropomorph located at the downstream end of Shelter A near the feline shown in CTPS2. This anthropomorph is located between two of the felines. The anthropomorph is red and black with the majority of the body rendered in red (Figure 4.44). Its arms are black with a thick red outline and its body and head are red with a thin black outline. The figure is centrastyled with two sets of black vertical parallel lines on either side of the body. These lines run almost the entire length of the body and terminate near the waist possibly

because of rubbing or spalling. Another vertical black line is visible in the center of the body beginning at the waist. This line terminates near the legs. The figure has a large red oval on the chest/shoulder area that is also outlined in black.

The red and black anthropomorph is associated with three smaller anthropomorphic figures that are also rendered in red and black. These attendant figures are located above the anthropomorph's head. An atlatl is near the large red and black anthropomorph's right hand. The atlatl is visible only upon close visual inspection but the spear associated with it is easy to discern (Figure 4.44). The figure has two wavy lines on either side of its body and a second set of wavy lines connect to a red oval below the feet. This oval contains two sets of black comb-like objects.

The red and black anthropomorph partially covers another larger anthropomorph. This figure is difficult to see because it is partially covered and its body is little more than a thin red outline with dots in the center (Figure 4.45 and Figure 4.46). Additionally, this red dotted anthropomorph is extremely faded. Although the body of this anthropomorph is difficult to see, the right arm, atlatl, and spear are distinctly visible. The figure also has a datura-like object and darts close to the left hand.

The visibility of both anthropomorphs was greatly improved with the UVIR and enhanced photography. The details within the body of 18A139 become more apparent in the grayscale and false color photographs (Figure 4.45 and Figure 4.46). Although the outline of this specific anthropomorph is more obvious in the grayscale images (Figure 4.45), the dots on its body are more visible in the false colors (Figure 4.46).

Photo Series CTPS10

Photo Series CTPS10 shows another smaller anthropomorph that is located at the downstream end of Shelter A. This anthropomorph is also located between the two downstream felines. It is black with some red details including red pigment in the center of the head which is referred to as masking (Figure 4.47). The masked anthropomorph is one of the most damaged anthropomorphs of any at the site. Its pigment is very faded and spalled. It is associated with some enigmatic figures that are very difficult to see. The field crew did not take UVIR images of this anthropomorph however; they did take high quality vis-spec photographs. These images were digitally enhanced in the lab using processing software. The enhanced photographs indicate that some of the enigmatics near this masked anthropomorph may be additional anthropomorphs (Figure 4.48 and Figure 4.49). The digital enhancements also reveal that this figure has a semi-circular concave arch near its waist (Figure 4.48). Additionally the enhanced images indicate that the masked anthropomorph seems to emerge from a circle within the center of the arch (Figure 4.49).

Photo Series CTPS14

Photo Series CTPS14 shows an anthropomorph and geometrics located at the upstream end of Shelter A. The anthropomorph is one of the few figures marred by graffiti. This vandalism consists of letters scratched into the pigment and surrounding rock (Figure 4.50 and Figure 4.51). Although the field crews did not take UVIR images of this anthropomorph, the digital enhancement of the vis-spec photographs revealed evidence of inpainting. The anthropomorph is tall and narrow; and it is associated with four lines or bars on either side of its body. It is red with a black outline. Several Red

Linear Style figures were painted near its body. This red and black anthropomorph has several lines near the waist on either side of its body. Red pigment superimposes these lines, which are not readily visible (Figure 4.51). However, when the images were digitally enhanced, the lines near the waist became apparent (Wier and Johnson 2007).

Photo Series CTPS17

Photo Series CTPS17 (Figure 4.52 through Figure 4.54) is a close up image of the torso and waist of the anthropomorph shown in CTPS14. In the false color and enhanced grayscales of Photo Series CTPS17, the lines on the waist of this anthropomorph become even more apparent (Figure 4.53 and Figure 4.54).

Photo Series CTPS3/CTPS4/CTPS22

Photo Series CTPS3, CTPS4, and CTPS22 show an upstream area of the panel in Shelter A that is located below the large feline with the spiral tail. This area of the panel contains a small red anthropomorph. The anthropomorph is noncontrastyled and its body is solid red (Figure 4.55 through Figure 4.60). Its feet are difficult to see because of a thick substance that has accumulated on the lower half of the panel. The waist and legs of the body seem to be at a slight angle to the rest of the figure. Some areas of its body appear to have piloerection while other areas do not. The left wrist appears to have some type of adornment. It is also interesting to note that the anthropomorph is associated with travertine lines within the limestone. These lines form elbow adornments or streamers that extend down from the figure's arms.

UVIR and enhanced vis-spec photography indicates that this anthropomorph may superimpose another pictograph. Another possibility is that it may have been contrastyled at one time. The UVIR and enhanced photographs reveal what appears to be

a line that runs length-wise along the center of the anthropomorph's body (Figure 4.56 through Figure 4.60). The grayscale photographs also show a difference in pigment between the upper and lower half of the body (Figure 4.56 and Figure 4.57). There is also some indication that there may have been an atlatl in the right hand however, additional UVIR and vis-spec photographs are needed before the presence of the atlatl can be confirmed.

PHOTOGRAPHIC ANALYSIS OF CURLY TAIL PANTHER SHELTER B

In shelter B there is only one figure that is visible and it does not appear to superimpose any others (Figure 4.27). The figure in shelter B is so faded that it is difficult to determine the style or subject matter. Attempts to enhance this figure have (to date) been unsuccessful. Since the results on this figure are inconclusive, photographs of it are not included in this paper.

PHOTOGRAPHIC ANALYSIS OF CURLY TAIL PANTHER SHELTER C

Shelter C contains several polychrome figures (Figure 4.28). There is considerable variability in the preservation of the images at this shelter. Some of the images are faded and difficult to see while others are still very bright. Those that are visible are bright purple and yellow in color. There are also some red figures but these are not well preserved. A few of the figures are difficult to see because they have spalled and faded. It is interesting to note that one of the geometric patterns in this shelter resembles those found on one of the anthropomorphs at Big Satan shelter (Figure 4.61 and Figure 4.62). Remnants of white paint cling to the shelter walls around the geometric figure and the enhanced photographs indicate that this may be another anthropomorph.

Photo Series CTPS18/CTPS19

Photo Series CTPS18 and CTPS19 show an anthropomorph that is located at the upstream end of Shelter C. The figure is purple-red in color and the area around the upper body is yellow (Figure 4.63 through Figure 4.67). Additionally the anthropomorph is associated with several indistinct splotches of faded red pigment (Figure 4.64). The yellow pigment on the anthropomorph resembles paint splatter, however it was actually applied by hand (Figure 4.64). Upon close inspection, numerous palm prints become visible (Figure 4.65).

These palm prints were created when the artist(s) applied paint to their hand and then “stamped” it onto the rock surface. The paint from many of the prints looks splattered and appears to have dripped. This would seem to indicate that the paint used was extremely fluid. The UVIR and digitally enhanced photographs reveal that the anthropomorph’s body also contains some purple handprints. The yellow handprints superimpose each other to such a degree that it is very difficult to distinguish the individual prints (Figure 4.63 and Figure 4.64). The UVIR and enhanced photographs help to increase the visibility of the details of the anthropomorph (Figure 4.66 and Figure 4.67). The images also revealed that the light red pigment associated with the anthropomorph is actually a group of zoomorphs. Both the yellow handprints and the anthropomorph overlay this faded line red of quadrupeds.

PHOTOGRAPHIC ANALYSIS OF CURLY TAIL PANTHER SHELTER D

Shelter D contains a large (approximately 1 meter tall) stick-like figure and some geometrics. The figure resembles the Red Linear Style but is much larger than Red Linear figures, which tend to be under 20 cm in height. Although Shelter D contains rock

art, there was no clear evidence of over-painting. Since there is no evidence of superimposition within Shelter D images of its pictographs are not included in this paper.

PHOTOGRAPHIC ANALYSIS OF CURLY TAIL PANTHER'S UNNAMED SHELTER

The Unnamed Shelter at Curly Tail Panther is located downstream of Shelter A. The Unnamed Shelter contains two very small Pecos River Style anthropomorphs and a few pictographs are probably Red Monochrome Style (Figure 4.29). The shelter walls where the pictographs are located are coated with a yellow substance, however this substance does not seem to overlay the pictographs and does not seem to impact their visibility. This yellow coating resembles the yellow pigment used to create the handprints seen on the anthropomorph in Shelter C, which is shown in CTPS18 and CTPS19 (Figure 4.63 through Figure 4.67). However, it is unknown at this time whether the yellow substance is pigment or simply the result of some naturally occurring process. Unfortunately the photographic analysis of the Pecos River Style pictographs in this shelter were inconclusive, therefore they are not shown in this thesis.



Figure 4.25 View of Curly Tail Panther (41VV18-A, B, C, and D).

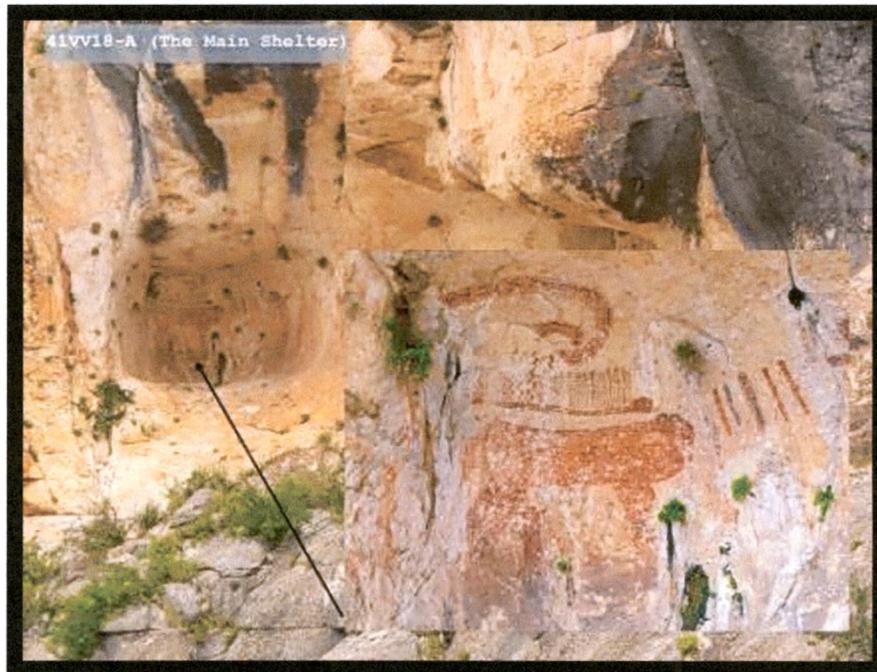


Figure 4.26 The Curly Tail Panther Site (41VV18-A).



Figure 4.27 The Curly Tail Panther Site (41VV18-B).



Figure 4.28 The Curly Tail Panther Site (41VV18-C and 41VV18-D).



Figure 4.29 The Curly Tail Panther Site (unnamed shelter).



Figure 4.30 CTPS5-VS-001.

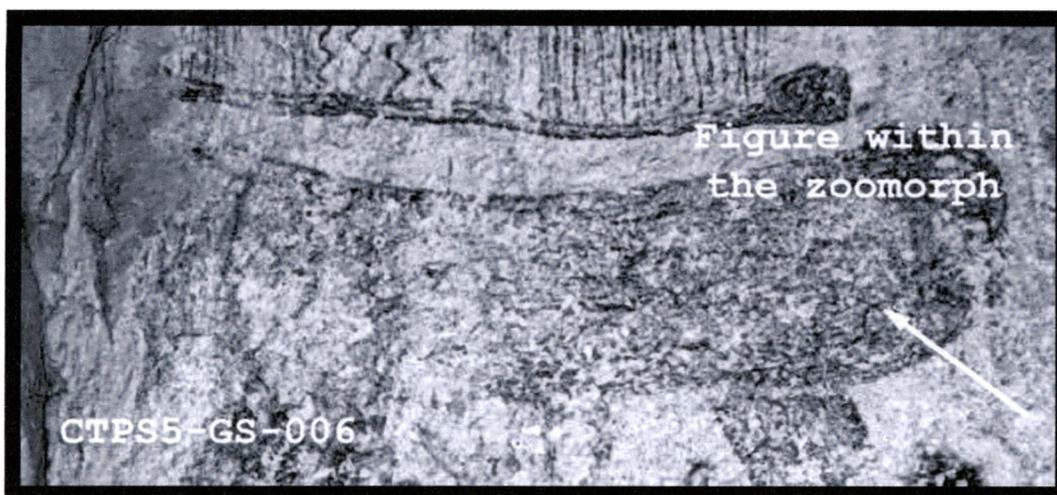


Figure 4.31 CTPS5-GS-006, showing an additional figure within the zoomorph's body.



Figure 4.32 CTPS5-GS-002.



Figure 4.33 CTPS5-FC-004.



Figure 4.34 CTPS20-VS-001.



Figure 4.35 CTPS20-GS-003.

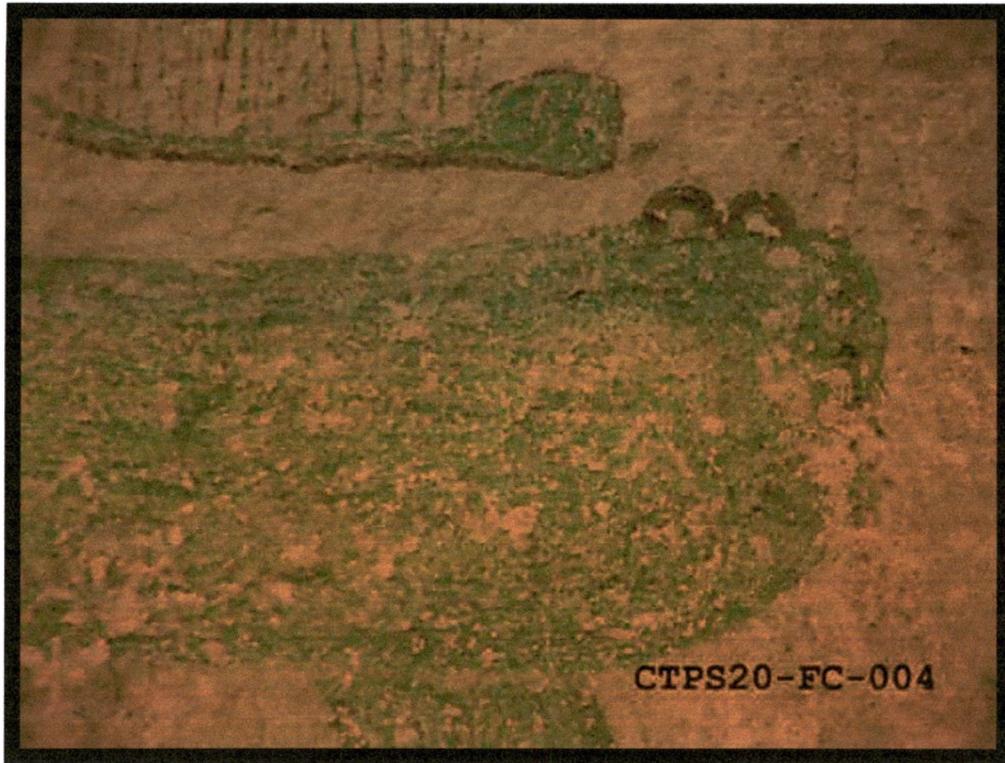


Figure 4.36 CTPS20-FC-004.



Figure 4.37 CTPS2-VS-001.

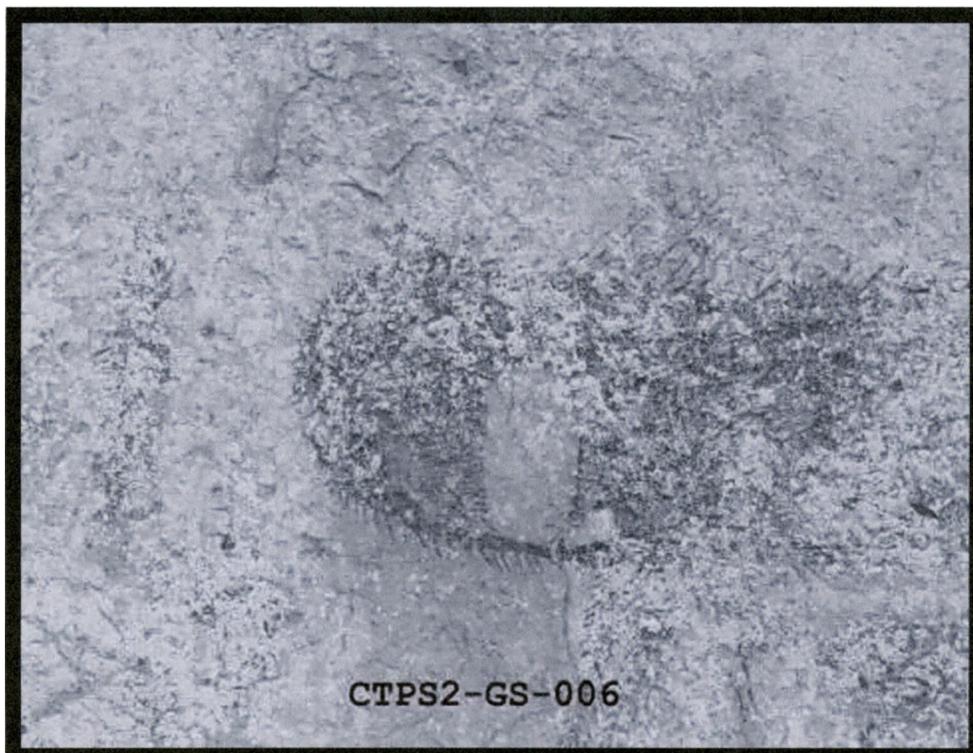


Figure 4.38 CTPS2-GS-006.

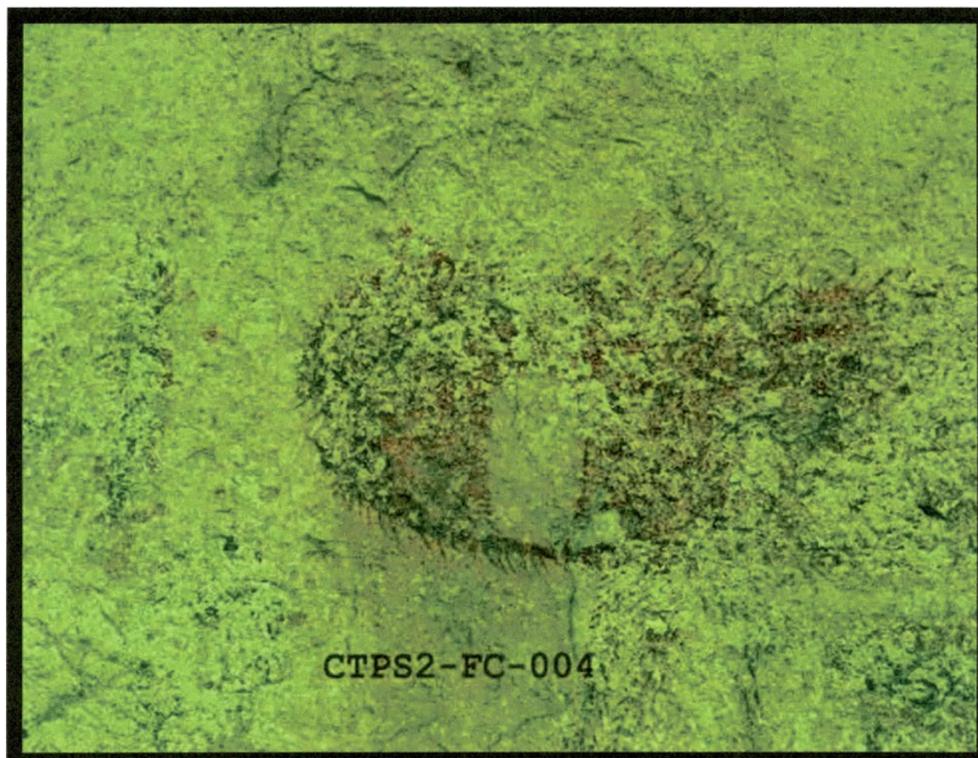


Figure 4.39 CTPS2-FC-004.

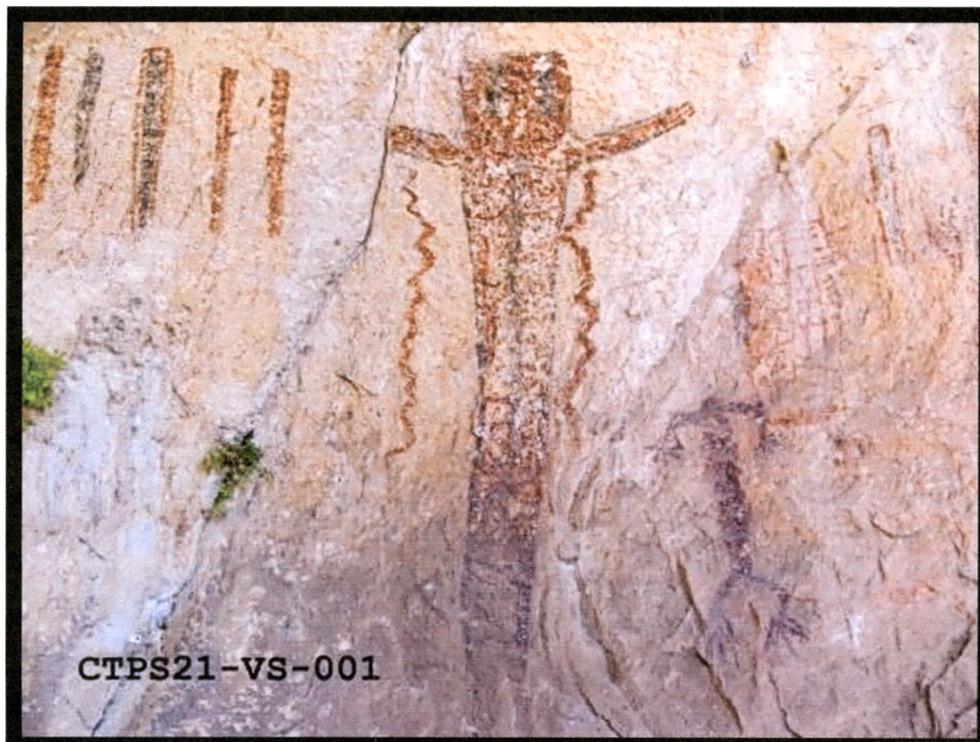


Figure 4.40 CTPS21-VS-001.



Figure 4.41 CTPS21-FC-005.



Figure 4.42 CTPS23-FC-002.



Figure 4.43 CTPS23-FC-003.



Figure 4.44 CTPS6-VS-001.

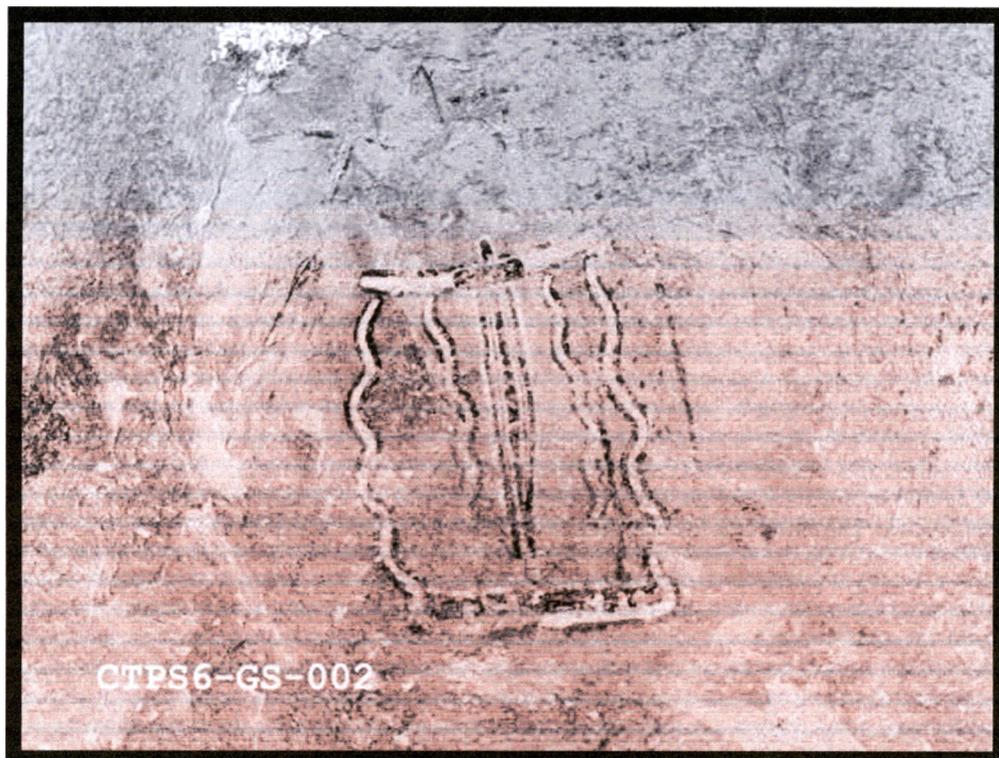


Figure 4.45 CTPS6-GS-002.

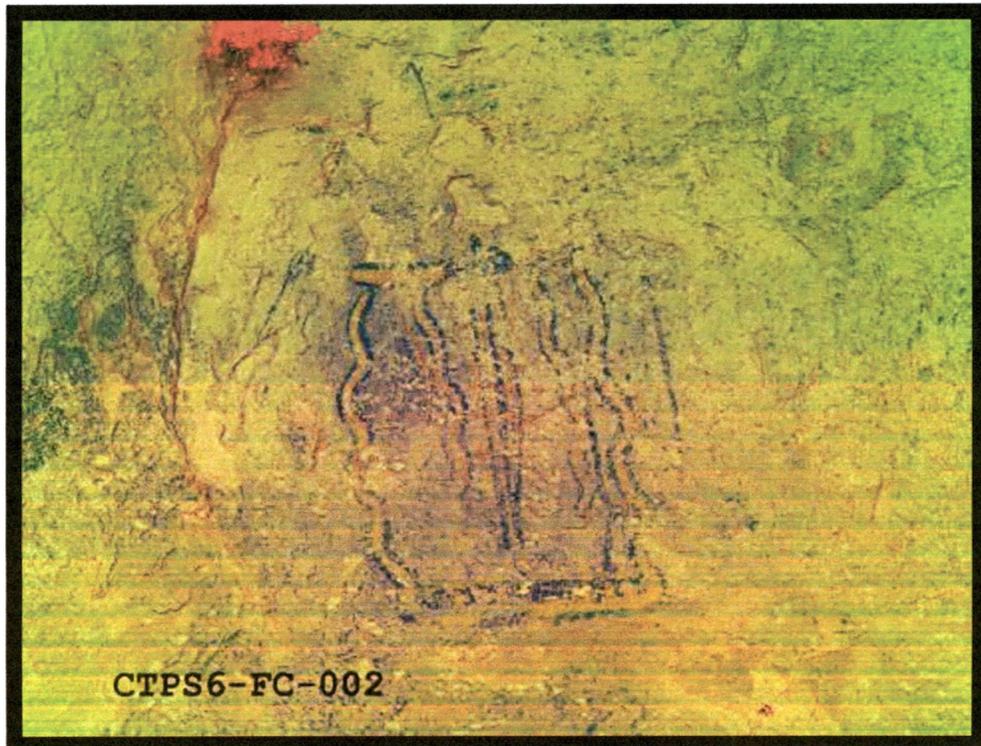


Figure 4.46 CTPS6-FC-002.

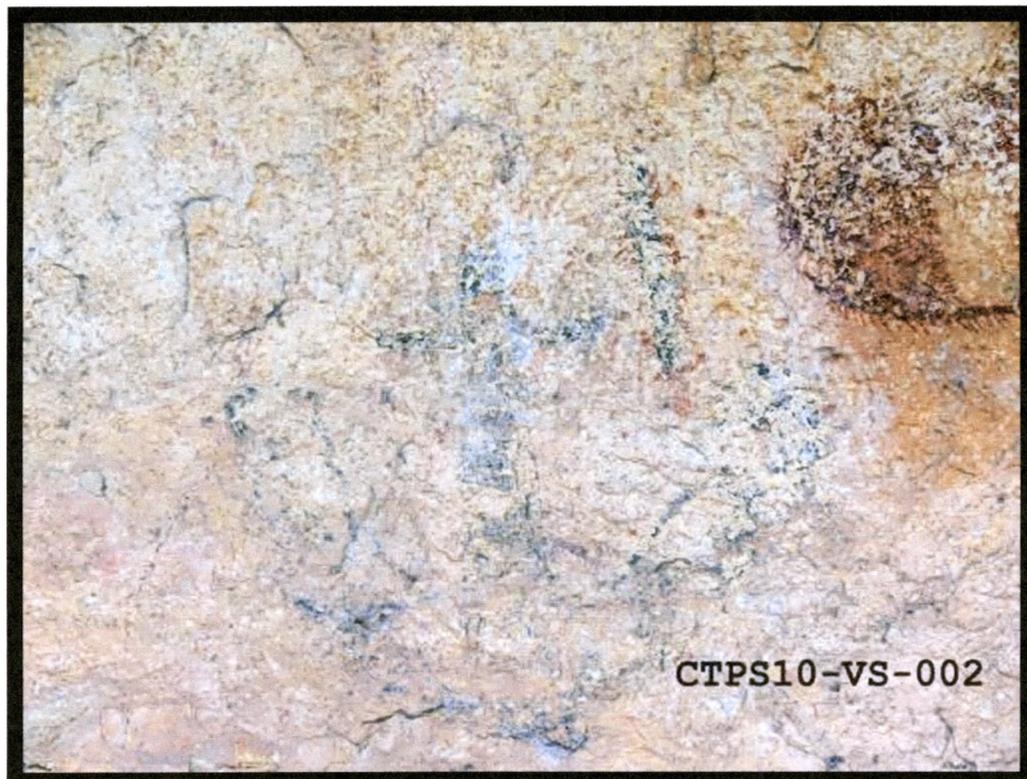


Figure 4.47 CTPS10-VS-002.

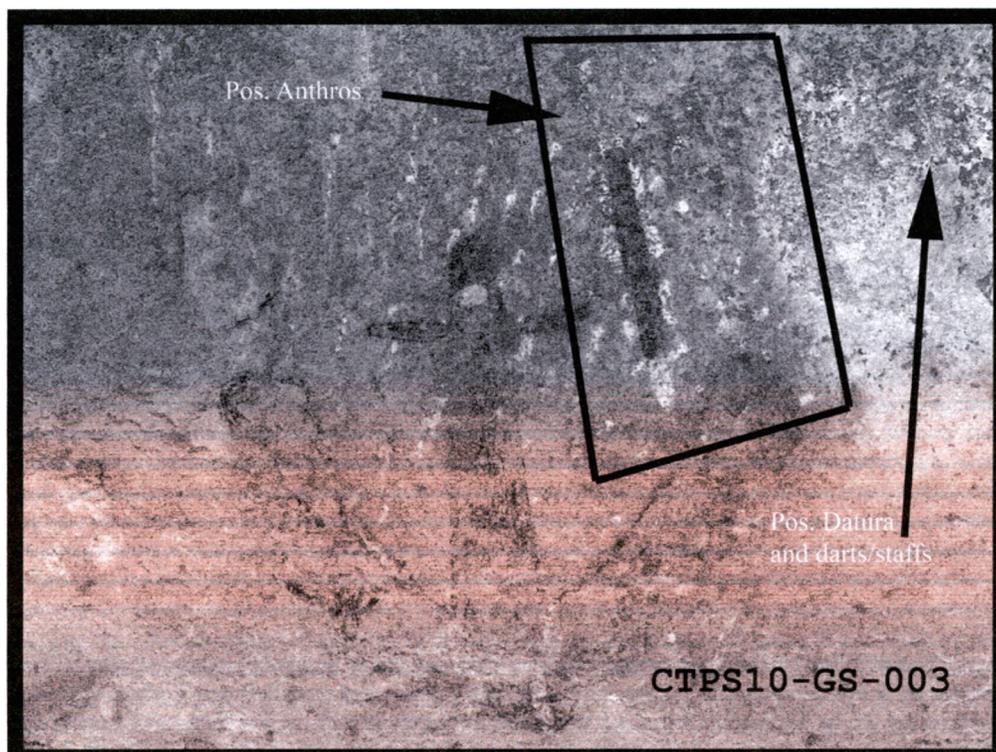


Figure 4.48 CTPS10-GS-003.

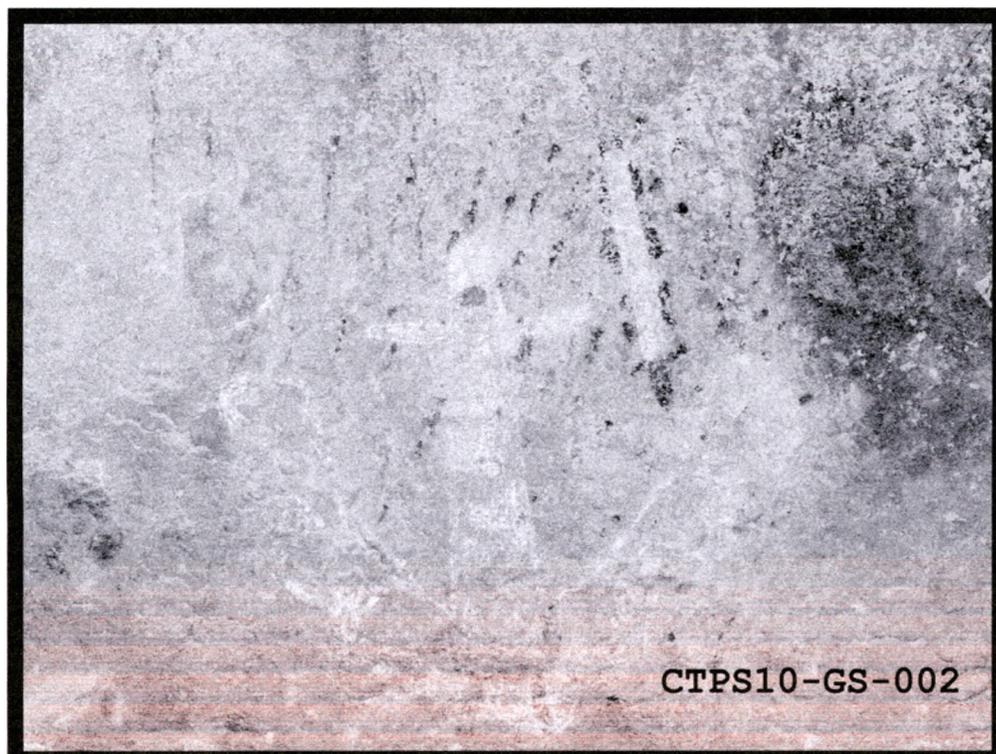


Figure 4.49 CTPS10-GS-002.



Figure 4.50 CTPS14-VS-002.

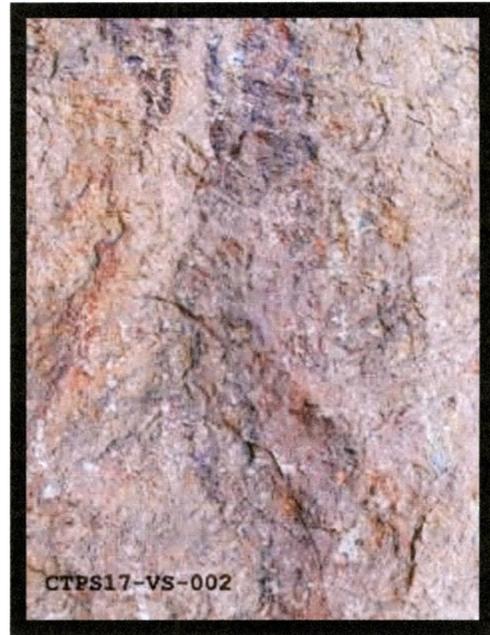


Figure 4.52 CTPS17-VS-002.



Figure 4.51 CTPS14-GS-002.

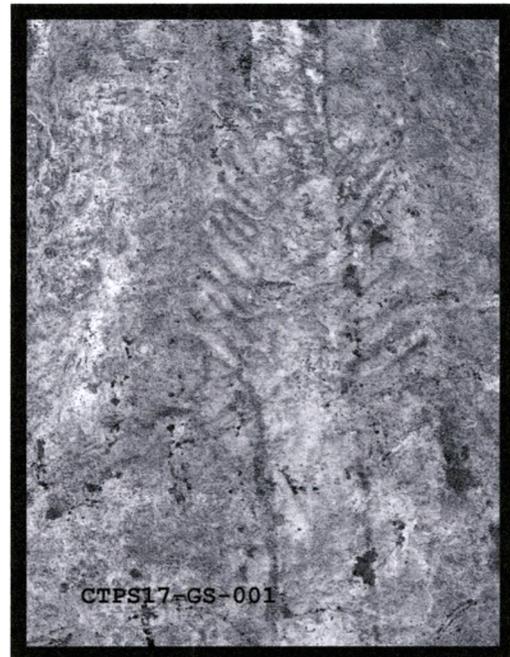


Figure 4.53 CTPS17-GS-001.

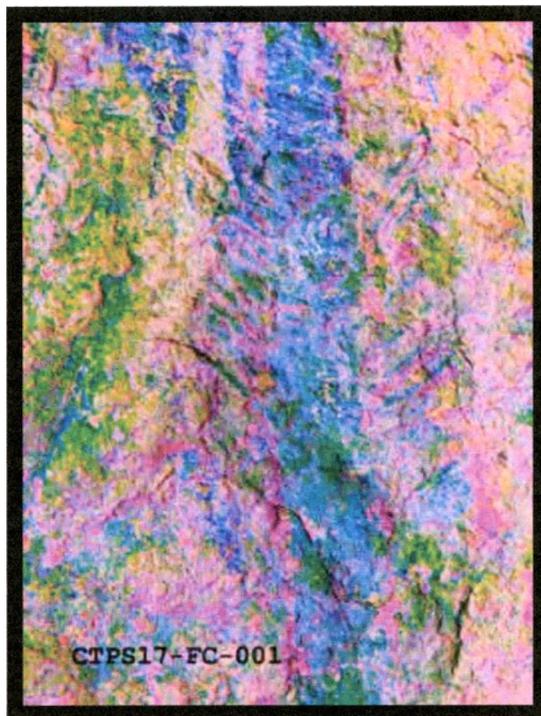


Figure 4.54 CTPS17-FC-001.



Figure 4.55 CTPS22-VS-001.

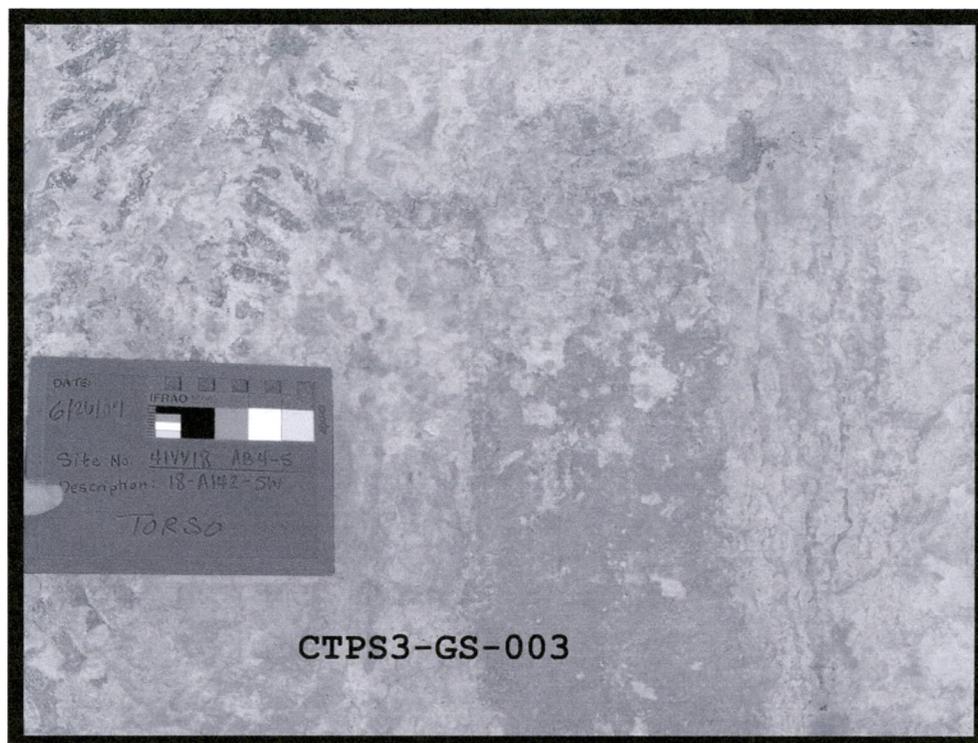


Figure 4.56 CTPS3-GS-003.

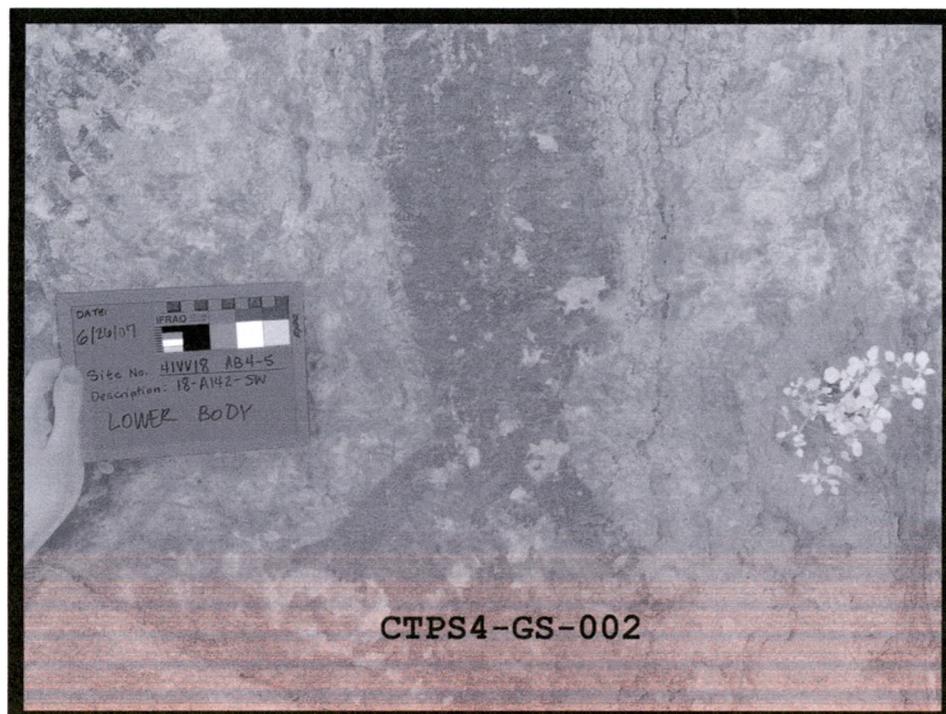


Figure 4.57 CTPS4-GS-002.



Figure 4.58 CTPS3-FC-002.



Figure 4.59 CTPS4-FC-002.

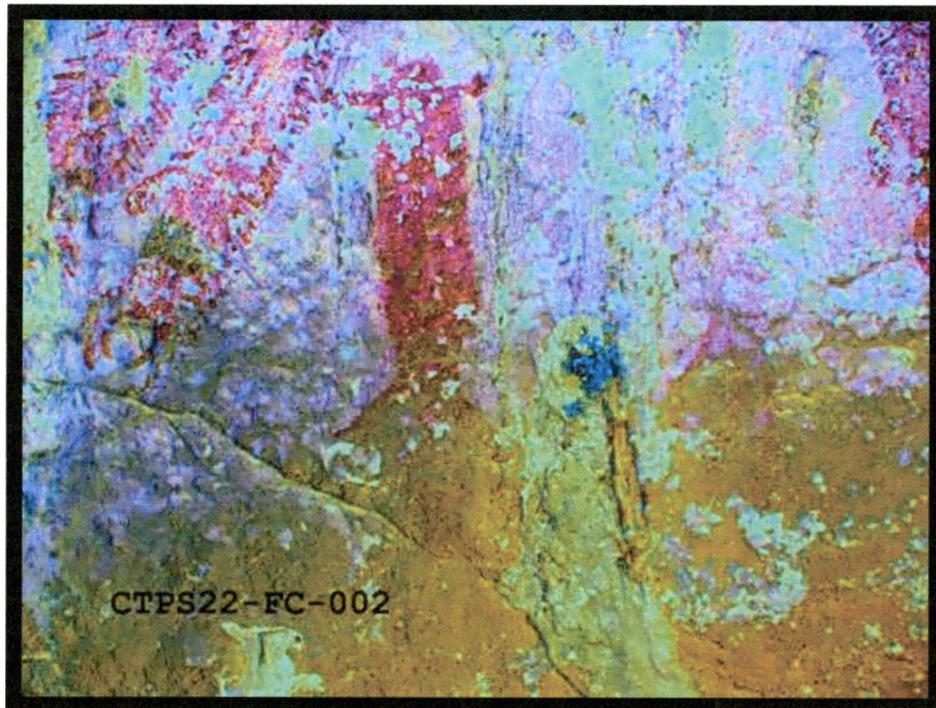


Figure 4.60 CTPS22-FC-002.



Figure 4.61 Geometrics at CTPS Shelter C may be another anthropomorph.



Figure 4.62 Geometrics on the body of an anthropomorph at Big Satan Shelter.

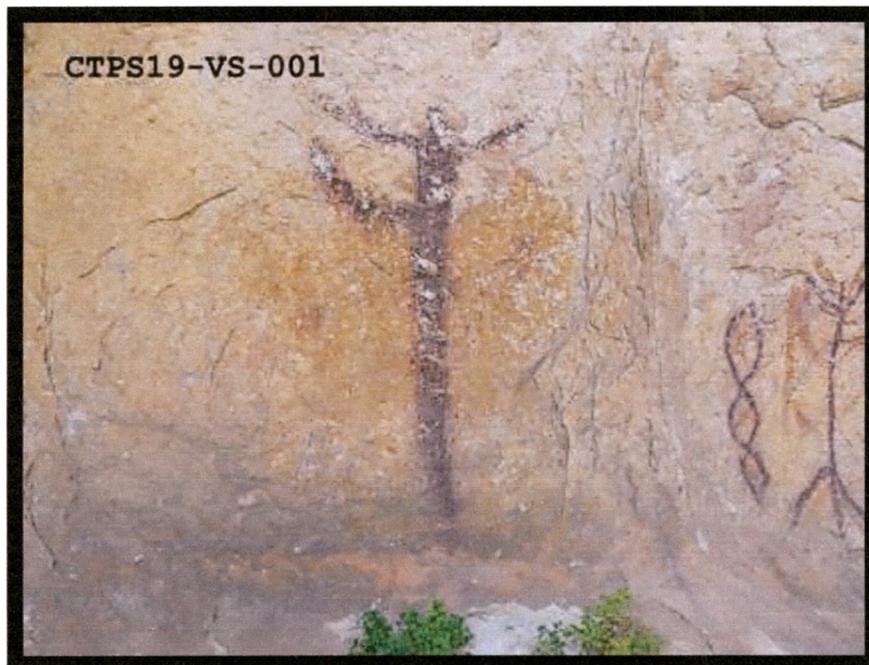


Figure 4.63 CTPS19-VS-001.



Figure 4.64 CTPS18-VS-002.



Figure 4.65 CTPS18-VS-004.

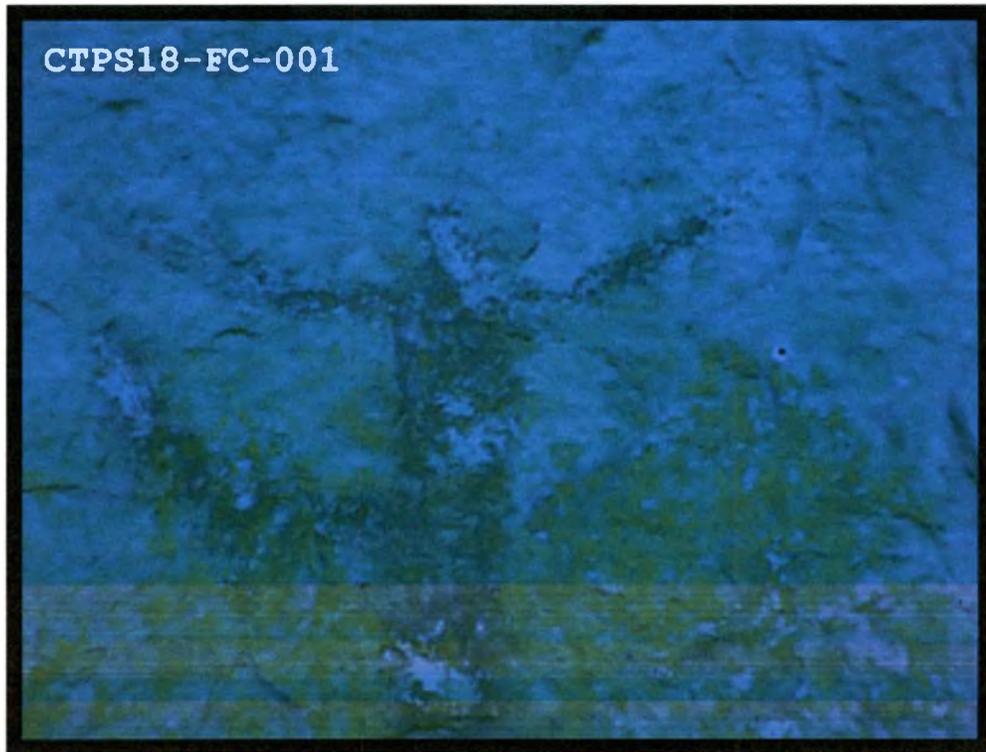


Figure 4.66 CTPS18-FC-001.

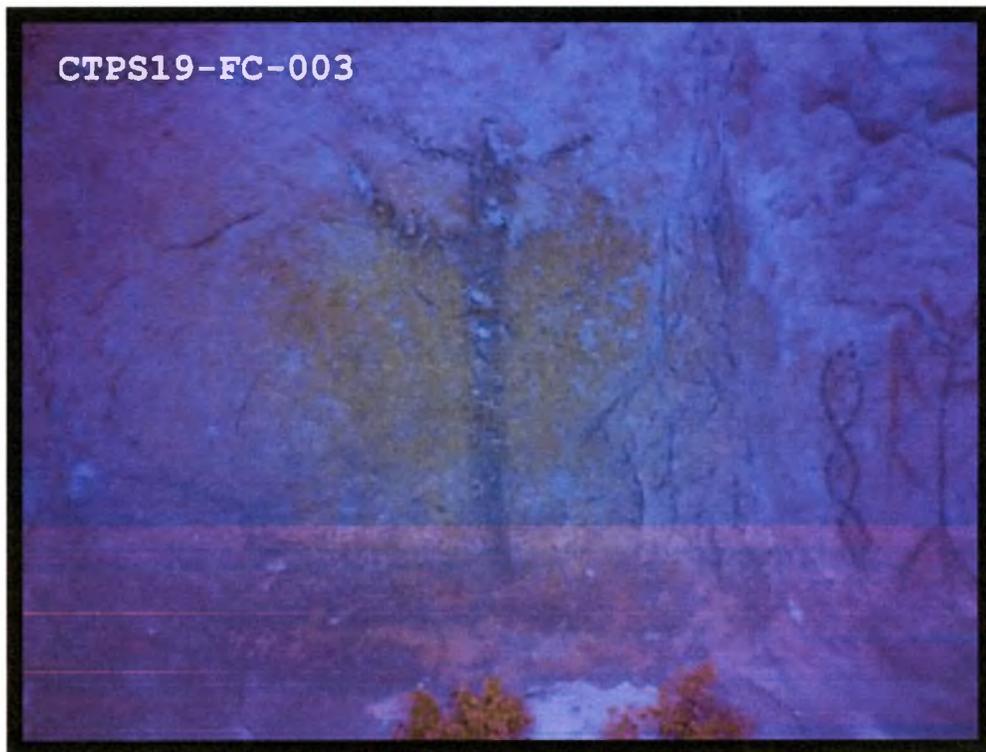


Figure 4.67 CTPS19-FC-003.

WHITE SHAMAN (41VV124)

SITE DESCRIPTION

The White Shaman site is several hundred feet above the current level of the Pecos River (Figure 4.68 and Figure 4.69). The site is well preserved, probably due to its secluded location, which until 50 years ago would have made it very difficult to reach (Wier 2006). The White Shaman site is located on a property referred to as the Galloway Preserve, which is owned by the Rock Art Foundation. The images captured for this study were taken during 2007 and 2009. At that time I was a crewmember in the Shumla field teams that recorded the White Shaman site. The field crews spent several days at the site and worked for approximately six hours each day. During that time, I documented, sketched, and photographed the rock art using UVIR and vis-spec photography. The site abbreviation on the labels for the White Shaman photo series is WSS.

PHOTOGRAPHIC ANALYSIS OF WHITE SHAMAN SHELTER

Photo Series WSS1/WSS2

Photo Series WSS1 and WSS2 show the small antlered anthropomorph on the far left of the panel (Figure 4.70 through Figure 4.75). This figure has a red outline and it is contrasted with red and black in the center of its body. The anthropomorph has adornments on its right wrist and left elbow. An atlatl and spear are associated with its right hand and a datura pod is associated with its left hand. Its antlers are red with black dots and it has a black horizontal stripe across its face (Figure 4.70).

Although the anthropomorph itself is well preserved, the pictographs below it are not. The crenelated arch upon which the anthropomorph is superimposed is still visible.

The center of the arch extends downward in a cigar-like shape. Although still faintly visible, the pictographs on this portion of the panel have been rubbed. Prior to the construction of its protective fence, the White Shaman site herds of animals used the shelter. The skin, fur, and hooves of these animals rubbed against the panel and likely contributed to its deterioration. Their abrasive action not only removed some of the pigment, but also left behind a residue that seems to encourage the accumulation of dust and other materials on the panel (Figure 4.71).

The UVIR photographs show that the area beneath the antlered anthropomorph may contain other figures, as is illustrated by the grayscale images in Series WSS2 (Figure 4.72 and Figure 4.73). The grayscales also show that the lines at the bottom of the panel on the antlered anthropomorph's right are connected to a single line. Based on this information, it is possible that these lines represent a stylized dart or spear (Figure 4.72). Photograph WSS2-GS-003 illustrates that this line bisects the arch diagonally and ends on one of the lobes on the outer portion of the arch (Figure 4.73). In the area directly below the anthropomorph faint geometric patterns resembling squares and C-like shapes can be ascertained (Figure 4.72 and Figure 4.73). The false color photographs indicate that there are other smaller anthropomorphs positioned around the arch and they increase the visibility of some of the details of the antlered anthropomorph (Figure 4.74 and Figure 4.75).

Photo Series WSS4

Photo Series WSS4 shows the lower central portion of the panel. A small inverted anthropomorph is visible as are the lower portions of two larger anthropomorphs. This photo series WSS4 does not include UVIR photographs however,

digital enhancements of the vis-spec photographs reveal details that show how the artists painted the pictographs (Figure 4.76 through Figure 4.80). The inverted anthropomorph is yellow and black with red details on its body. The body is contrasted and is yellow with a black oval in the center. The black area of its body contains small red lines that resemble fur. Intermittent red lines within the yellow follow the contour of the anthropomorph's body. A red line extends from the lower portion of the figure's black center, through the yellow portion of the body, and terminates at the black line above the figure's legs. The anthropomorph's arms and legs are also black. The hair was painted with alternating red and yellow lines that extend downward away from its scalp.

Although the arms of the yellow/black/red anthropomorph seem to form two separate lines, the enhanced grayscale images show that the line for the arms actually extends through the body (Figure 4.77). The portion of the line that crosses the body and connects the arms is not as thick. Therefore, it is likely that the line for the arms was painted first and that the body was painted over it. After finishing with the body, the artist may have repainted each arm with a heavier line.

Photo Series WSS4 also provides a detailed view of a white anthropomorph that partially overlaps a black anthropomorph. The overlapping of these figures gives the viewer the impression that the white anthropomorph is standing slightly in front of the black anthropomorph. The grayscale and false color images show that the painting of the black anthropomorph continues underneath the white anthropomorph (Figure 4.78 through Figure 4.80). It is difficult to say with certainty whether the overlapping of the two figures was intended to convey this perspective, or something else. Nevertheless, the careful rendering of the two figures, as well as the similarity in style, seem to suggest that

the over-painting was intended to be compositional rather than an attempt to cover an earlier figure.

Photo Series WSS6

The photographs in Series WSS6 show the upper left portion of the panel. WSS6 gives further indication of the techniques used to paint the pictographs (Figure 4.81 through Figure 4.84). The false colors rendered from the compositing of UVIR and vis spec photographs greatly improve the visibility of the inverted anthropomorph on the viewer's left (Figure 4.84). This contrasted anthropomorph is red and white. It has small fur-like lines along the outside of its body and; its long hair extends away from its head toward the viewer's right. It has a line and a spear-like object associated with its left hand. A dart or spear-like object is also associated with its right hand. The right side of the anthropomorph is impaled and a yellow line extends from its right hand through both the white and black anthropomorphs. Although the pattern within the anthropomorph's body is visible at the site, a substance covers the pigment making the exact shape difficult to discern. However, the false color images revealed that this red anthropomorph has diagonal rectangles across its upper body and diamond-like shapes across the lower half of its body. White dots within the red pigment follow the outline of the anthropomorph's body. Similarly, the grayscales reveal that the body is slightly thicker than it appears in the vis-spec photographs (Figure 4.82 and Figure 4.83). A re-examination of the vis-spec images using digital zoom revealed that this anthropomorph's body may have originally been outlined with yellow pigment.

A second red anthropomorph on the viewer's right has a large oval head and a narrow upper body. Like the previously described figure, the second anthropomorph is

also contrasted and inverted. Its long hair extends away from its head toward the viewer's right and; the right side of its body is impaled. It has a spear and an atlatl-like object associated with its left hand and a spear associated with its right hand. The previously described obscuring substance also coats this anthropomorph and likewise obscures some of its details. However, the grayscale images increased the visibility of the patterns within the pictograph (Figure 4.82 and Figure 4.83).

The red and black anthropomorph in the lower right corner of the photographs is non-contrasted. Its head is red and the rest of its body is solid black. It has a black and red cigar-shaped object associated with each of its hands. The false color images indicate that a yellow line extends from the red anthropomorph on the right and passes through the black anthropomorph's head and body.

Unfortunately, the UVIR and vis-spec enhancements of the white anthropomorph in the center of the photograph have been inconclusive thus far. However, the grayscale and false color images did reveal additional geometric figures below the anthropomorphs. The false color and grayscales also made the outlines and brushstrokes visible. Although the results on the white anthropomorph were inconclusive, the photographs show that the arms of the other three anthropomorphs were initially painted in one thin line across the body. Since the line for the arms is thicker on either side of the body, it is possible that the thin line within these figures represents a kind of preparatory under-drawing that was later covered with paint.

Photo Series WSS11

Photo Series WSS11 shows a wide-angle view of the center of the panel (Figure 4.85 and Figure 4.86). Although UVIR images were not taken of this portion of the

panel, the digitally enhanced vis spec photographs reveal additional details about the panel. The images also show that some of the figures are intertwined (Figure 4.86). This is most obvious in the black wrist adornment shown on the white anthropomorph. In this case, a portion of the wrist adornment overlaps the wrist while another portion of it underlies the wrist. This gives the impression that the wrist adornment actually encircles the wrist (Figure 4.86).

Photo Series WSS12/WSS21/WSS23

WSS12, WSS21, and WSS23 refer to the end of the panel located on the viewers' left. Both the UVIR and enhanced vis spec photographs illustrate more of the under-painting found in some of the anthropomorphs (Figure 4.87 through Figure 4.91). The enhanced grayscales as well as the false color images reveal a solid square on the waist of the inverted red anthropomorph (Figure 4.89 and Figure 4.91). There are also changes in pigment within this anthropomorph's body (Figure 4.89 and Figure 4.90). These could indicate that the anthropomorph was originally contrasted or it could indicate the artist's under-drawing. The dots that are visible on this portion of the panel are also visible on the body of one of the black anthropomorphs (Figure 4.89 and Figure 4.91). The enhancement of this series of photographs also made the enigmatics at the bottom (viewer's right) of the panel more visible (Figure 4.88).

Photo Series WSS25

Photo Series WSS25 is a close-up of an inverted anthropomorph that was discussed in the previous series (Figure 4.92 through Figure 4.95). The anthropomorph is red with a black face. The area above its face is yellow and contains small red lines. The left side of the anthropomorph is impaled and it is surrounded by splatters of red paint.

This Photo Series did not include UVIR images. Instead, the images were digitally enhanced in order to reveal the details. The close-up provides additional information concerning the rendering of the figure. As is the case with other anthropomorphs at this site, the gray scale and false color images indicate that the artist painted the arms as a continuous line across the body (Figure 4.93 through Figure 4.95).

Although the outline and portions of the interior are often the same color, the enhanced photography makes the subtle differences in tone obvious. The outlines are often a slightly darker shade than the interior of the figure. A similar effect is often observed in contemporary paintings when the artist begins by outlining the figure and later fills in the details. Therefore, it is possible that the minor differences in color shade could indicate that the artist(s) outlined the figures first before painting the interior. If further research produces additional examples from this site, it would lend further credence to the theory that the pictographs at the White Shaman site represent a planned composition.



Figure 4.68 View of the White Shaman site (41VV124).



Figure 4.69 The rock art panel at the White Shaman site (41VV124).



Figure 4.70 WSS1-VS-001.

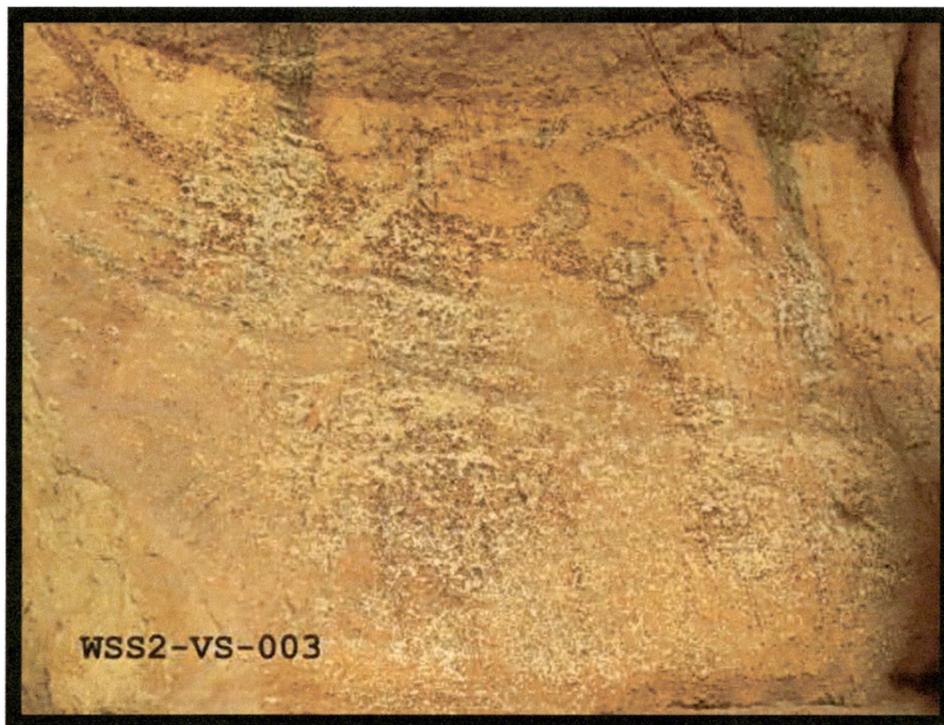


Figure 4.71 WSS2-VS-003.



Figure 4.72 WSS2-GS-001.



Figure 4.73 WSS2-GS-003.

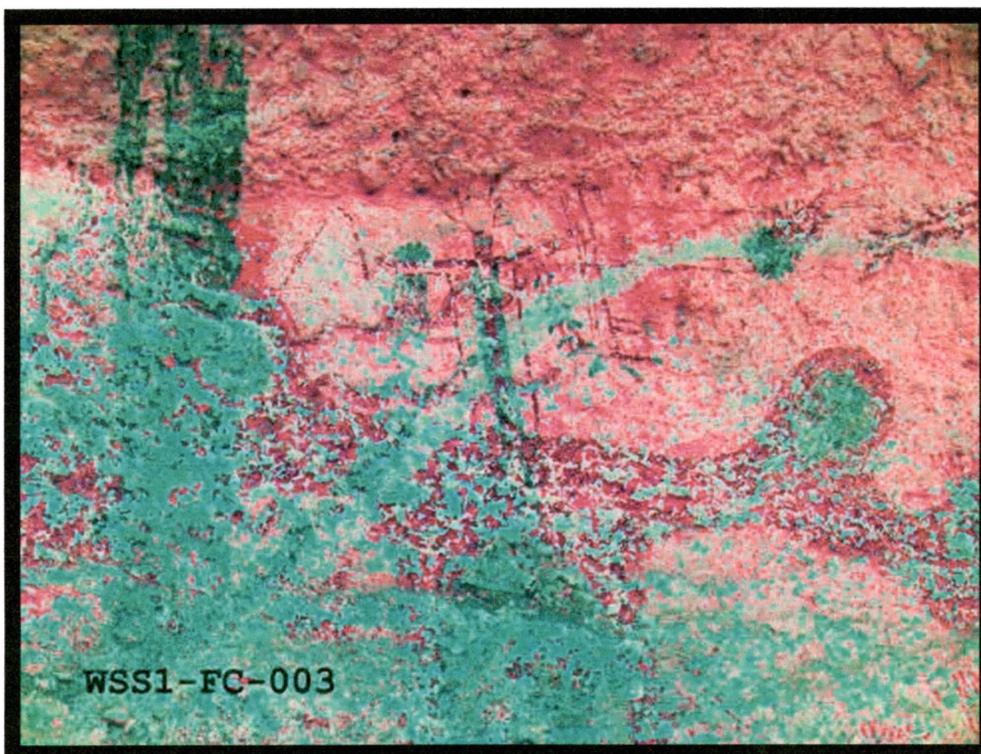


Figure 4.74 WSS1-FC-003.

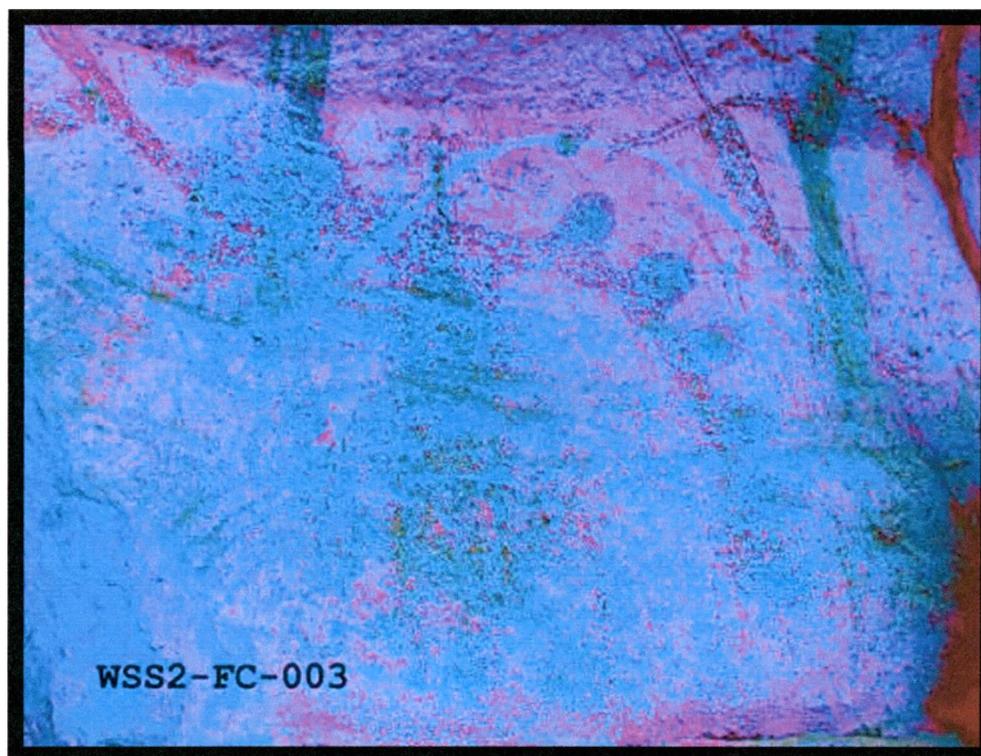


Figure 4.75 WSS2-FC-003.



Figure 4.76 WSS4-VS-001.



Figure 4.77 WSS4-GS-004.



Figure 4.78 WSS4-GS-001.



Figure 4.79 WSS4-GS-003.

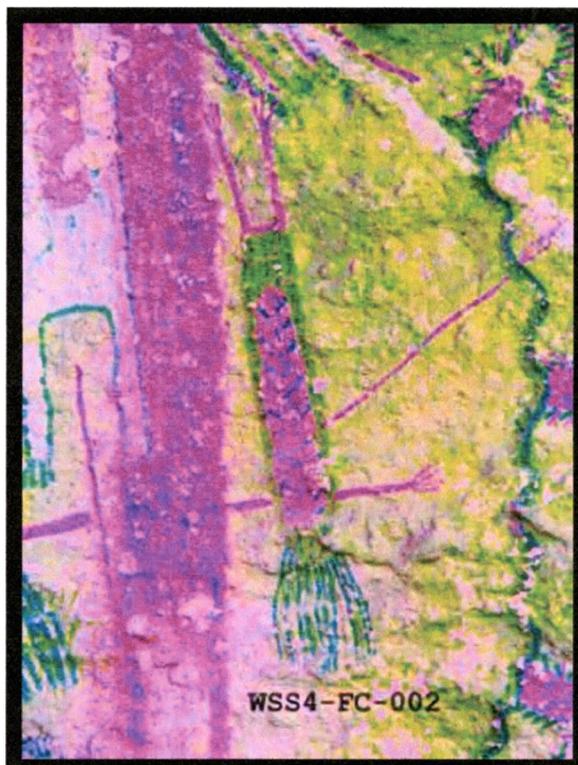


Figure 4.80 WSS4-FC-002.



Figure 4.81 WSS6-VS-001.



Figure 4.82 WSS6-GS-001.



Figure 4.83 WSS6-GS-002.



Figure 4.84 WSS6-FC-002.



Figure 4.85 WSS11-VS-001.



Figure 4.86 WSS11-FC-002.



Figure 4.87 WSS23-VS-001.



Figure 4.89 WSS21-GS-002.



Figure 4.88 WSS23-GS-001.



Figure 4.90 WSS12-FC-001.



Figure 4.91 WSS21-FC-002, showing the dot on the body of the red and black anthropomorph.



Figure 4.92 WSS25-VS-001.

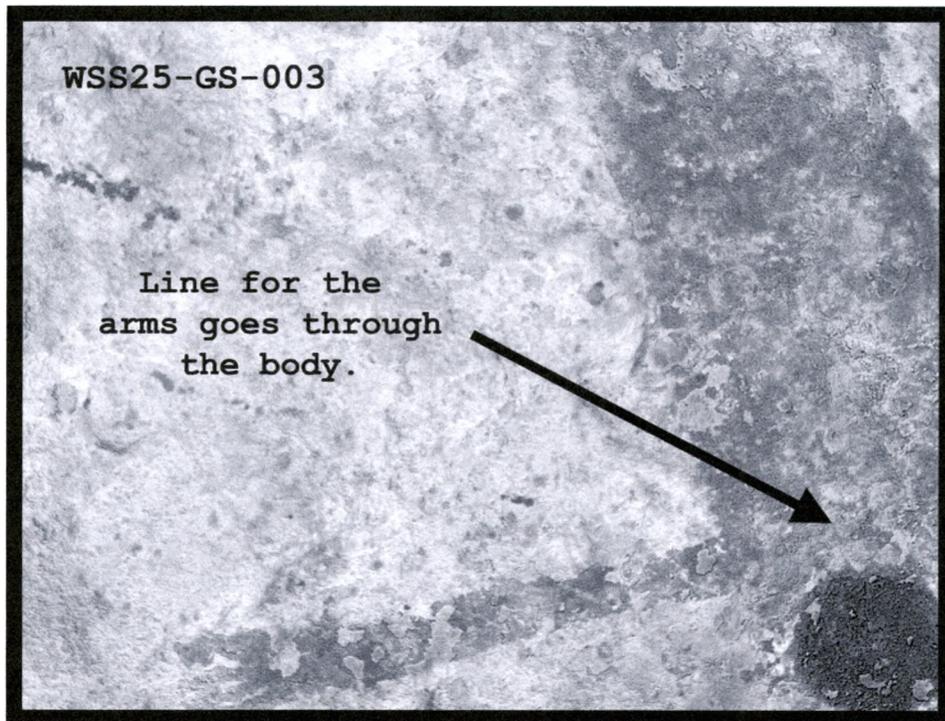


Figure 4.93 WSS25-GS-003, showing the line for the arms.

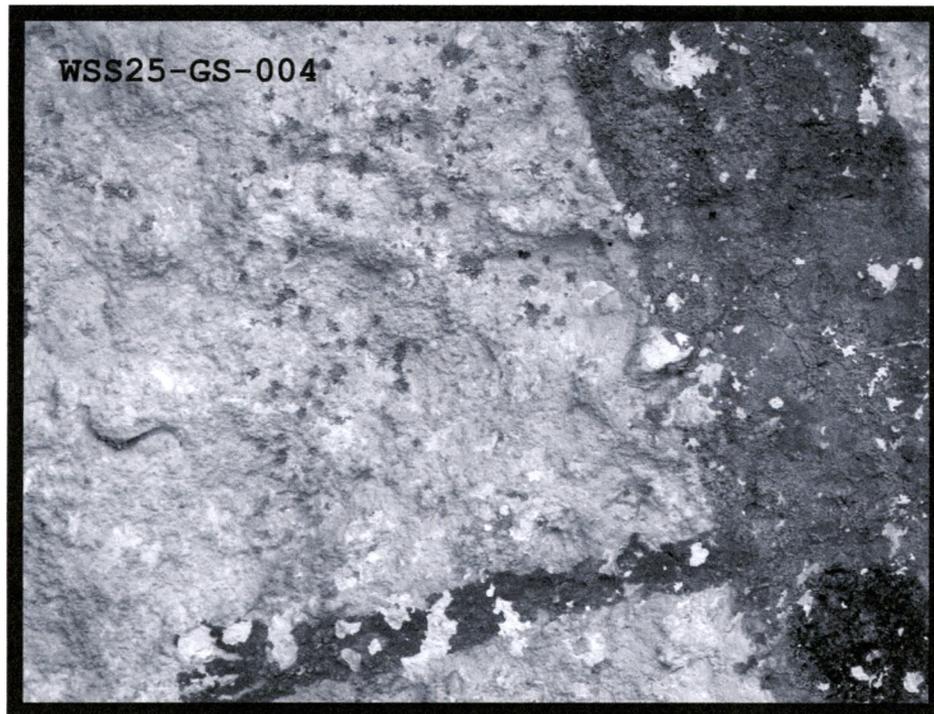


Figure 4.94 WSS25-GS-004.

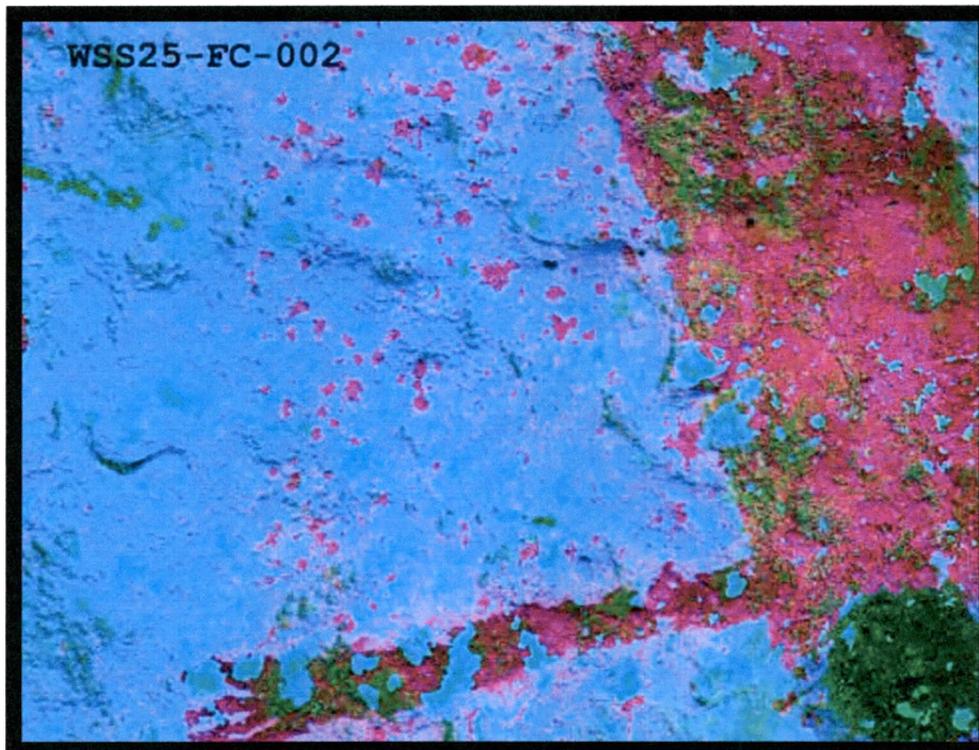


Figure 4.95 WSS25-FC-002.

BIG SATAN (41VV40)

SITE DESCRIPTION

Located approximately 100 feet from the canyon floor in a dry tributary of the Devil's River, Big Satan shelter is a challenge to reach (Figure 4.96). The interior of the shelter is large with a high ceiling and a rock ledge along the back wall. The shelter contains numerous figures that are still in relatively good condition; however, the pictographs at the far end of the shelter on the viewer's left are badly faded.

During the 2006 Field Methods in Rock Art Class hosted by The Shumla School, I visited Big Satan Shelter. As part of the field crew, I documented some of the images. I returned to Big Satan Shelter on April 4, 2008. While there, I was able to take photographs as well as notes. Since the visit to the shelter was brief, I was not able to establish a baseline; however, I did follow an imaginary baseline. I also attempted to

move from left to right. As was the case with Panther Cave, my visit was only a few hours in length. Therefore, additional documentation of this site should be done before the results can be considered complete. The site abbreviation on the labels for the Big Satan Shelter photo series is BGS.

PHOTOGRAPHIC ANALYSIS OF BIG SATAN SHELTER

Photo Series BGS1

Photo Series BGS1 refers to the lower central portion of the panel. The red anthropomorph in Photo Series BGS1 has probably been altered several times. A preliminary examination of the photographs indicates that several small details have been in-painted on the anthropomorph (Figure 4.97 through Figure 4.100). The outline and shape of the arms seem to indicate that they are either not original to the figure or that they were altered after the figure was painted. It is difficult to tell whether this figure was originally an anthropomorph or not. The grayscales and false color images reveal shapes within the body that are similar in style to the datura pods located on the anthropomorph's left (Figure 4.97 through Figure 4.100). It is possible that a subsequent artist(s) painted the anthropomorph over the original pictograph (Figure 4.100).

Photo Series BGS2

Photo Series BGS2 refers to an area of the panel located on the right of the viewer. This series shows several of the anthropomorphs and geometrics located near the end of the panel (Figure 4.101 through Figure 4.104). The false color images produced from the UVIR photo series enhance the contrasted patterns on several of the anthropomorphic figures (Figure 4.103 and Figure 4.104). With the aid of the UVIR photographs, the head dress on the large black anthropomorph in the center of the

photographs becomes more visible. This Photo Series reveals the details of this head dress and shows that it is made up of three long slender objects protruding the anthropomorph's head (Figure 4.103 and Figure 4.104). There is also a change in the color tone of the torso and the lower half of the body (Figure 4.103 and Figure 4.104). This may indicate that the figure is superimposed over another or that the lower portion of the body is a later addition to the painting. The UVIR photographs enhance the details on the smaller anthropomorphs on the left side of the frame. The centrastyled anthropomorph with the rounded head has geometric designs resembling Xs on its body (Figure 4.103). The anthropomorph on the far left has ecstatic hair. The false color images indicated that this anthropomorphic figure has two long solid black lines attached to its head (Figure 4.103 and Figure 4.104). Additionally the grayscale shows that it also has a solid line that runs through its head and down its body (Figure 4.102).

Photo Series BGS3

Photo Series BGS3 documents the area at the end of the shelter on the viewer's left (Figure 4.105 through Figure 4.107). UVIR photography was not used in this Photo Series. However, the vis-spec images were enhanced digitally to reveal the badly deteriorated pictographic figures. All that is visible in this area without enhanced photography are a few tall red and black figures with some remnants of red pigment above them and the remnants of a crenelated line below them.

In spite of the digital enhancements, the details in this area of the shelter are still barely visible. The enhancements did increase the visibility of several of the tall horizontal red and black figures (Figure 4.107). These figures are probably anthropomorphs and they are associated with the remnants of the crenelated line. The

digitally enhanced photographs also revealed that the faded red pigment above these figures, is a large red zoomorph. Although very little pigment remains, the enhanced gray scales and false color photographs show the basic shape of the zoomorph and its location on the panel (Figure 4.106 and Figure 4.107). This figure is most likely a feline though identification is difficult since it is extremely faded. Certainly, this figure appears to be standing on its hind legs in a leaping posture. Unfortunately, the digital enhancements did not make the zoomorph's front legs visible and additional attempts need to be made to obtain more detailed photographs of this zoomorph.

Photo Series BGS4

Perhaps the most striking feature of this site is a large red and black oval that is sometimes mistaken for a rosebud (Figure 4.108 through Figure 4.112). Many researchers now believe that this oval is a stylized datura pod (Boyd 2006, Personal Communication). It is located in the center of the shelter where dust obscures the lower portion of the panel. The false color images produced from UVIR photographs in this series indicate that there are other pictographs located just below the line of dust (Figure 4.111 and Figure 4.112). Although the results are preliminary the UVIR images revealed that there is a horizontal figure (possibly an anthropomorph) just below the dust line. Additional photographic enhancements revealed that a smaller yellow and black line surrounds the pod (Figure 4.109 and Figure 4.110). The datura pod may also have been altered, however more research is needed before a determination can be made.

Photo Series BGS5

Photo Series BGS5 shows an area of the panel located on the viewers' right (Figure 4.113 through Figure 4.116). The details on the rabbit-eared anthropomorph in

Series BGS5 are difficult to see (Figure 4.113). This anthropomorph has not been photographed with UVIR. However, digital enhancements were produced from the vis-spec photographs (Figure 4.114 through Figure 4.116). Like the other figures in the shelter, the anthropomorph is coated with a layer of dust that restricts visibility. Some of its pigment has spalled and this further obscures the figure. The anthropomorph's body is centrastyled and the pattern is that of a large red single-pole ladder. Although this unusual pattern is visible at the site, digital enhancement increased its visibility in the photographs (Figure 4.114 through Figure 4.116).

Photo Series BGS7

Photo Series BGS7 refers to an area of the panel located on the right of the viewer (Figure 4.117 through Figure 4.120). BGS7 does not include infrared photographs, however digital enhancements were made using the vis-spec photographs. These Photo Series show an anthropomorph whose details resemble those of the large datura pod in Series BGS4 (Figure 4.108 through Figure 4.112). All of the figures on this part of the panel have a red line that crosses their upper bodies. The line is difficult to see but becomes obvious in the grayscale and false color photographs (Figure 4.118 through Figure 4.120).

Photo Series BGS8/BGS9/BGS10

The red line also crosses over the anthropomorphs in BGS8, BGS9, and BGS10 (Figure 4.121 through Figure 4.125). Two of these anthropomorphs have rayed half-circles above their heads which hence forth will be referred to as "halos." Digital enhancement of these photographs revealed that the red and black haloed anthropomorph is standing on or rising out of a large C-shaped figure (Figure 4.123 through Figure

4.125). The red line, described above, passes between this anthropomorph and its “halo” (Figure 4.123 and Figure 4.125).

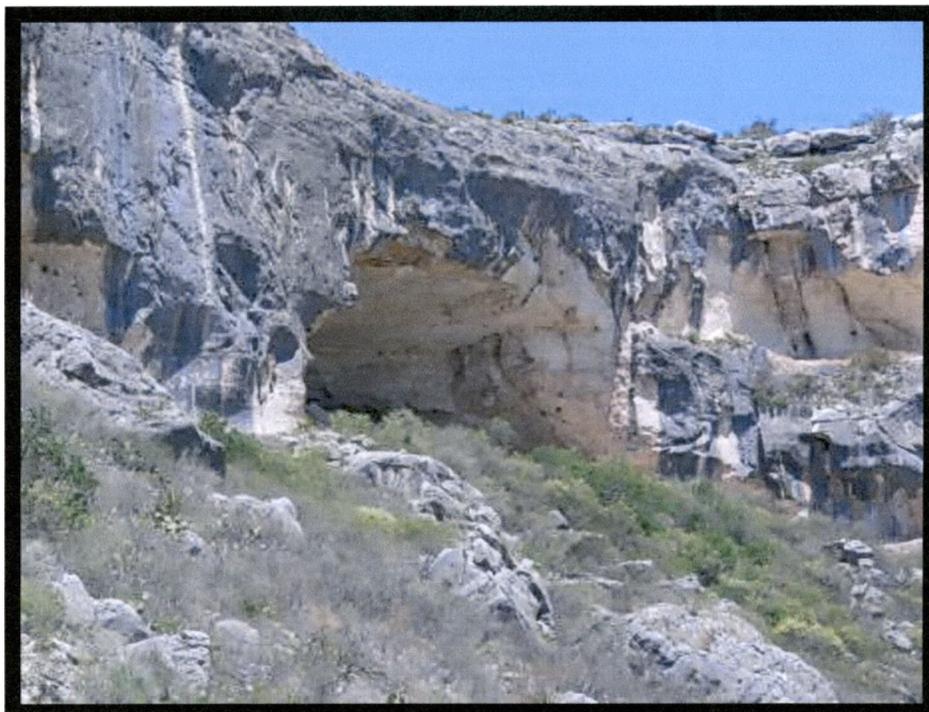


Figure 4.96 View of Big Satan Shelter (41VV40).



Figure 4.97 BGS1-VS-001.



Figure 4.98 BGS1-GS-002.



Figure 4.99 BGS1-GS-004.

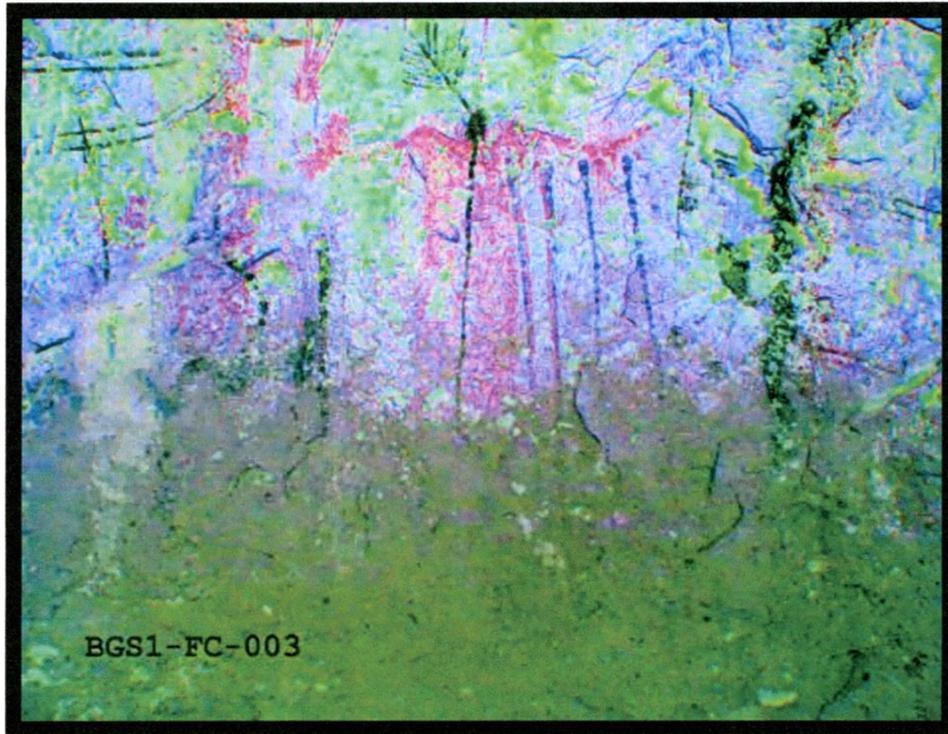


Figure 4.100 BGS1-FC-003.



Figure 4.101 BGS2-VS-003.



Figure 4.102 BGS2-GS-004.

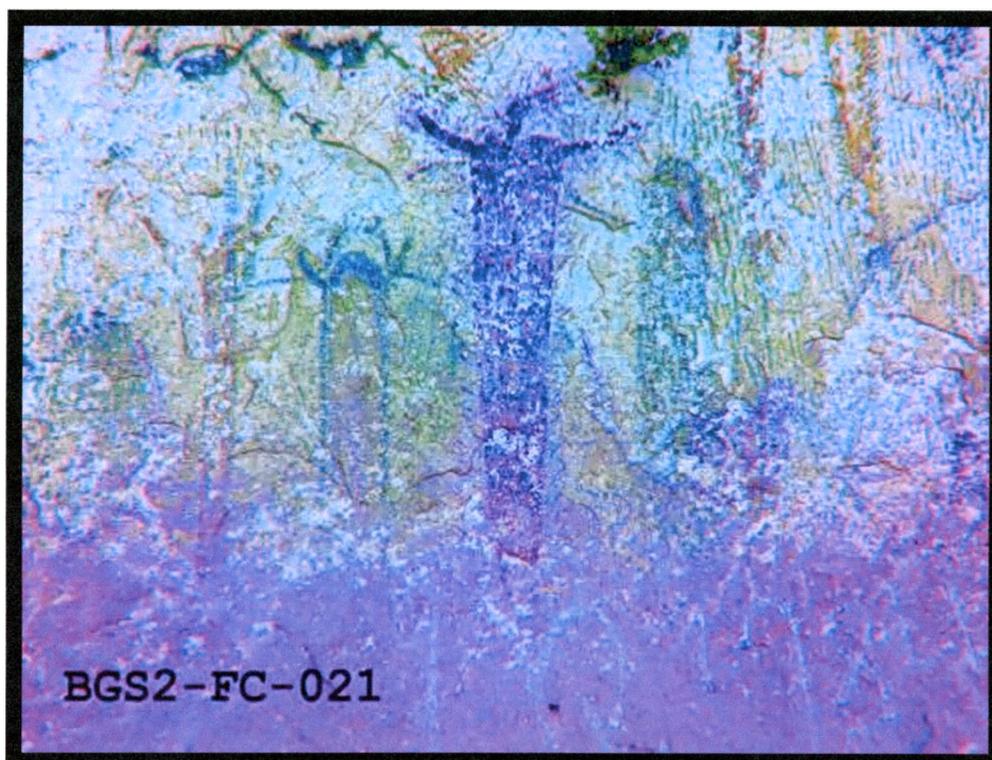


Figure 4.103 BGS2-FC-021.

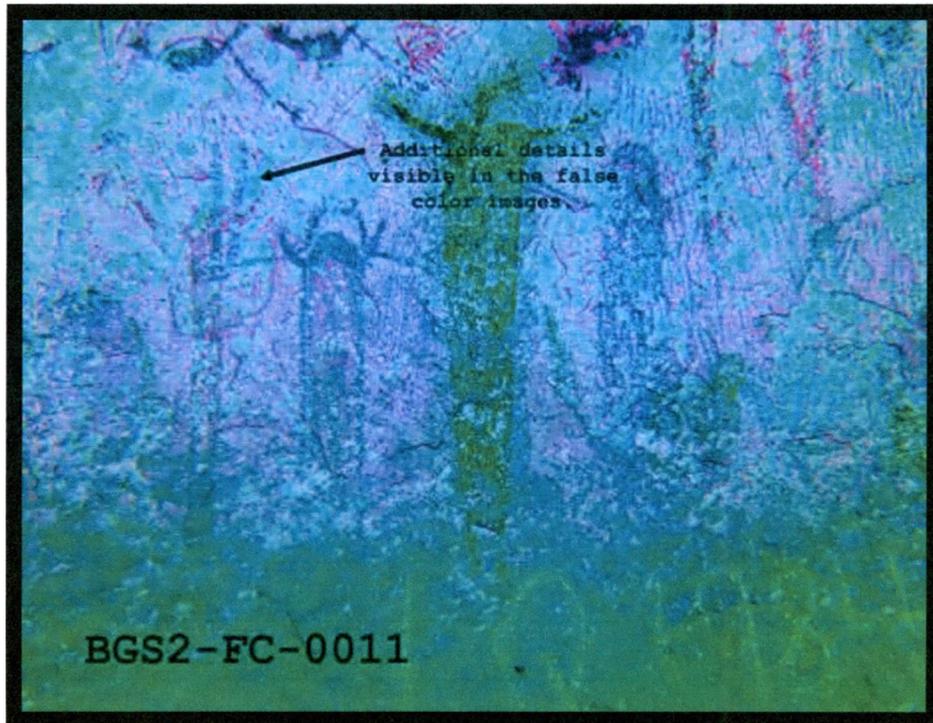


Figure 4.104 BGS2-FC-0011.



Figure 4.105 BGS3-VS-005.

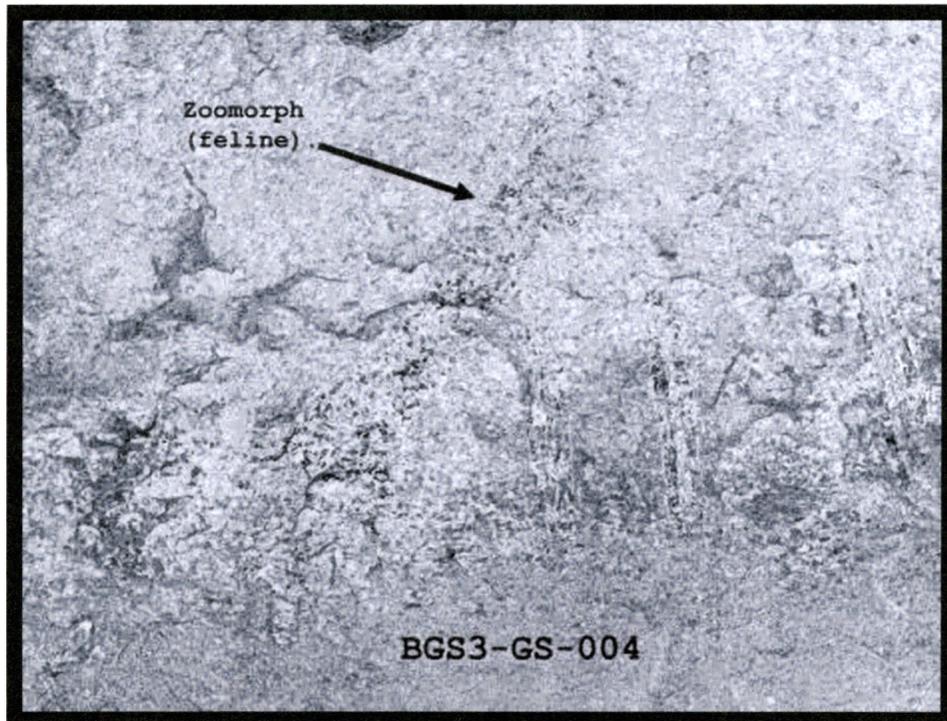


Figure 4.106 BGS3-GS-004.

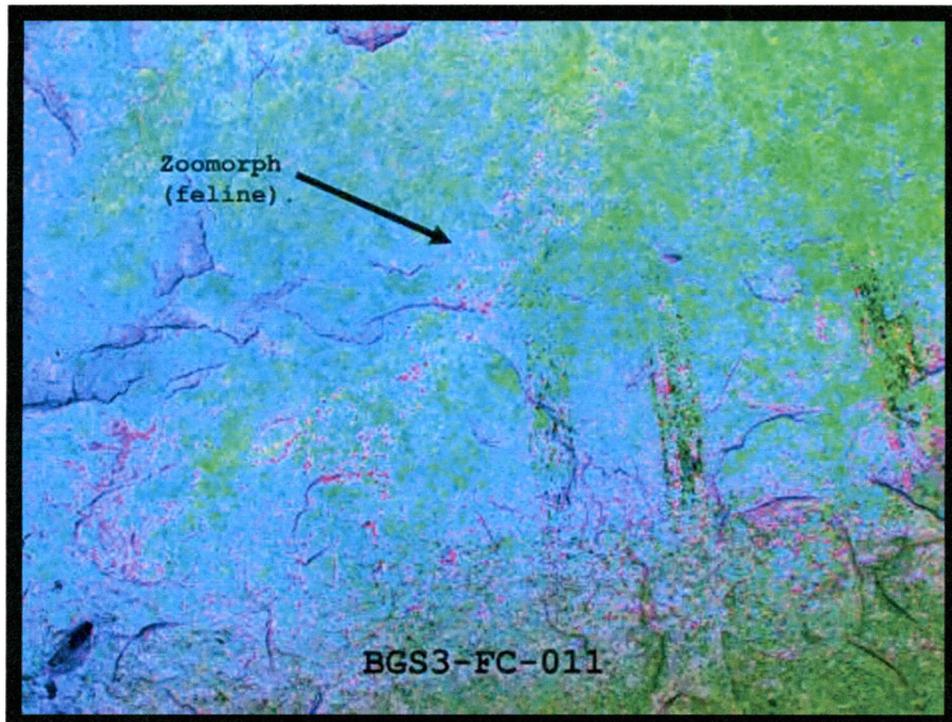


Figure 4.107 BGS3-FC-011.

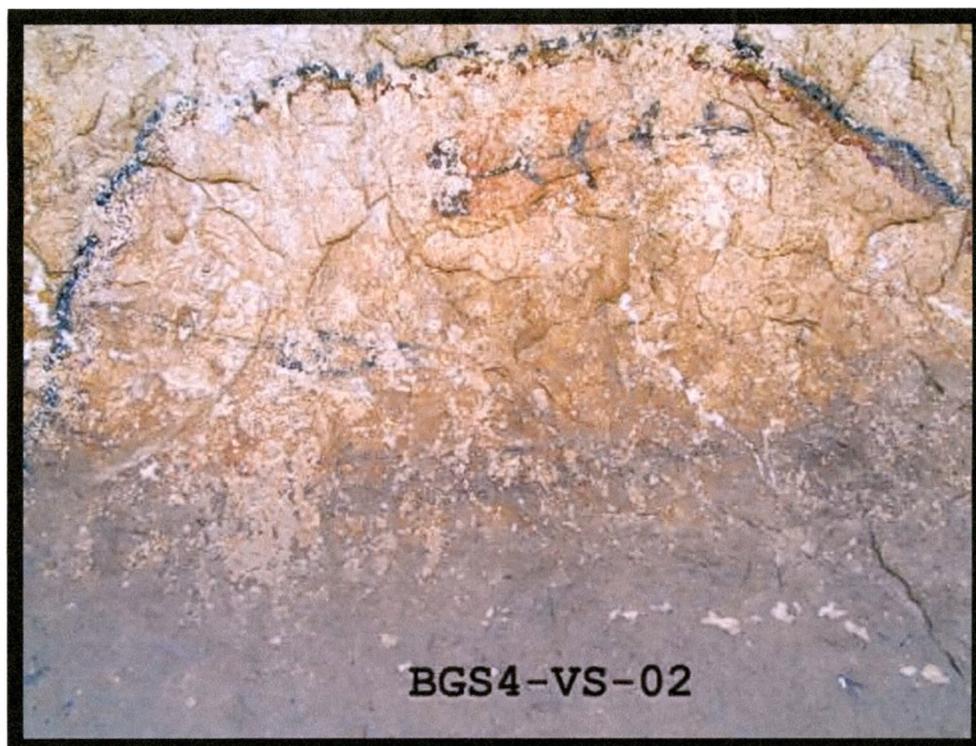


Figure 4.108 BGS4-VS-02.

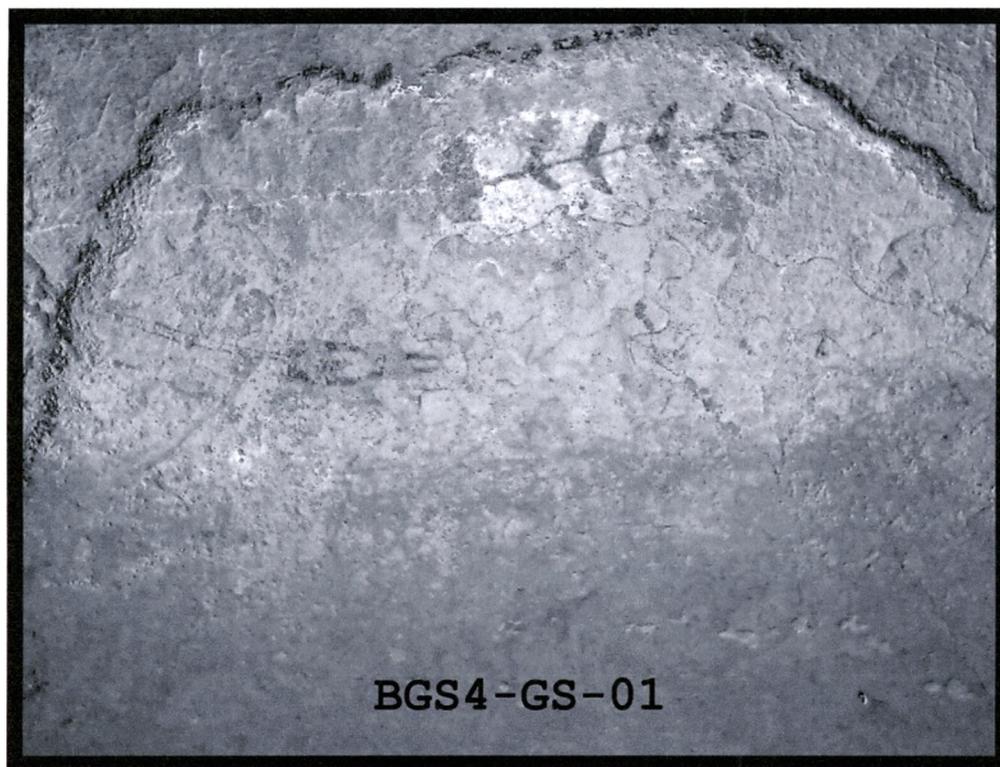


Figure 4.109 BGS4-GS-01.

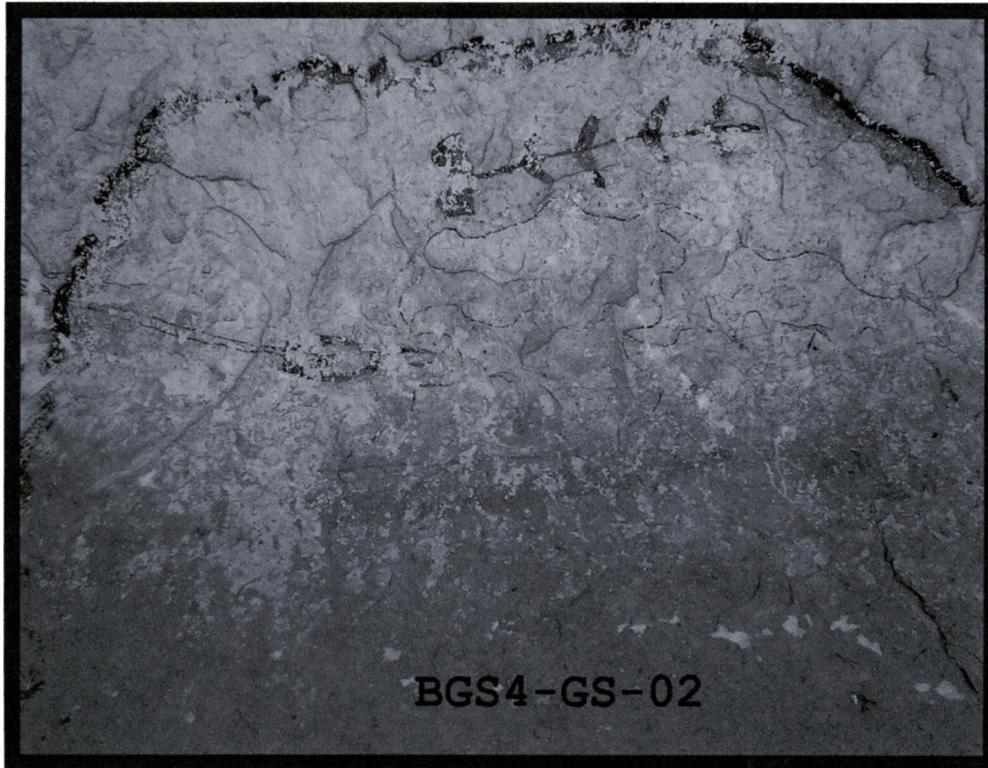


Figure 4.110 BGS4-GS-02.

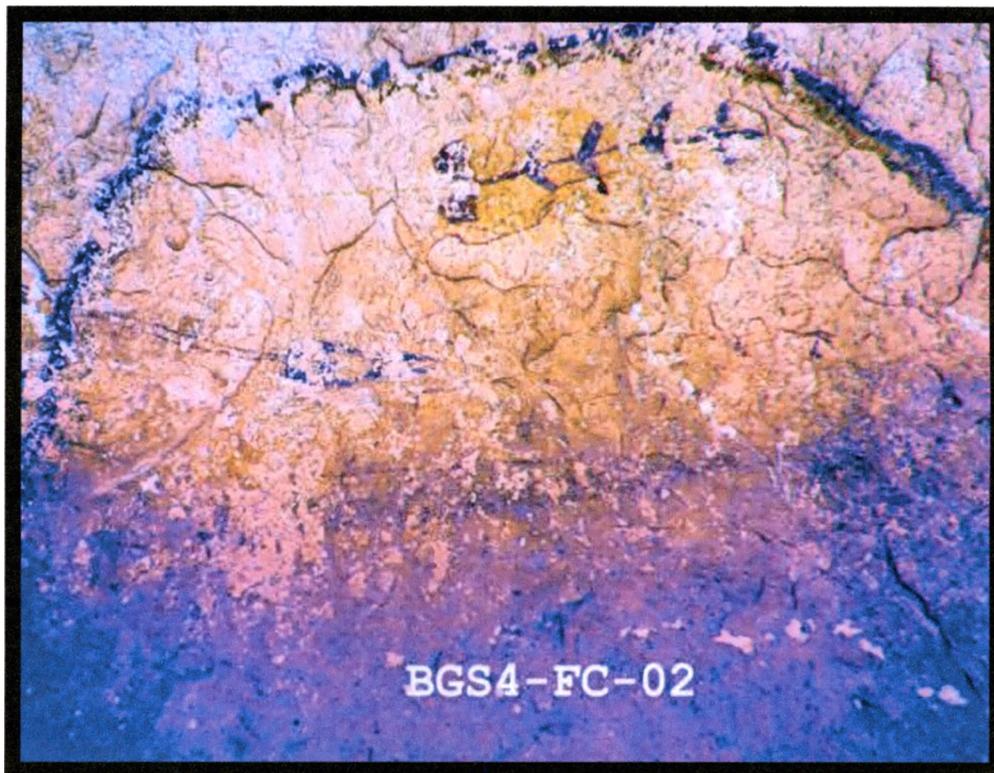


Figure 4.111 BGS4-FC-02.

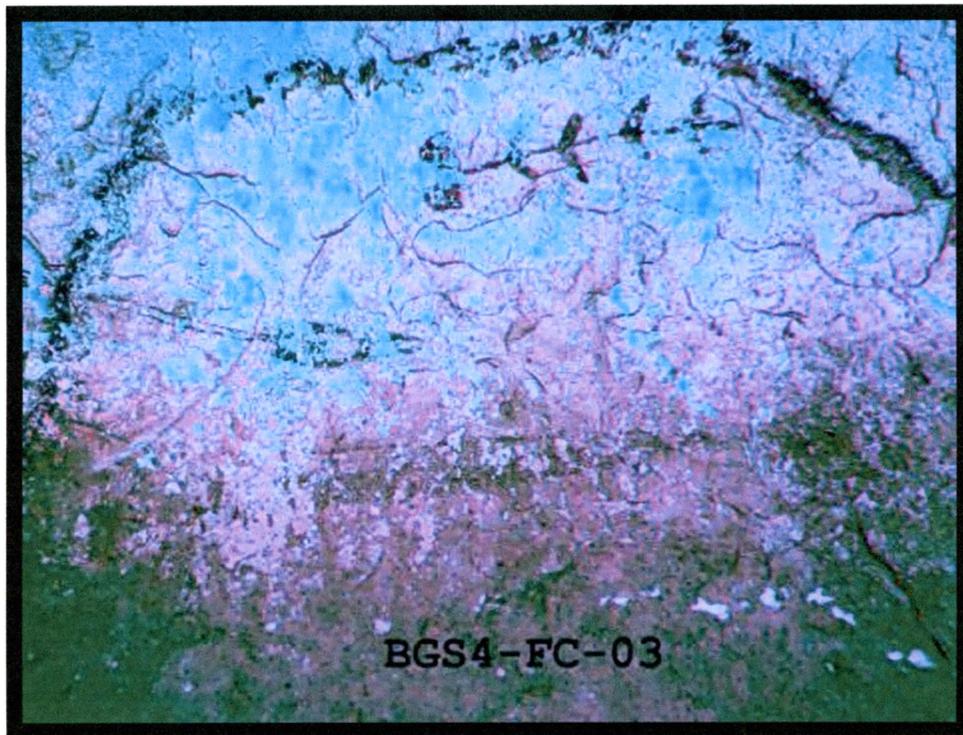


Figure 4.112 BGS4-FC-03.



Figure 4.113 BGS5-VS-01.

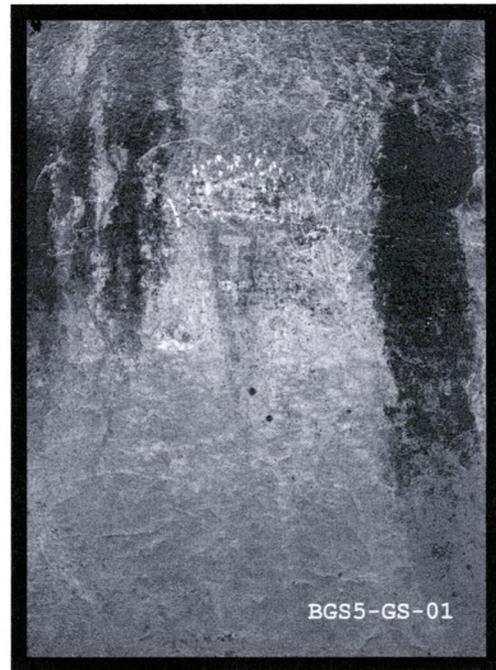


Figure 4.114 BGS5-GS-01.



Figure 4.115 BGS5-GS-02.

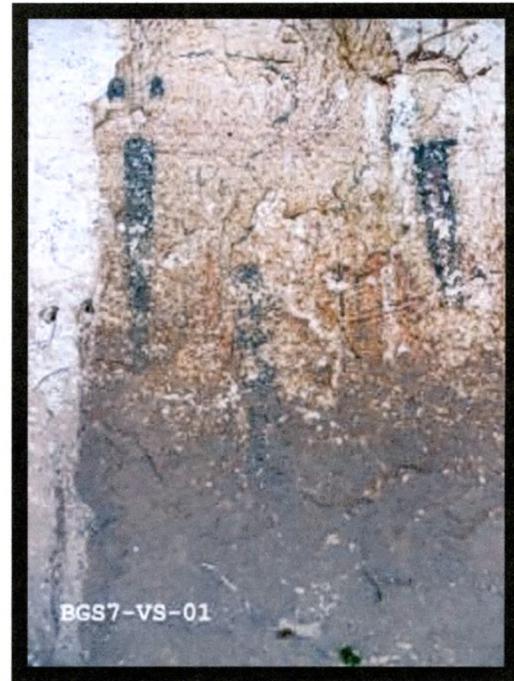


Figure 4.117 BGS7-VS-01.

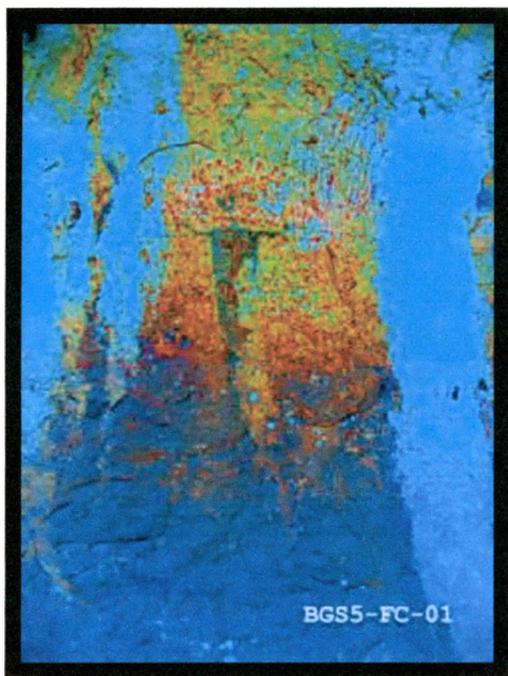


Figure 4.116 BGS5-FC-01.

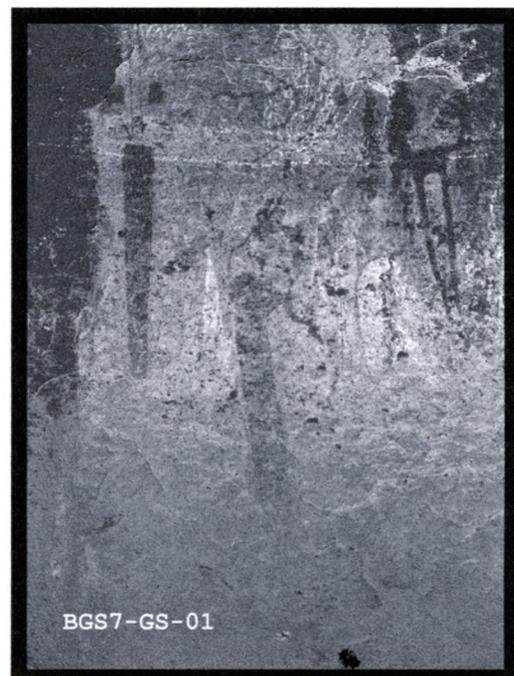


Figure 4.118 BGS7-GS-01.



Figure 4.119 BGS7-GS-02.

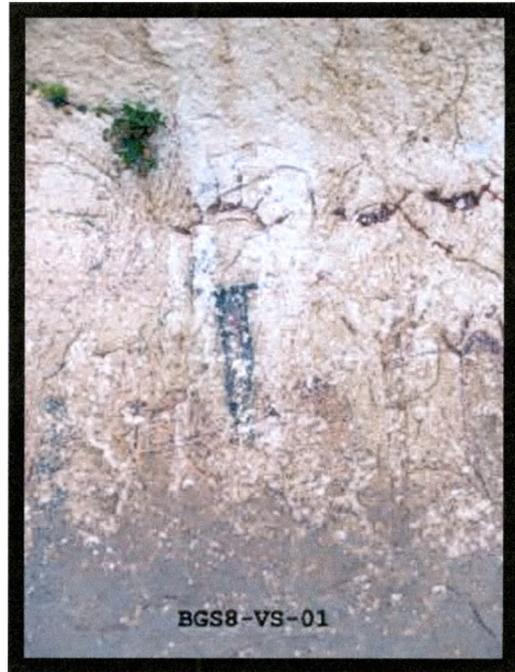


Figure 4.121 BGS8-VS-01.

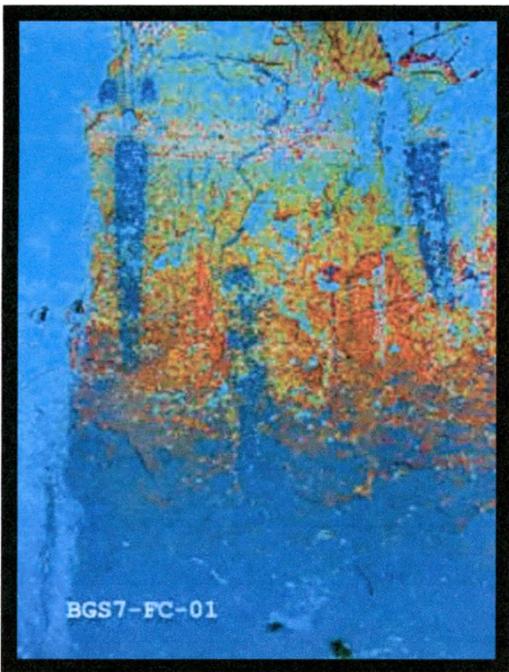


Figure 4.120 BGS7-FC-01.



Figure 4.122 BGS9-VS-01.



Figure 4.123 BGS8-GS-01.



Figure 4.124 BGS10-GS-01.



Figure 4.125 BGS8-FC-01.

MYSTIC SHELTER (41VV612)

SITE DESCRIPTION

Mystic Shelter is located in a small side canyon near the Devil's River (Figure 4.126). The shelter itself is shallow and low. It measures approximately seven meters deep by seven meters tall at its widest point. The shelter is sixteen meters in length and the rock art, which contains several examples of over-painting, runs the entire length of the shelter. A small ledge located at the bottom of the panel forms a shelf (Figure 4.127). Additional pictographs are visible underneath the shelf however, they are very faint. Since the pictographs underneath the shelf do not appear to be Pecos River Style, they are not discussed in this paper and were not considered as part of the rock art panel.

The pictographs in Mystic Shelter are in relatively good condition. Although there is some dust accumulated on the pictographs, particularly at the bottom of the panel, the dust is not coated as thick as it is in other Pecos River Style sites. A milky white film (most likely calcium carbonate) obscures some of the pictographs. This film is likely the result of moisture and mineral seepage.

Some of the information recorded in Mystic Shelter was gathered during Shumla's 2006 field school (Figure 4.126 and Figure 4.127). I collected the additional data during the course of several field trips conducted by both Shumla and the Rock Art Foundation. These field trips all occurred between 2006 and 2009.

As with the previous sites, I documented the information collected in my field notebook. This included information on the pictographs, shelter size, location, and sketches of some of the figures. Since I collected the data over the course of several trips, I was not able to establish a baseline. Nevertheless, I did attempt to move as

systematically as possible by following an imaginary baseline and moving from left to right along the panel. The site abbreviation on the labels for the Mystic Shelter photo series is MYST.

PHOTOGRAPHIC ANALYSIS OF MYSTIC SHELTER

Photo Series MYST01

The pictographs shown in Photo Series MYST01 depict a small anthropomorph above a snake-like figure (Figure 4.128 through Figure 4.133). These images are located on the viewer's left. The serpent-like pictograph runs almost the entire length of the panel, however only a portion of it is shown in MYST01-VS-01 (Figure 4.128). It is red and black and its lower portion has large black dots that run the length of the figure. The red and black line of the snake-like figure seems to terminate with a black line and circle or semi-circle (Figure 4.128).

The anthropomorphic figure is perpendicular to the snake-like figure. A large white stain, which is likely the result of water seepage, partially obscures the anthropomorph. The UVIR and digitally enhanced vis-spec photographs improve the visibility of some of the anthropomorph's features.

The grayscales and false color images of these figures reveal several interesting elements (Figure 4.129 through Figure 4.133). The anthropomorphic figure appears to have fur along its body and the fur along its arms appears to continue through its torso (Figure 4.129 and Figure 4.133). The fingers on both of the anthropomorph's hands are elongated (Figure 4.129 through Figure 4.133). Additionally the pigment used to depict its shoulders appears to be darker than that of the rest of its body (Figure 4.129, Figure 4.131, and Figure 4.133).

The UVIR and enhanced photographs also revealed that the interior of the circle on the snake-like figure may have been painted with another color of pigment (Figure 4.130 through Figure 4.133). Additionally, the photographs revealed that the black line, which bisects the snake-like figure and passes under the circle, may represent arms (Figure 4.133). Although the snake-like figure appears to be outline oriented, the black circle and line do not (Figure 4.131 and Figure 4.132). Several of the enhanced vis-spec close-ups of this area indicate that this black line may have fingers at each end (Figure 4.133). However, additional study of the snake-like figure is necessary before it can be determined if the black line does in fact represent arms.

Photo Series MYST02

Photo Series MYST02 shows an area of the panel just right of MYST01. The photographs in Photo Series MYST02 show two large anthropomorphs, two deer, a U-shaped geometric figure, an atlatl, and other pictographs that are difficult to identify (Figure 4.134 and Figure 4.137). The area on the viewer's left is coated with the same white mineral mentioned previously and some of the pictographs are coated with dust (Figure 4.134).

The grayscale image provides additional detail and reveals that both of the larger anthropomorphs appear to be outline oriented (Figure 4.135). The inverted anthropomorph on the left is impaled by at least two lines (Figure 4.135 and Figure 4.136). The false color photographs reveal that the spear loaded in the atlatl also crosses through the inverted anthropomorph (Figure 4.136).

The second anthropomorph shown in this photo series, has fur along the outside of its body and a headdress that resembles two large antennae. The false color images of

this second anthropomorph indicate that it was once smaller than its present rendering. MYST02-GS-0002 and MYST02-FC-0008 show that the pigment on the figure's waist covers a second pair of legs (Figure 4.135 and Figure 4.136).

The UVIR false color image labeled MYST02-FC-0006, reveals a darkening of the pigment within the anthropomorph's head. This difference in pigment density seems to indicate that this portion of the anthropomorph was painted sometime after the deer which it overlays (Figure 4.137). Additionally this false color image increases the visibility of the deer's right antler (Figure 4.137). The UVIR and enhanced images in MYST02 also indicate that the U-shaped geometric superimposes another small anthropomorph (Figure 4.136 and Figure 4.137).

Photo Series MYST03

Nearing the center of the panel, Photo Series MYST03 shows numerous anthropomorphs and geometrics (Figure 4.138 through Figure 4.142). Some of these figures are obscured by the mineral stains (Figure 4.138). The central anthropomorph is red. It has a red and black box above its head, and a black box connected to a red and black arch at its waist. Beneath the arch are several smaller black anthropomorphs. These smaller anthropomorphs are surrounded by black dots and they appear to be standing on a black surface.

The grayscale and false color images enhance the details on this anthropomorph and indicate the presence of another box above the anthropomorph's head (Figure 4.139 through Figure 4.142). This second box is located directly above the red and black box. The grayscales also enhance the visibility of the dots on several of the smaller

anthropomorphs nearby and indicate that the contour of the red and black anthropomorph's body may be outlined in dashes (Figure 4.139 and Figure 4.140).

The photograph labeled MYST03-GS-0015 indicates that the red and black anthropomorph is contrasted with a crenelated line running lengthwise down its body (Figure 4.139). The anthropomorph's feet are also visible within the black box near its waist (Figure 4.139). A change in the pigment color is visible just above the waist and there are faint lines along the outside of the figure's body. These lines may indicate that the anthropomorph was originally larger (Figure 4.140). The false color images also show that the antlered anthropomorph on the viewer's left has a crenelated line that extends the length of its body (Figure 4.141 and Figure 4.142). This is similar to the line on the red and black anthropomorph's body.

Photo Series MYST04

Photo Series MYST04 is a wide angle view of the two previous photo series (MYST02 and MYST03). In these false color images the visibility of the anthropomorph that is superimposed by the U-shaped geometric is enhanced (Figure 4.143 and Figure 4.144).

Photo Series MYST07

Located near the end of the shelter on the viewer's right, the pictographs shown in Photo Series MYST07 include several large red felines surrounding a group of smaller anthropomorphs, enigmatics, and geometrics (Figure 4.145 through Figure 4.148). Although MYST07 did not include UVIR photographs, the digitally enhanced images make the brushstrokes on the top feline more visible (Figure 4.146 and Figure 4.147). It is also interesting to note that the black circles in the center of the panel both cover

portions of the lower middle feline. One of the circles overlays the felines tail and the other partially over lays its back (Figure 4.146 and Figure 4.147). These circles are attached to the undulating lines that lead up to the middle of the panel. A square is located between the two lines but is not connected to them. Additionally the grayscale and false colors increase the visibility of the pictographs that are covered by calcium carbonate (Figure 4.146 and Figure 4.148).

Photo Series MYST08

The photographs in Photo Series MYST08 represent close-up views of the same area shown in MYST07. Photo Series MYST08 is a close-up view of a red anthropomorph directly below the top feline's forelegs (Figure 4.149 and Figure 4.150). The anthropomorph is associated with a square and two undulating lines, one of which is partially obscured by calcium carbonate. The enhanced UVIR images indicate that a line runs down the center of the red anthropomorph's body (Figure 4.150). The UVIR images in this series also reveal a portion of the undulating line that is covered with calcium carbonate.

Photo Series MYST09

As was the case with the previous series, the photographs in Photo Series MYST09 (Figure 4.151 and Figure 4.157) represent details of the portion of the panel shown in MYST07. Photo Series MYST09 contains detailed images of two felines. One of the felines is headless, has limbs that appear atrophied, and a curved tail that is partially obscured by calcium carbonate (Figure 4.151). The other feline's back legs and tail are disconnected from its body and its head and forelegs are obscured by calcium carbonate (Figure 4.152).

Although this series does not include UVIR images, the enhanced vis-spec photographs improved the visibility of several elements of this panel. Both the grayscales and false color images improved the visibility of the headless feline's tail (Figure 4.153 and Figure 4.155). The head of the disarticulated feline also became more visible after digital enhancement (Figure 4.154, Figure 4.156, and Figure 4.157). These images also show that the body of the feline continues through the black circle in the bottom right corner of the photographs (Figure 4.154 and Figure 4.156). This indicates that the feline was painted first and the black circle was later painted over it.

These two felines also have figures painted within their bodies. Although this is partially visible at the site, the grayscales and false colors improve the visibility of these details (Figure 4.153 through Figure 4.157). Unfortunately, even with the digital enhancements it is still difficult to determine what the figures within the feline's bodies may represent. Additional examination of the panel and perhaps several UVIR Photo Series of these felines will be necessary before a conclusive determination can be made.



Figure 4.126 The Devils River near Mystic Shelter (41VV612).



Figure 4.127 Mystic Shelter rock art panel.



Figure 4.128 MYST01-VS-01.



Figure 4.129 MYST01-GS-032.

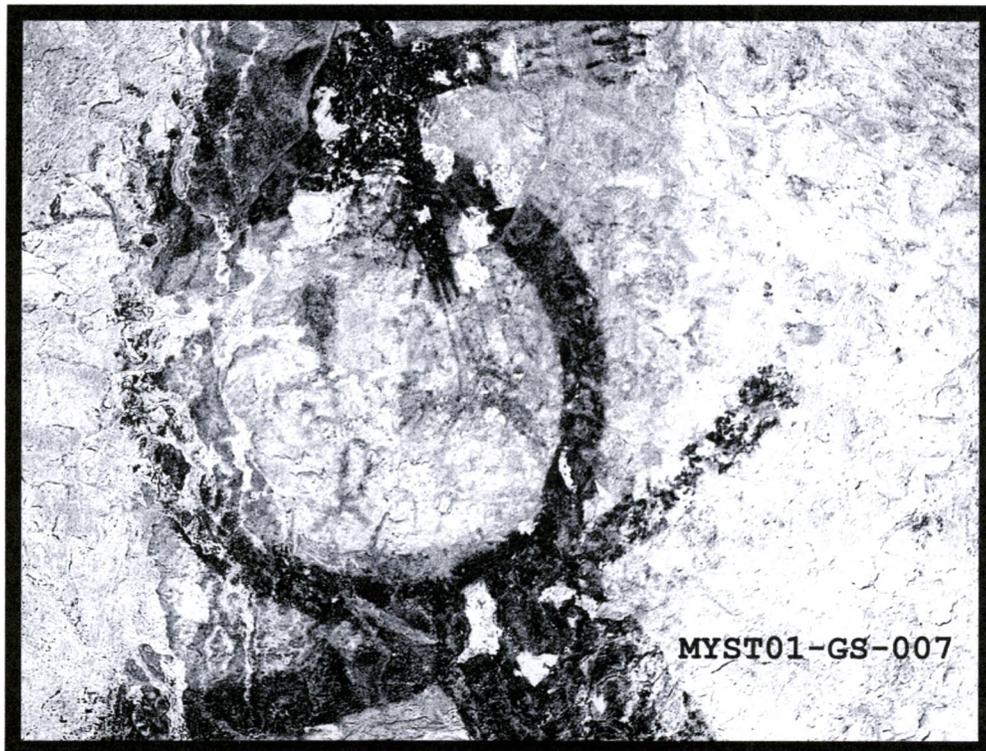


Figure 4.130 MYST01-GS-007.



Figure 4.131 MYST01-FC-08.

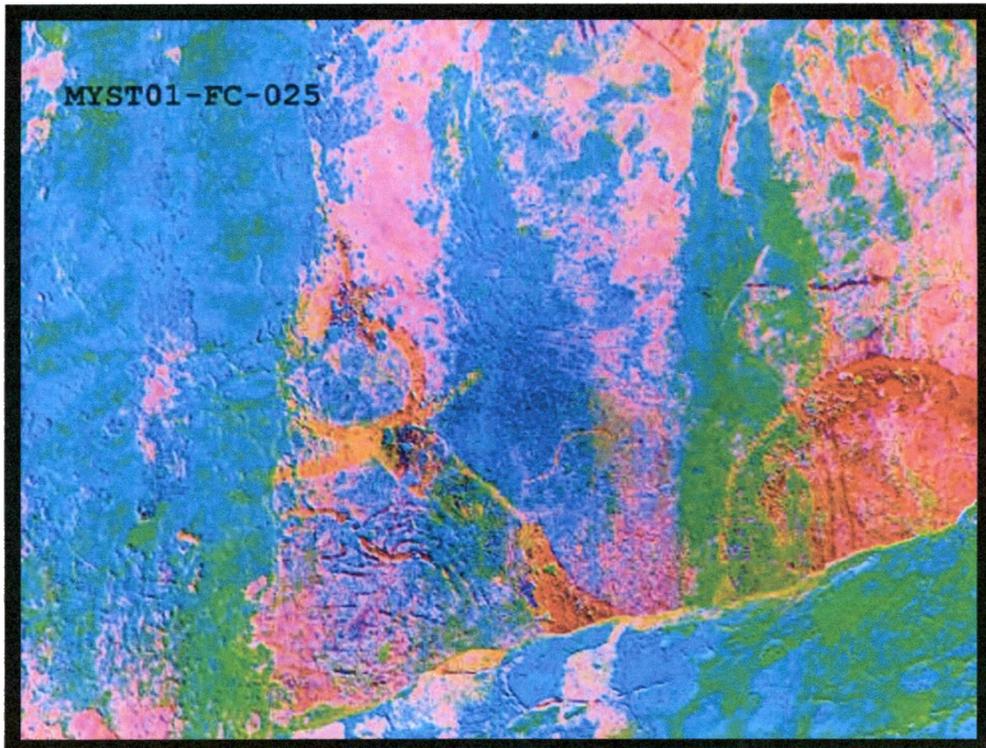


Figure 4.132 MYST01-FC-025.

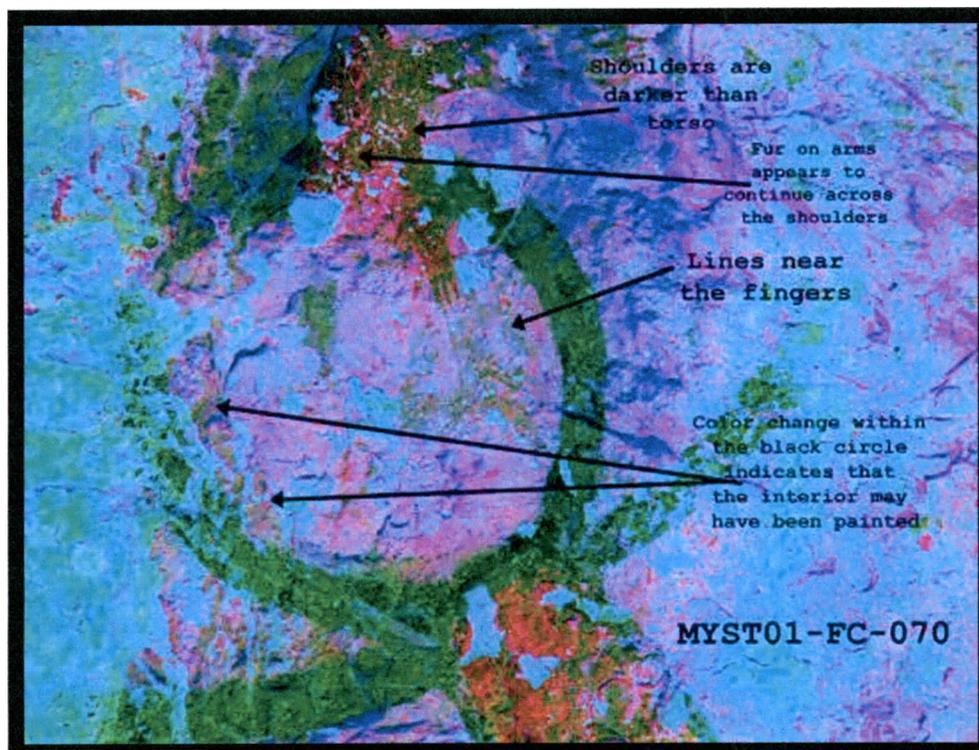


Figure 4.133 MYST01-FC-070.

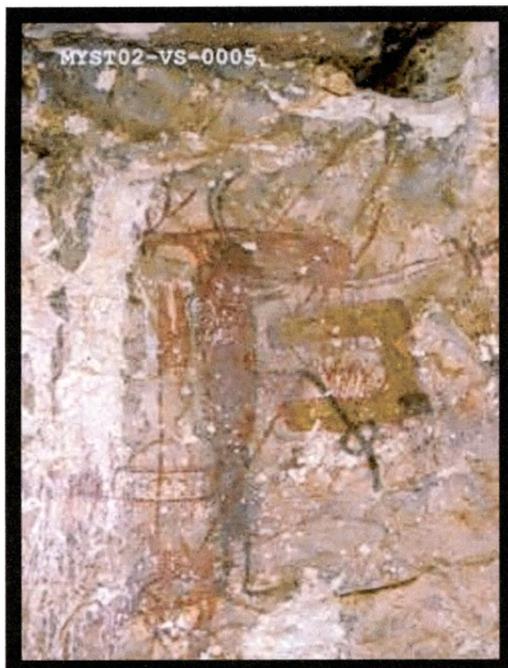


Figure 4.134 MYST02-VS-0005.



Figure 4.135 MYST02-GS-0002.



Figure 4.136 MYST02-FC-0008.



Figure 4.137 MYST02-FC-0006.

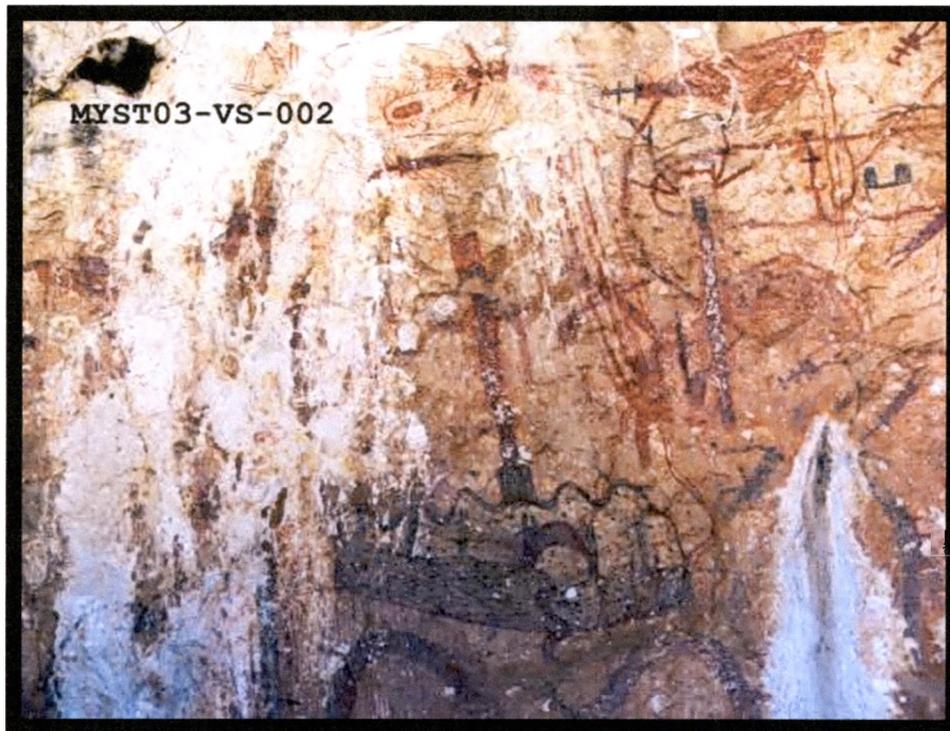


Figure 4.138 MYST03-VS-0002.



Figure 4.139 MYST03-GS-0015.



Figure 4.140 MYST03-GS-0011.



Figure 4.141 MYST03-FC-0013.



Figure 4.142 MYST03-FC-0018.



Figure 4.143 MYST04-VS-002.

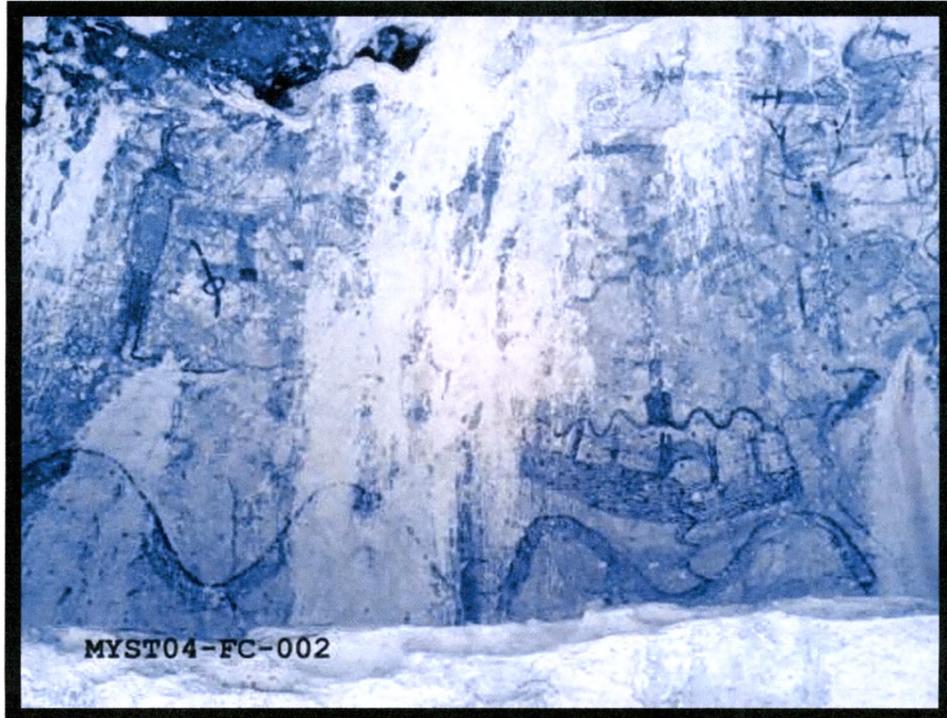


Figure 4.144 MYST04-FC-002.



Figure 4.145 MYST07-VS-001.



Figure 4.146 MYST07-GS-0017.



Figure 4.147 MYST07-FC-0035.



Figure 4.148 MYST07-FC-0011.



Figure 4.149 MYST08-VS-003.

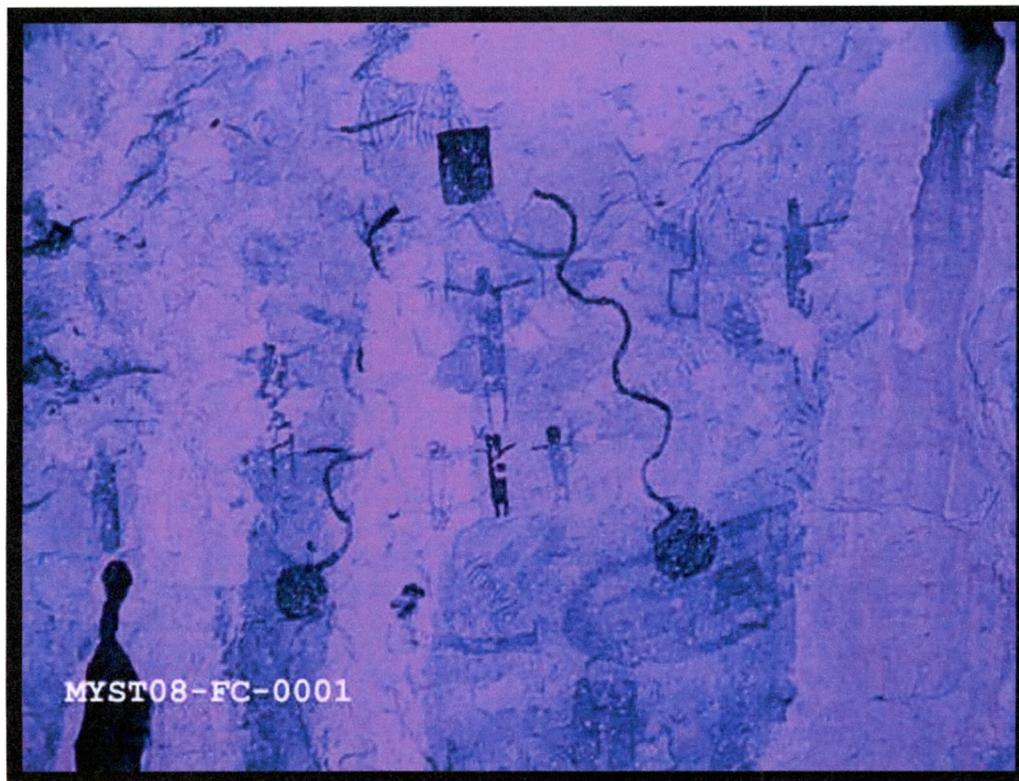


Figure 4.150 MYST08-FC-0001.



Figure 4.151 MYST09-VS-003.



Figure 4.152 MYST09-VS-001.



Figure 4.153 MYST09-GS-0064.

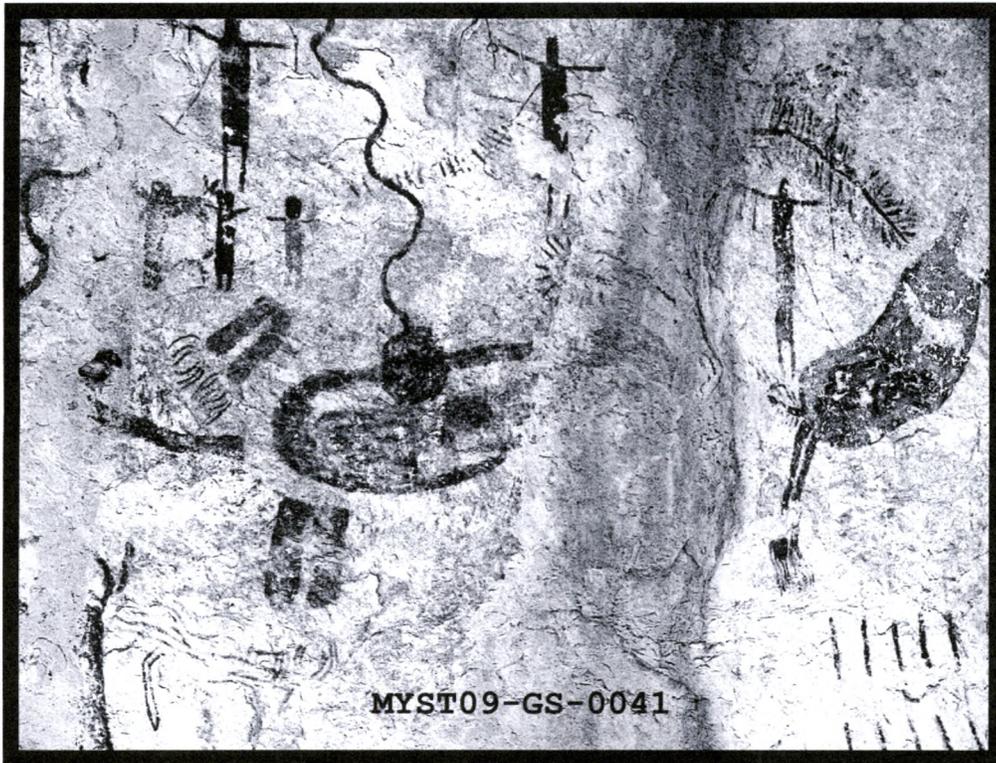


Figure 4.154 MYST09-GS-0041.



Figure 4.155 MYST09-FC-0108.

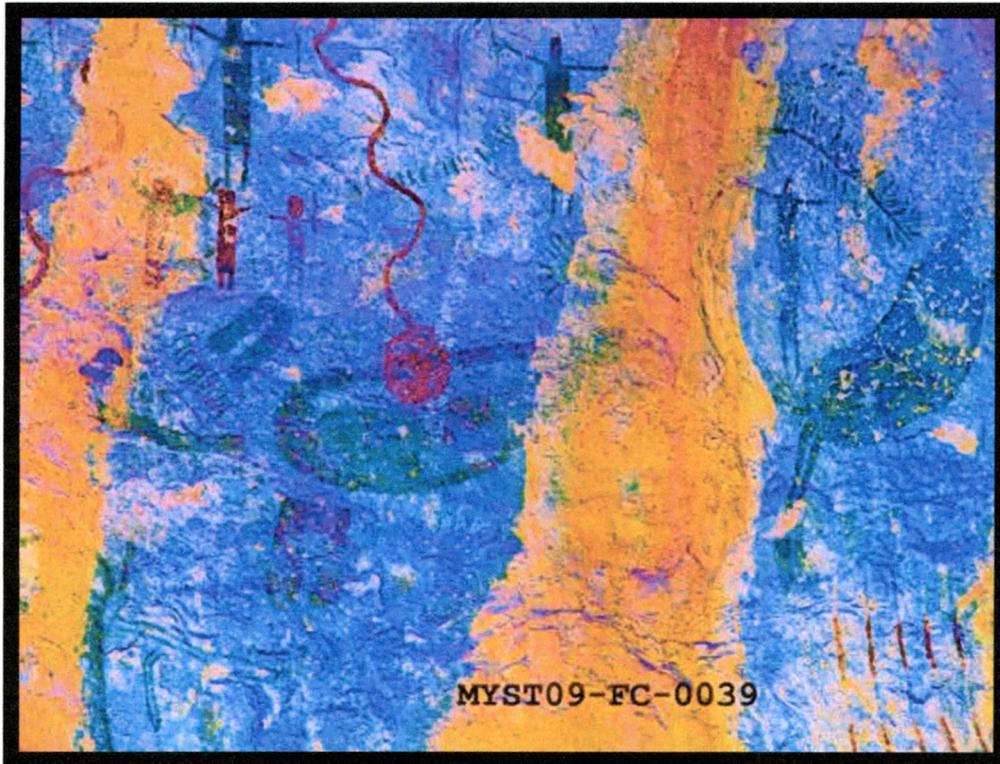


Figure 4.156 MYST09-FC-0039.



Figure 4.157 MYST09-FC-0037.

FATE BELL (41VV74)

SITE DESCRIPTION

Fate Bell Shelter is located near the Rio Grande in Seminole Canyon State Park (Figure 4.158). The shelter is large and deep; measuring approximately 4000 square meters (Turpin 1982:68-71). A large mound of habitation debris covers the floor, which is near the bottom of the canyon. The site is easy to access and in spite of the fact that many of the images are faded, they are still visible from the opposite rim of the canyon. Fate Bell appears to have experienced several episodes of painting. The figures vary in style and there is evidence that some of the figures were painted over earlier images.

As was the case with Mystic Shelter, the information recorded on Fate Bell Shelter was gathered over several years beginning with Shumla's 2006 field school (Figure 4.158). From 2006 through 2009, I collected the additional data during the course of several field trips conducted by both Shumla and the Rock Art Foundation.

Due to its size and configuration, establishing a baseline in Fate Bell Shelter is difficult. However, I did attempt to record the information as systematically as possible. This included taking careful notes about the location of each image photographed, as well as information about the shelter's size and condition. The site abbreviation on the labels for the Fate Bell Shelter photo series is FBLS.

PHOTOGRAPHIC ANALYSIS OF FATE BELL SHELTER

Photo Series FBLS01

Photo Series FBLS01 shows a series of pictographs at the far end of the shelter on the viewer's left (Figure 4.159 through Figure 4.167). These figures are very faded. Although this photo series did not include UVIR photographs, the vis-spec photographs

were digitally enhanced. These enhancements increased the visibility of the figures and revealed details that were not visible at the site.

FBLS01-VS-008 is a red anthropomorph that is contrasted with a black rectangle along the center of its body (Figure 4.159). The anthropomorph's body is surrounded by streaks of red pigment and a large black circle is located just above its head. Grayscale and false color images indicate that the anthropomorph has an atlatl and spear associated with its right hand. Additionally these enhanced photographs revealed several lines that resemble darts and a datura-like object are associated with its left hand (Figure 4.162 and Figure 4.165).

Photograph number FBLS01-VS-007 shows another red anthropomorph (Figure 4.160). The figure is contrasted but the original color of its torso is unknown at this time. The pictograph is barely visible at the site. The enhanced images of this anthropomorph were far from conclusive. However, they do reveal some additional details such as the presence of a headdress (Figure 4.163 and Figure 4.166).

FBLS01-VS-004 is a small red and black anthropomorph. It has a red and black crenelated line on the right side above its head (Figure 4.161). Grayscale and false color images reveal that the figure has an atlatl associated with its right hand and a crenelated line and several darts associated with its left hand. Both the atlatl and the crenelated line are outlined in dark pigment (Figure 4.164 and Figure 4.167). The grayscales and false colors also reveal that the crenelated line above the anthropomorph's head forms an arch and circle (Figure 4.164 and Figure 4.167).

Photo Series FBLS06

Photo Series FBLS06 consists of four large anthropomorphs (approximately 2 m in length), as well as several geometrics and enigmatic figures (Figure 4.168 and Figure 4.172). The UVIR images in Photo Series FBLS06 indicate that this area of the shelter has been repainted several times. The grayscale and false color photographs show that the area was originally covered with smaller figures (Figure 4.169 through Figure 4.172).

The grayscale image labeled BLS06-GS-0008 and the false color image labeled FBLS06-FC-0027 reveal the presence of lines around the large antlered anthropomorph (Figure 4.169 and Figure 4.171). These lines are not visible at the site. Additionally, these two photographs also revealed the upper portion of the small black anthropomorph under the left arm of the antlered figure. Other UVIR composites and grayscales such as, FBLS06-GS-0004 and FBLS06-FC-0006 provide additional detail about the figures underneath those that are visible at the site. These details include a row of concentric circles along the left side of the antlered anthropomorph (Figure 4.170 and Figure 4.172). These circles are not easily discernable at the site. The following three Photo Series FBLS03, FBLS04, and FBLS05 are close-ups and detail photographs of the same figures.

Photo Series FBLS03

Photo Series FBLS03 did not include UVIR photographs. The images in this series show the details of the two anthropomorphs on the viewer's left in this grouping (Figure 4.173). Both anthropomorphs are partially superimposed by washes of yellow, black, and orange paint. However, they are still visible and the superimposition appears to be compositional in this instance. The second anthropomorph from the left is yellow, red, and black. It is centrastyled and has an atlatl associated with its right hand. The

anthropomorph also has a wrist adornment on its right wrist. The enhanced photographs of this anthropomorph improved the visibility of its headdress and atlatl (Figure 4.174 and Figure 4.175).

Photo Series FBLS04

The central figure in Photo Series FBLS04 is a large red and black contrasted anthropomorph (Figure 4.176 through Figure 4.179). The figure has an antler headdress, rectangular shaped protrusions resembling wings, and a masked face. Its torso is impaled with a large spear. The grayscale and false color images created from the UVIR and vis-spec photographs revealed show a closer view of the concentric circles that this anthropomorph superimposes (Figure 4.177 through Figure 4.179).

The UVIR photographs also show that there are differences in the thickness and intensity of the pigment on the antlered anthropomorph's wings (Figure 4.178 and Figure 4.179). This could indicate that they were originally shorter or that they were a different color. The enhanced images also reveal that the antlered anthropomorph has a faint circle around its torso and that the crenelated line associated with passes through the anthropomorph's body (Figure 4.177 through Figure 4.179).

Photo Series FBLS05

The photographs in Photo Series FBLS05 show the details of the large anthropomorph on the viewer's right (Figure 4.180 through Figure 4.187). The posture of this anthropomorph is unusual. While it appears that its head is turned toward its left arm, its feet are actually turned in the opposite direction, toward its right arm (Figure 4.181 and Figure 4.182). Like the others previously described, this anthropomorph is contrasted and its colors are red, yellow, and black. The anthropomorph's headdress

consists of two lines shaped like exclamation points. Although UVIR photographs were not included in this photo series, the enhanced vis-spec images increased the visibility of the figures (Figure 4.183).

The grayscale and false color images increased the visibility of this anthropomorph (Figure 4.183 through Figure 4.187). The datura bundle associated with the anthropomorph's left arm is barely discernable at the site. Nevertheless, it becomes more visible after image enhancement (Figure 4.183). The enhanced images may also provide clues as to the methods the artist used to paint the pictographs. Some of the enhanced photographs indicate that a line was painted through the figure's head and that the arms were painted with one continuous line (Figure 4.184 and Figure 4.186). These images also revealed a change in the intensity of the pigment within the anthropomorph's waist (Figure 4.183, Figure 4.185, and Figure 4.187). Although the change may indicate that figure was enlarged, there is no evidence of a second pair of legs. Therefore, it is also possible that the color difference is indicative of the artist's technique. If the artist began by painting the outline and filled in the waist after the outline was dry it would likely produce the change in color intensity observed in the figure.

Photo Series FBLS12

Photo Series FBLS12 features an antlered anthropomorph located in the center of the shelter wall (Figure 4.188 through Figure 4.190). The figure is centrastyled and appears to have wings, however it appears to lack feet. Its face is masked and its colors are red, yellow, and white. It is surrounded by geometrics and enigmatic figures (Figure 4.188).

This photo series does not include UVIR images, however the digital enhancement of the vis-spec images revealed that this anthropomorph may have also been altered. The grayscale and false color images indicate that the intensity of color within the wings is not consistent. This implies that either, the anthropomorph's wings were enlarged or, that the wing tips were originally a lighter color (Figure 4.189 and Figure 4.190).



Figure 4.158 View of Fate Bell Shelter (41VV74).



Figure 4.159 FBL S01-VS-008.

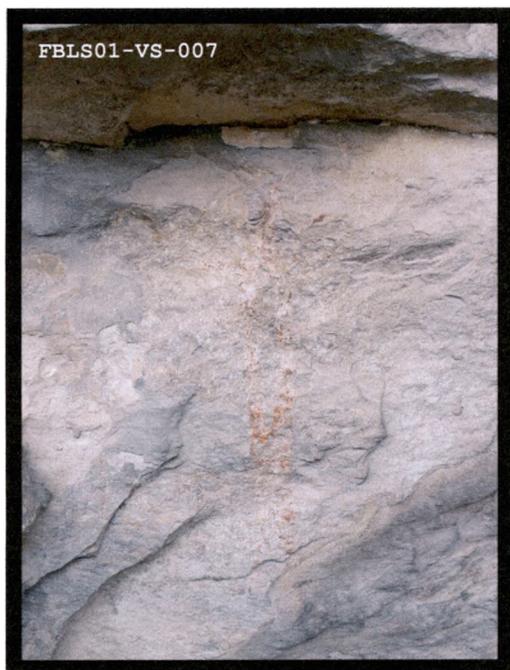


Figure 4.160 FBL01-VS-007.



Figure 4.161 FBL01-VS-004.

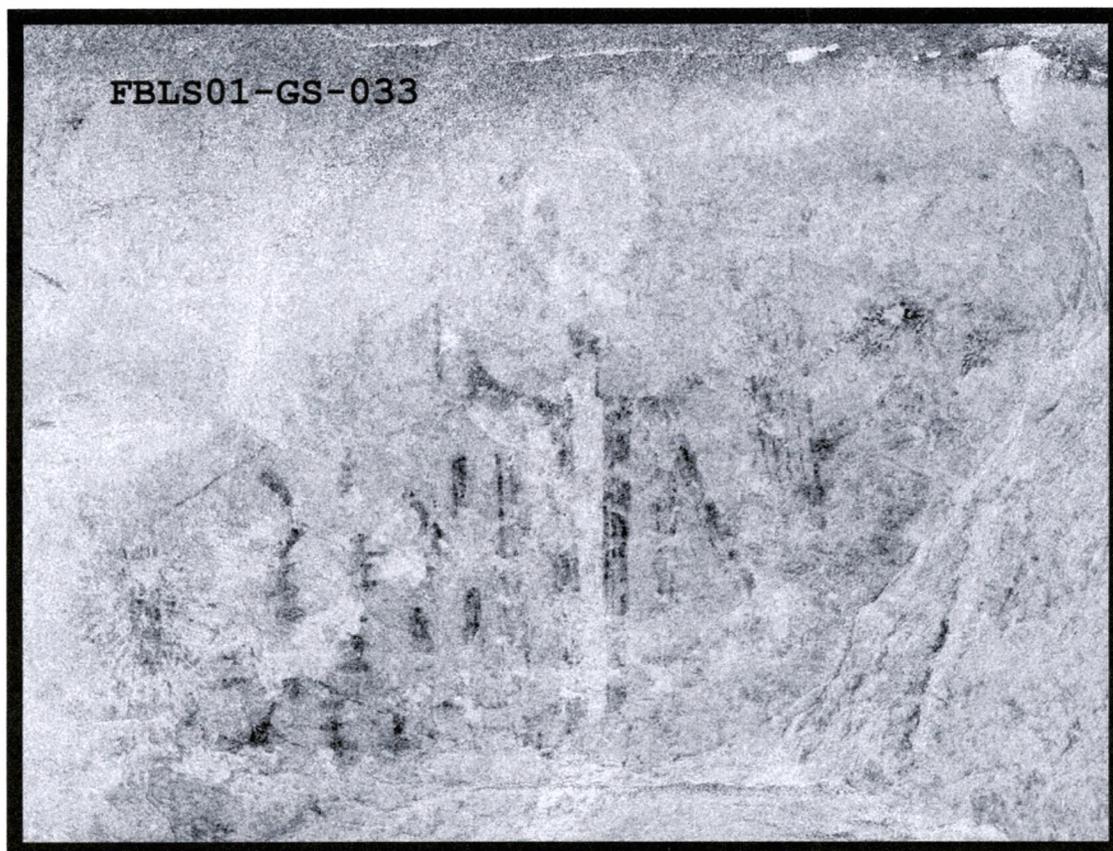


Figure 4.162 FBL01-GS-033.



Figure 4.163 FBL01-GS-024.



Figure 4.164 FBL01-GS-011.



Figure 4.165 FBL01-FC-0024.

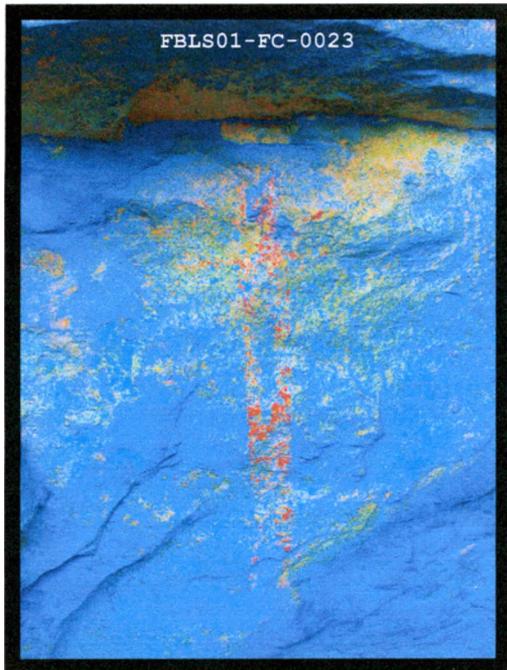


Figure 4.166 FBL01-FC-0023.

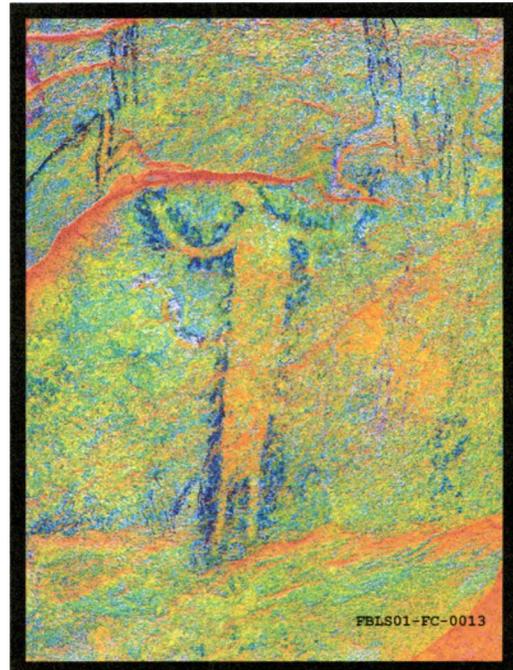


Figure 4.167 FBL01-FC-0013.



Figure 4.168 FBL06-VS-0007.



Figure 4.169 FBLS06-GS-0008.



Figure 4.170 FBLS06-GS-0004.



Figure 4.171 FBL06-FC-0027.

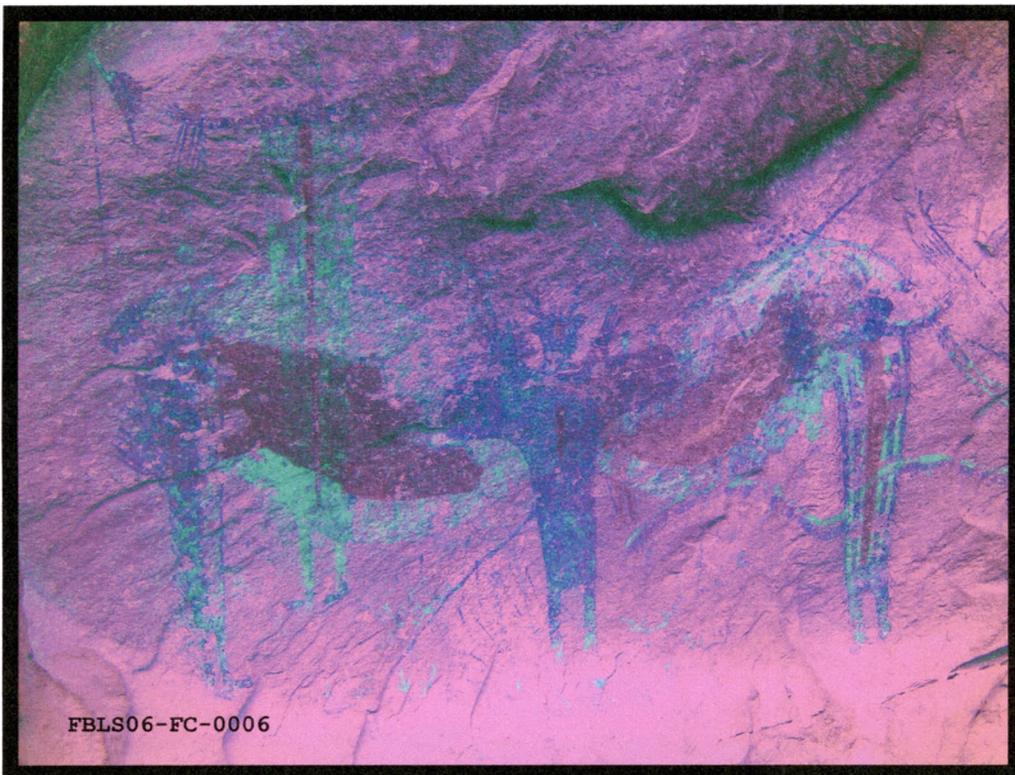


Figure 4.172 FBL06-FC-0006.



Figure 4.173 FELS03-VS-002.



Figure 4.174 FELS03-GS-0025.



Figure 4.175 FELS03-FC-0016.

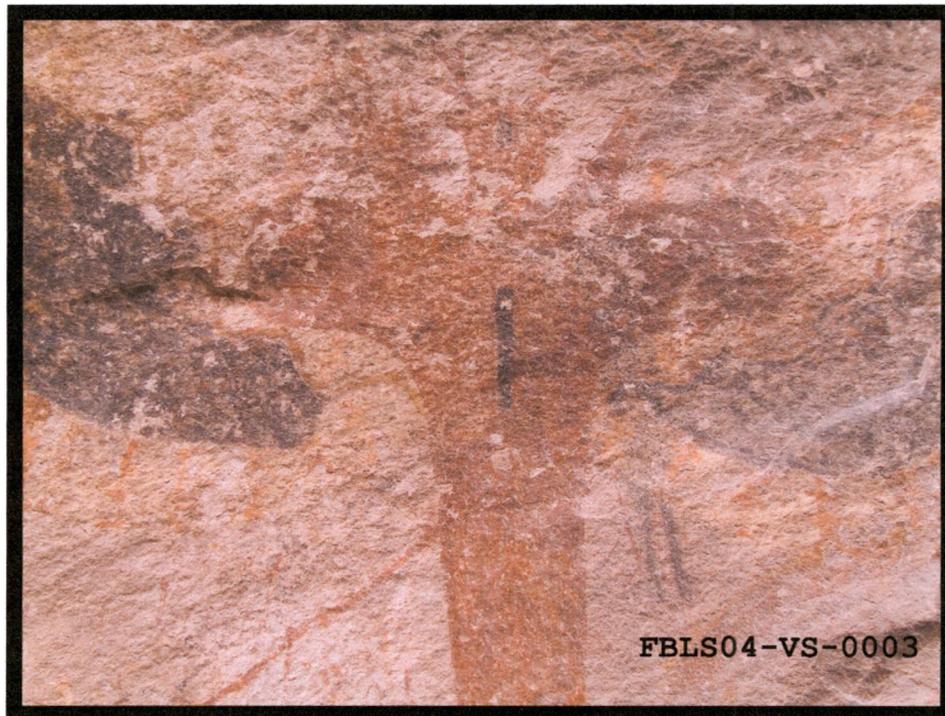


Figure 4.176 FBLS04-VS-0003.

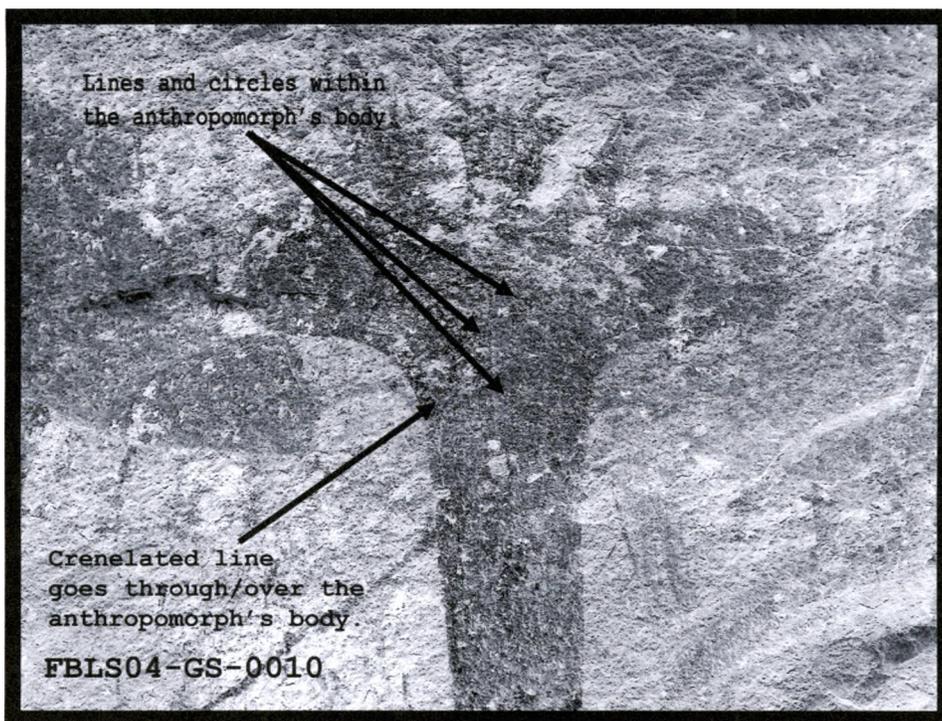


Figure 4.177 FBLS04-GS-0010.

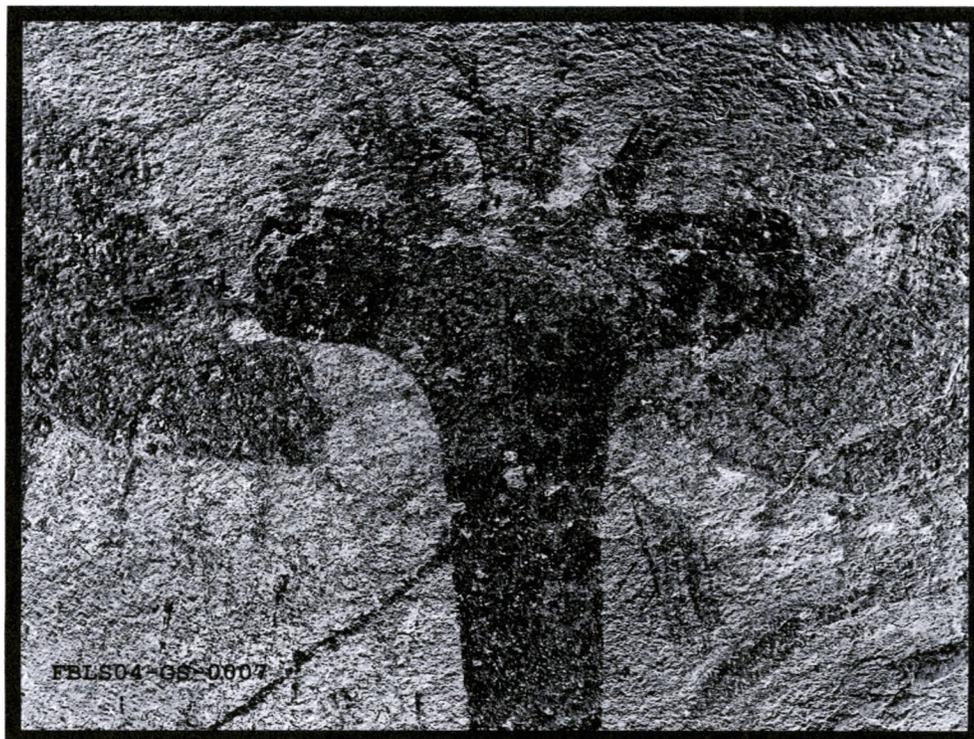


Figure 4.178 FBLS04-GS-0007.



Figure 4.179 FBLS04-FC-0010.

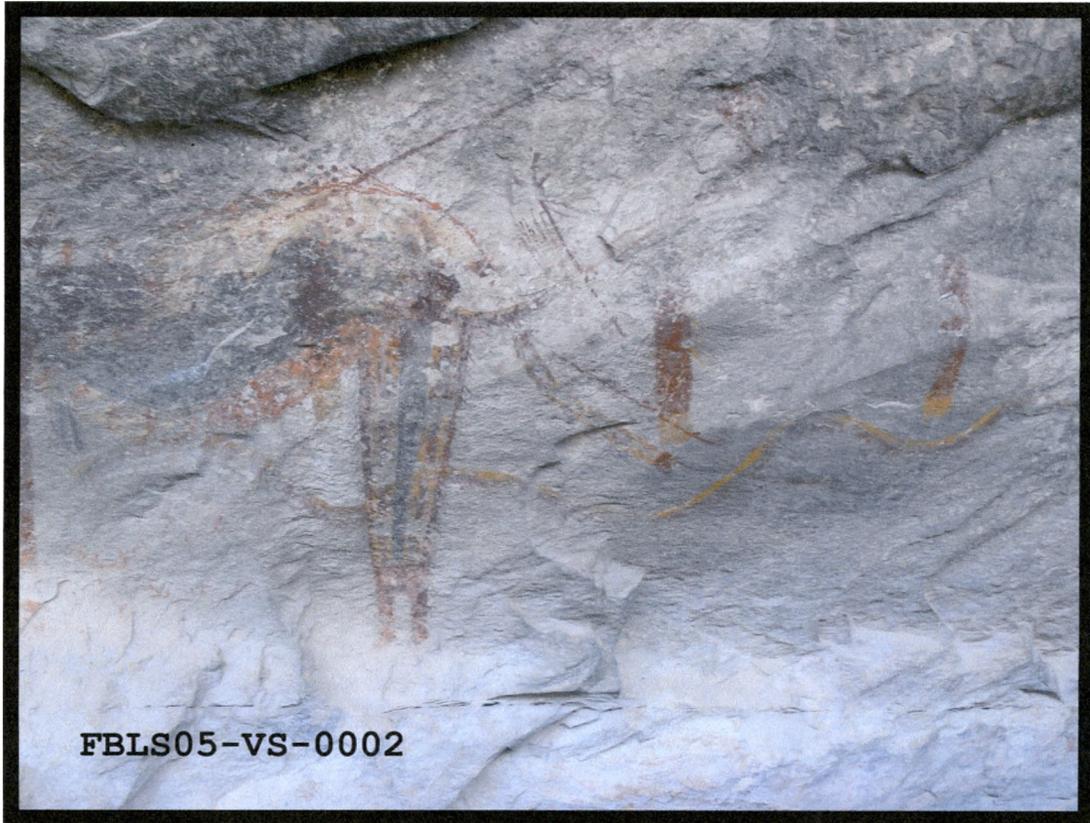


Figure 4.180 FBL05-VS-0002.



Figure 4.181 FBL05-VS-0012.



Figure 4.182 FBL05-VS-0016.



Figure 4.183 FBLS05-GS-001.

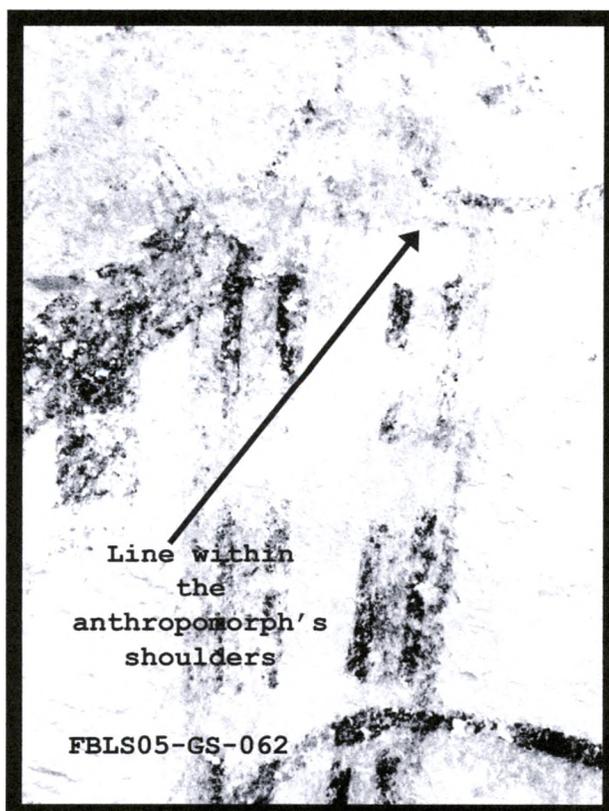


Figure 4.184 FBLS05-GS-062.

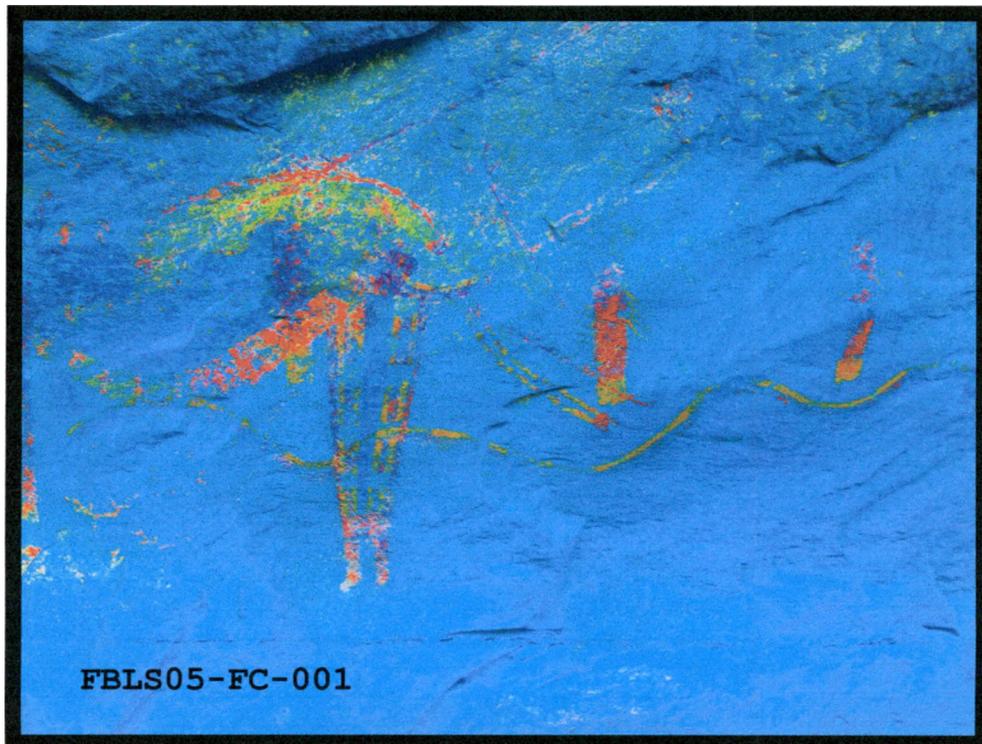


Figure 4.185 FBLS05-FC-001.

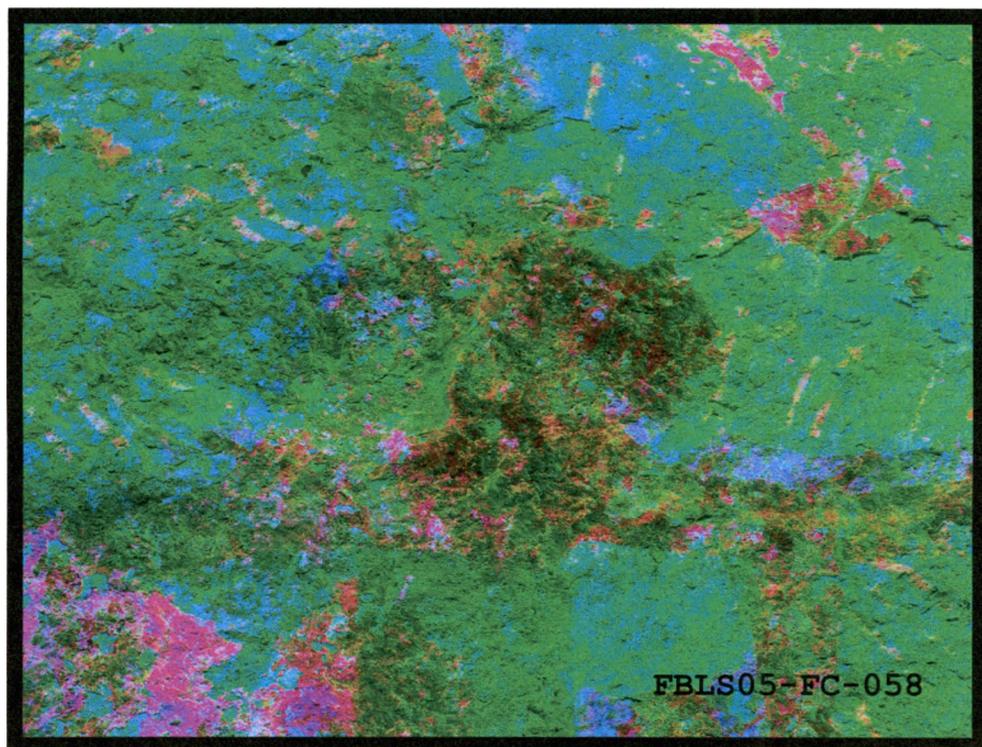


Figure 4.186 FBLS05-FC-058.

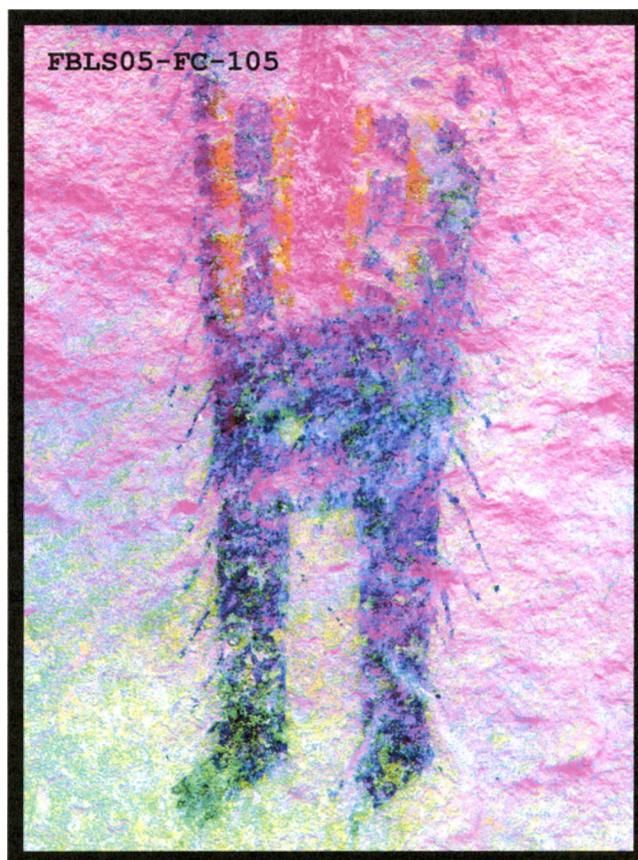


Figure 4.187 FBLS05-FC-105.

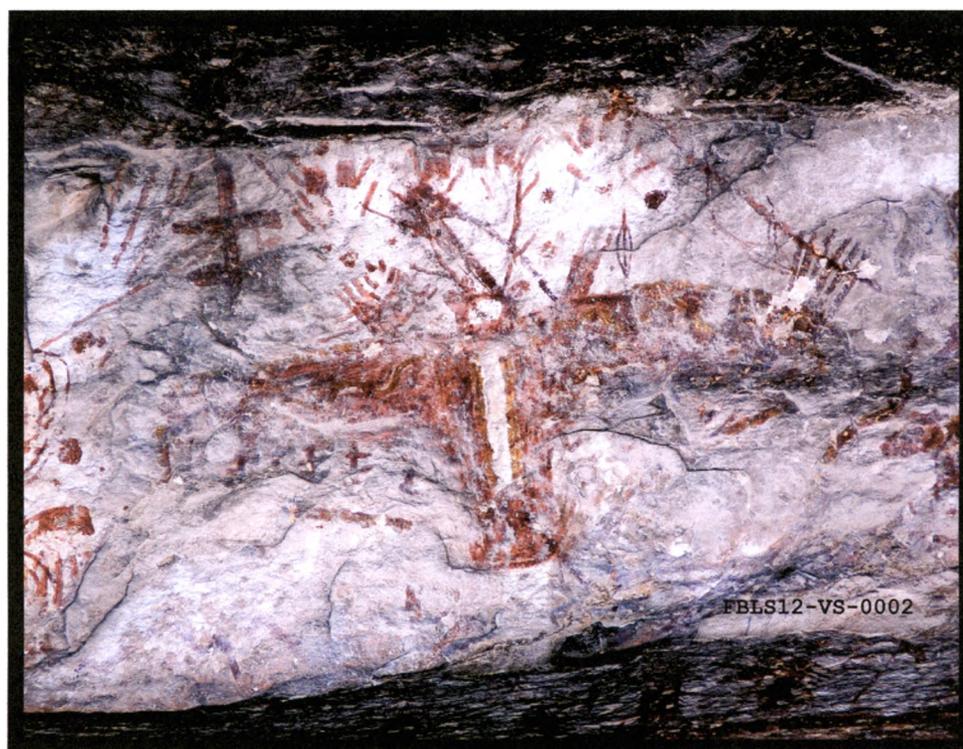


Figure 4.188 FBLS12-VS-0002.

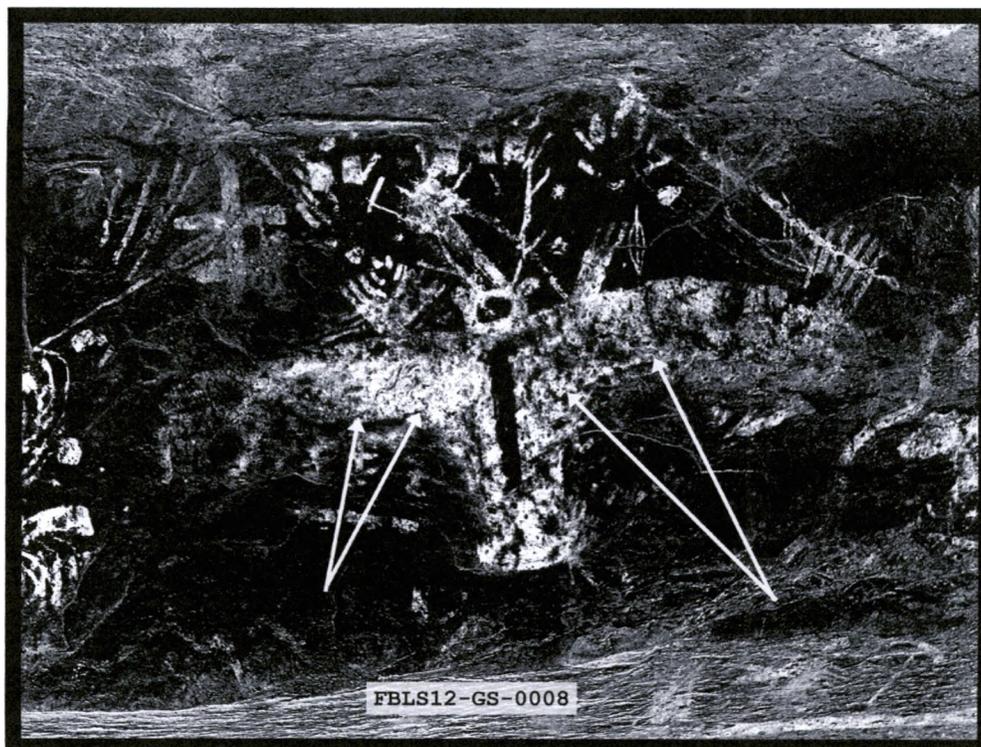


Figure 4.189 FBLS12-GS-0008.



Figure 4.190 FBLS12-FC-0011.

RESULTS

UVIR EXPERIMENTS

The initial experiments with UVIR photography were encouraging. Although it does not work in every situation, it is particularly useful on areas that are covered with dust. It can also be used to view under-painting. It increases the contrast and makes the brushstrokes in the paintings more noticeable. This technique when combined with digital processing software, vis-spec photography, and other recording methods, can increase researchers' knowledge of rock art by revealing obscured pictographs.

OVER-PAINTING

Certainly, additional research is necessary before the full implications of over-painting in the Pecos River Style are known. The initial results indicate that each of these six sites has different types of over-painting. In some instances it appears that the under-painting was a part of the artist's preparatory work. In other cases, it appears that subsequent artists may have in-painted earlier pictographs; possibly in an attempt to repair or improve the original painting.

CONCLUSION

The initial results support the use of UVIR cameras as an additional tool for recording Pecos River Style rock art. When combined with enhanced vis-spec images, UVIR photographs can greatly enhance the visibility of obscured pictographs.

The six Pecos River Style sites that were observed, displayed different types of over-painting. Although previously used to establish relative chronologies, the over-painted images have the potentiality to convey much more information about the Pecos

River Culture. Further investigations must be conducted before the implications of over-painting in the Lower Pecos are fully understood.

CHAPTER 5: CONCLUSIONS

Figures that are faded, spalled, or covered with dust are common among Pecos River Style sites. Pictographs covered through superimposition are also common, although they are more abundant at some sites than at others. The research goals of the project discussed in this thesis include: documenting pictographs that are obscured due to natural and cultural processes; testing the efficacy of UVIR photography and digital image enhancement as recording tools and; addressing the implications of intra-stylistic over-painting observed in the Pecos River Style rock art.

In order to achieve these goals, I examined the pictographs at six Pecos River Style rock art sites. Using a variety of considerations, I chose to document Panther Cave, Curly Tail Panther, White Shaman, Big Satan, Mystic Shelter, and Fate Bell. I utilized a variety of traditional recording methods as well as, UVIR and digitally enhanced photography to document figures obscured by natural processes and over-painting at each of the rock art sites.

RECORDING THE ALTERED IMAGES

The project goal of recording obscured Pecos River Style pictographs was accomplished through numerous field trips to the Lower Pecos. However, prior to conducting any fieldwork it was necessary for me to research the techniques and methods used to record UVIR photographs. Literature published by Fredlund, Sundstrom, and Dorrell provided some information on the application of UVIR photography to rock art

research. Additionally the digital enhancement techniques developed by Mark and Billo were useful in processing the vis-spec images

During trips to the six rock art sites, the field crews and I recorded a variety of data about the pictographs. We noted areas of concern within each panel where the pictographs have been obscured due to natural processes. Additionally the crews noted any visible evidence of cultural alterations including those that appeared to be intra-stylistic.

The obscured pictographs were photographed using both vis-spec and UVIR photography. Both types of photographs were later processed and digitally enhanced in the lab. These images as well as the other data collected are digitally archived.

EXPERIMENTS WITH UVIR PHOTOGRAPHY

As the photographs provided in this thesis demonstrate, both IR and UV photography were helpful in recording the rock art sites. The IR/vis-spec composite images were often the most successful in revealing obscured pictographs. However, there were situations where it was useful to use UV; UV vis-spec composites; or a combination of vis-spec, UV and IR. The UVIR photography was helpful in revealing the pictographs covered by over-painting as well as those covered by accumulations of dust, microflora, and other debris.

CONSIDERATIONS

Although my research has shown that UVIR photography is successful in revealing obscured pictographs, there are several issues to consider with this technique. Both UVIR and vis-spec photography are dependent upon available light therefore, the results are variable. Depending upon the available light, and other conditions, high

quality vis-spec images once digitally enhanced may work as well as UVIR. Both types of photography are merely recording tools and should be used together as well as with other methods of recording.

Lab Work

Both UVIR and enhanced vis-specs require a considerable amount of post-processing. The length of the processing time decreases as the researcher becomes more familiar with the equipment. However, it is normal to spend about 2 to 3 hours of image processing in the lab for every hour spent taking photographs.

Obscured Images and Conservation

While attempting to take UV photographs at one Pecos River Style site, I noted that the coating that obscures the panel, also reflects UV light. Although this rendered the UV photographs of the panel useless, it also indicates that the substance obscuring the pictographs may protect them from the damaging effects of UV light. This discovery is significant since it has implications for conservation and restoration of the pictographs. Unfortunately, this result was only observed at one site and the photographs could not be included in this paper because of access issues with the site. Further testing is needed before any conclusions can be drawn. However, if this result is observed at other sites it suggests that the accumulation of dust is protecting the pictographs from the harmful UV rays that cause fading.

OVER-PAINTING WITHIN THE PECOS RIVER STYLE

The third and final goal of this project is to verify the presence of intra-stylistic over-painting within the Pecos River Style and discuss the possible implications of the over-painting observed. The field and lab work for this thesis yielded some intriguing

results. During the research project, several examples of intra-stylistic over-painting were documented at each of the six Pecos River Style rock art sites.

The results of this research project also indicate that there may be several types of over-painting. Each type may have served different purposes for those who created it. Although additional research is necessary before the results can be considered conclusive, the preliminary evidence indicates the possibility of the following three types of over-painting: overlap, under-painting/under-drawing, and inpainting.

SUMMARY OF OBSERVATIONS BY SITE

There is considerable variation in the amount and type of over-painting observed at each of the six sites. It also appears that at least some of the over-painting observed at these sites was intended as an element of the composition. In other words, the artist(s) may have intentionally overlapped certain images to produce the desired effect. More research is necessary before this can be considered conclusive, however if it is validated, then it would support Boyd's theory that at least some of the panels were planned compositions (Boyd 2003).

In addition to increasing the visibility of over-painted figures, the UVIR and enhanced photographs made the lines and brush strokes of the pictographs more visible. These details are vital to understanding the techniques, tools, and methods used by the artists. Further analysis of these elements may lead to the identification of the individual artists or groups of artists responsible for the creation of the pictographs.

Panther Cave (41VV83)

The majority of the over-painted figures observed at the Panther Cave site seems to be overlaps as seen in PCS5 (Figure 4.19 through Figure 4.21) and PCS6 (Figure 4.22

through Figure 4.24). It is unclear at this time whether these are compositional overlaps. Additionally, many of the figures are outline oriented as seen in PCS7 (Figure 4.10) Although the site may also contain examples of under-painting and in-painting, additional analysis is necessary before their presence can be conclusively confirmed.

Curly Tail Panther (41VV18)

The over-paint observed at the Curly Tail Panther site includes examples of overlapping as seen in CTPS6 (Figure 4.44 through Figure 4.46). Due to the stylistic differences between the two overlapping anthropomorphs, it is unlikely that the overlap is compositional. Other over-painted figures, such as those seen in CTPS5, CTPS20, and CTPS17 (Figure 4.30 through Figure 4.36 and Figure 4.52 through Figure 4.54) may represent examples of inpainting or under-painting. Additionally there seems to be a mixture of painting techniques used at this site, with some of the figures being outline oriented (CTPS14, Figure 4.50 and Figure 4.51) and others having less definitive lines (CTPS6, Figure 4.44 through Figure 4.46).

White Shaman (41VV124)

The over-painting that occurred at the White Shaman site seems to consist primarily of overlapping. Based on the stylistic similarities of the over-painted figures, this overlapping may be compositional in nature (WSS4, Figure 4.76 through Figure 4.80). Some of the figures show evidence of under-painting (WSS25, Figure 4.92 through Figure 4.95) however, additional research is necessary before this can be considered conclusive. Most of the pictographs appear to be contour oriented. Many of the figures at this site have a heavy layer of pigment outlining their bodies. This heavier application of pigment tends to emphasize the outlines and attributes of the exterior of the

figure (WSS4, Figure 4.76 through Figure 4.80). It is also interesting to note that the arms of some of the anthropomorphs were rendered by painting a single straight line through the body of the figures. This observation is most clearly demonstrated in small anthropomorphs shown in WSS4 (Figure 4.76 through Figure 4.80) and WSS25 (Figure 4.92 through Figure 4.95).

Big Satan (41VV40)

Although there are several examples of over-painted figures at Big Satan (BGS1, Figure 4.97 through Figure 4.100), additional research is necessary before it can be determined if it is overlap, under-paint, in-paint, or some other type.

Mystic Shelter (41VV612)

Mystic Shelter contains examples of both overlapping and in-painting (MYST02, Figure 4.134 through Figure 4.137). This site has a mixture of figures that are outline oriented such as those shown in MYST07, MYST08, and MYST09 (Figure 4.145 through Figure 4.157). Additionally the brush strokes made by the artist are clearly visible in the felines (Figure 4.145 through Figure 4.148).

Fate Bell (41VV74)

Fate Bell shelter also contains a mixture of overlapping and in-painting. This is particularly evident in FBLS06 (Figure 4.168 through Figure 4.172). The overlapping is likely a combination of both compositional and non-compositional. However, it is clear that the panel shown in FBLS06 has been altered repeatedly at various times through out its history.

IMPLICATIONS

UVIR EXPERIMENTS

The initial experiments with UVIR photography were encouraging. Although it does not work in every situation, it is particularly useful on areas that are covered with dust. It can also be used to view under-painting. It increases the contrast and makes the brushstrokes in the paintings more noticeable. This technique when combined with digital processing software, vis-spec photography, and other recording methods, can increase researchers' knowledge of rock art by revealing obscured pictographs. By increasing the visibility of the artist's brushstrokes, UVIR and enhanced vis-spec images may also facilitate the identification of rock art created by specific individuals or groups

OVER-PAINTING

Certainly, additional research is necessary before the full implications of over-painting in the Pecos River Style are known. However, further analysis of the techniques used to create the rock art will help rock art researchers understand the Pecos River Style pictographs and the role that over-painting played within this stylistic tradition.

The initial results indicate that each of these six sites has different types of over-painting. In some instances it appears that the under-painting was a part of the artist's preparatory work. In other cases, it appears that subsequent artists may have in-painted earlier pictographs; possibly in an attempt to repair or improve the original painting. At sites such as White Shaman and Panther Cave, this hypothesis is supported by the observation that the superimposed figures tend to be of the same style as those that they overlay. Since these over-lapping figures are almost identical in style, it seems likely that the artist intentionally over-lapped them as part of the composition. Other

sites, such as Curly Tail Panther, seem to have a large amount of stylistic variation among the over-painted figures. Since the Pecos River Style artist rarely obliterated images completely, it may be possible to rule out iconoclasm as a motivating factor. However, additional data must be gathered before attempting to explain the purpose of over-painting in the Pecos River Style.

SITE MAINTENANCE AND REUSE

Perhaps one of the most interesting observations to come out of this project was the observation of several examples of in-painting. Evidence of small changes made to individual figures could indicate that the groups who painted the panels were re-visiting and maintaining the sites.

Ethnographic studies of the relationship between the San and their rock art sites indicate the San shamans revisited their sites and added to the pre-existing images (Deacon 1988:133-8). Additionally, the Mowanjum of the Western Kimberleys in Australia continually visit their rock art sites in order to maintain them. This maintenance includes repainting the images that are faded (Clottes 2002:102-12; Layton 2001:313-5; Lewis-Williams 2002:261; Loubser 2001:82, 90-1). Although the San and Mowanjum are geographically and temporally distant from the Pecos River culture, the presence of this practice among modern and historic groups with similar subsistence strategies should not be ignored. When combined with the sparse ethnographic-historical data from North America, these examples further strengthen the possibility that some Pecos River Style pictographs may have been repainted in order to repair or maintain them.

CONCLUSION

As I stated in the introduction, this thesis was intended to discuss the preliminary results of a continuing project whose goal is to document obscured pictographs in Pecos River Style rock art. The goal of the project remains multi-faceted. Its primary focus is to record Pecos River Style pictographs that have been altered by weathering and over-painting. This was accomplished through the fieldwork and photography methods previously described.

The project's second goal is to test the efficacy of UVIR and digitally enhanced photography as a tool for revealing obscured pictographs. This second goal was achieved by photographing Pecos River Style figures at six different sites. Both UVIR and vis-spec photography were used to record the pictographic sites and the results from the processed images indicate that these are effective recording tools.

The final goal of the project is to discuss the implications of the over-painting within the Pecos River Style. The possibility of several different types of over-painting is suggested by the photographs from the six Pecos River Style rock art sites discussed in this thesis. Additionally, the photographic results provide some indication that these sites were maintained, or at least revisited by the Pecos River Style artists. This is further supported by the previously cited archeological and ethnographic literature. Finally, the data recorded in this project suggests that some of the over-painting may have been preparatory in nature. This hypothesis is strengthened by the previously cited archaeological literature. However, additional data is necessary before any absolute conclusions may be drawn.

My research has convinced me that what remains is the need to research additional Pecos River Style rock art sites. Archaeological investigations of rock shelters and other sites within the Lower Pecos would also augment the existing data concerning the Pecos River Style rock art sites. Further study of Pecos River Style sites and additional archaeological research, may lead to a better understanding of the purpose of over-painting. Undoubtedly, further efforts at recording Pecos River Style Rock art will clearly indicate that these paintings rank highly in comparison with other rock art of the ancient world.

WORKS CITED

- Barunga, Pudja
2003 History & Culture, in Mowanjum Artists Spirit of the Wandjina Aboriginal Corporation. Electronic Document. <http://www.mowanjumarts.com>, accessed March 12, 2009.
- Bieseke, Megan.
1986 Bushman Art: A Preoccupation with Transformation. In *Ancient Texans: Rock Art and Lifeways Along the Lower Pecos*, compiled by Harry J. Shafer with illustrations by George Strickland and photography by Jim Zintgraff, pp. 200-203. Texas Monthly Press Inc., Austin, Texas.
- Boyd, Carolyn E.
1996 Shamanic Journeys into the Otherworld of the Archaic Chichimec. *Latin American Antiquity* 7(3):152-164.
- 1998a Pictographic Evidence of Peyotism in the Lower Pecos, Texas Archaic. In *The Archaeology of Rock-Art*. Edited by Christopher Chippindale and Paul S.C. Tacon, 229-246. Cambridge University Press, Cambridge.
- 1998b The Work of Art: Rock Art and Adaptation in the Lower Pecos, Texas Archaic. Unpublished Ph.D. dissertation, Texas A&M University, College Station, Texas.
- 2003 *Rock Art of the Lower Pecos*. Texas A&M University Press, College Station, Texas.
- 2006 *Field Methods in Rock Art 2006: Scientific Method in Rock Art: Developing a Research Design*. The Shumla School, Inc., Comstock, Texas.
- 2007 *Field Methods in Rock Art 2007: Recording Forms*. Drawings and forms on file in The Shumla School, Inc., Comstock, Texas.
- Boyd, C. E. and J. P. Dering
1996 Medicinal and Hallucinogenic Plants Identified in the Sediments and the Pictographs of the Lower Pecos, Texas Archaic. *Antiquity* 70(268):256-275.

- Boyd, Carolyn E. and Marvin Rowe
2010 Over and Under: A Re-examination of Red Linear Rock Art. Paper presented at the 2010 American Rock Art Research Association's Annual Conference, Del Rio, Texas.
- Campbell, T. N.
1958 Origin of the Mescal Bean Cult. *American Anthropologist* 60(1):156-160.
- Chandler, C. K., Thomas R. Hester, and Harry J. Shafer
1994 New Data on Clay Figurines from the Lower Pecos Area, Texas. *Bulletin of the Texas Archeological Society* 65: 347-353.
- Chomsky, Noam
2002[1957] *Syntactic Structures*, Walter de Gruyter GmbH & Co., KG, 10785, Berlin, Germany
- Clottes, Jean
2002 *World Rock Art*. Trans. by Guy Bennett. The Getty Conservation Institute, Los Angeles.
- Collins, Michael B.
2004 Archeology in Central Texas. In *The Prehistory of Texas*, edited by Timothy K. Perttula, 101-126. Texas A&M University Anthropology Series Number 9, D. Gentry Steele, general editor, Texas A&M University Press, College Station, Texas.
- Deacon, Janette
1988 The Power of a Place in Understanding Southern San Rock Engravings *World Archaeology* 20(1):129-140.
- Delahunt, Michael
2008 Artlex Art Dictionary for artists, collectors, students and educators in art production, criticism, history, aesthetics, and education. Electronic document, <http://www.artlex.com>, accessed March 29, 2008.
- Dorrell, Peter G.
1994 *Photography in Archaeology and Conservation*. 2nd ed. Cambridge Manuals in Archaeology. Cambridge University Press, Cambridge.
- Dowson, Thomas A.
1994 Reading Art, Writing History: Rock Art and Social Change in Southern Africa. *World Archaeology* 25(3):332-345.

- Fabisz, Natalia
2009 Archive for Chomsky Category. In *Linguistics and Beyond*. Word Press BN. Electronic document, <http://www.linguisticsplanet.com/category/chomsky/>, accessed November 3, 2009.
- Farace, Joe
2007 *Complete Guide to Digital Infrared Photography*. Lark Books, A Division of Sterling, New York.
- Flood, Josephine
1997 *Rock Art of the Dreamtime: Images of Ancient Australia*. Angus & Robertson an imprint of HarperCollins Publishers, Sydney, Australia.
- Fredlund, Glen and Linea Sundstrom
2007 Digital Infra-red Photography for Recording Painted Rock Art. *Antiquity* 81:733-742.
- Gardner, Helen, Horst De La Croix, Richard G. Tansey, and Diane Kirkpatrick
1991 *Gardner's Art Through the Ages I: Ancient, Medieval, and Non-European Art*. 9th ed. Harcourt Brace College Publishers, San Diego.
- Gebhard, David
1960 *Prehistoric Paintings of the Diablo Region—A Preliminary Report*, Publications in Art and Science, No. 3. Roswell Museum and Art Center, Roswell, New Mexico.

1965 Prehistoric Rock Paintings of the Seminole Canyon Area, Val Verde County, Texas. Submitted to the National Park Service by the University of California at Santa Barbara.
- Grant, Campbell
1993 (1965) *The Rock Paintings of the Chumash*. Santa Barbara Museum of Natural History, Santa Barbara, California.
- Grieder, Terence
1966 Periods in Pecos Style Pictographs. *American Antiquity* 31(5)(1):710-720
- Gould, Richard A.
1986 Cave Art of the Australian Desert Aborigines: A Code to Survival. A special contribution in *Ancient Texans: Rock Art and Lifeways Along the Lower Pecos*, compiled by Harry J. Shafer with illustrations by George Strickland and photography by Jim Zintgraff, pp. 204-209. Published for the Whitte Museum of the San Antonio Museum Association, San Antonio, Texas, Georg Zappler, general editor, Texas Monthly Press Inc., Austin, Texas.

- Guy, N. K.
2007 Infrared (IR) Photography - Popular Myths. <http://photonotes.org/articles/ir-myths/>, accessed February 5, 2008.
- Harrison, James B.
2004 *Rock Art Boundaries: Considering Geographically Limited Elements within the Pecos River Style*. Master's thesis, Texas A&M University, College Station, Texas. Electronic document, <http://txspace.tamu.edu/bitstream/1969.1/501/1/etd-tamu-2004A-ANTH-Harrison-1.pdf>, accessed October 10, 2007.
- Hyman, Marian and Marvin W. Rowe
1997 Plasma-Chemical Extraction and AMS Radiocarbon Dating of Rock Paintings. In *American Indian Rock Art*, Volume 23, edited by Steven M. Freers, 1-9. American Rock Art Research Association, Tucson, Arizona.
- Hyman, Marian, Solveig A. Turpin, and Michael E. Zolensky
1996 Pigment Analyses from Panther Cave, Texas. *Rock Art Research* 13(2):93-103.
- Ilger, Wayne A., Marian Hyman, and Marvin W. Rowe
1994 Radiocarbon Date for a Red Linear Style Pictograph. *Bulletin of the Texas Archaeological Society* 65:337-346.
- Ilger, Wayne A., Marian Hyman, John Southon, and Marvin Rowe
1995 Dating Pictographs with Radiocarbon. *Radiocarbon* 37:299-310.
- Jackson, A. T.
1938 *Picture-Writing of the Texas Indians*. Anthropological Papers Vol. II, The University of Texas Publication No. 3809, Bureau of Research in the Social Sciences Study No. 27. The University of Texas Publications, Austin, Texas.
- Jones, Bernard M. Jr.
2005 Reflected Images of Power: Shamanic Metaphors in Rock Art. In *Rock Art Papers, Vol. 17*, edited by Ken Hedges, pp. 161-170. San Diego Museum Papers 43, Ken Hedges, series editor, San Diego Museum of Man, San Diego, California.
- Kaiser, David A. and James D. Keyser
2008 Symbolic Superimposition: Overlapping Shield Bearing Warriors at Bear Gulch. In *American Indian Rock Art*, Vol. 34, edited by James D. Keyser, David A. Kaiser, George Poetschat, and Michael W. Taylor, pp. 37-59. American Rock Art Research Association, ARARA Publications, Tucson, Arizona.
- Kelley, J. C.
1950 Atlatls, Bows and Arrows, Pictographs, and the Pecos River Focus. *American Antiquity* 16(1): 71-74.

Keyser, James D.

2001 Relative Dating Methods. In *Handbook of Rock Art Research*, edited by David S. Whitley, 116-138. AltaMira Press, Walnut Creek, California.

2004 *Art of the Warriors: Rock Art of the American Plains*. The University of Utah Press, Salt Lake City, Utah.

Keyser, James D. and Michael A. Klassen

2001 *Plains Indian Rock Art*. University of Washington Press, Seattle.

Kirkland, Forrest

1937 A Study of Indian Pictures in Texas. *Bulletin of the Texas Archeological and Paleontological Society* 9:89-119.

1938 A Description of Texas Pictographs. *Bulletin of the Texas Archeological and Paleontological Society* 10:11-40.

1939 Indian Pictures in the Dry Shelters of Val Verde County, Texas. *Bulletin of the Texas Archeological and Paleontological Society* 11:47-76.

Kirkland, Forrest and W. W. Newcomb

1996 (1967) *The Rock Art of Texas Indians*. University of Texas Press, Austin.

Koenig, Charles

2010 Atlatls in Pecos River Style Rock Art. Paper presented at the 2010 American Rock Art Research Association's Annual Conference, Del Rio, Texas.

Layton, Robert

2001 Ethnographic Study and Symbolic Analysis. In *Handbook of Rock Art Research*, edited by David S. Whitley, 311-331. AltaMira Press, Walnut Creek, California.

Lewis-Williams, J. D.

1972 The Syntax and Function of the Giant's Castle Rock-Paintings. *The South African Archaeological Bulletin* 27(105/106):49-65.

1974 Superpositioning in a Sample of Rock-Paintings from the Barkly East District. *The South African Archaeological Bulletin* 29(115/116):93-103.

Lewis-Williams, J. David

2001 Brainstorming Images: Neuropsychology and Rock Art Research. In *Handbook of Rock Art Research*, edited by David S. Whitley, 332-357. AltaMira Press, Walnut Creek, California.

- Lewis-Williams, J. David
2002 *A Cosmos in Stone: Interpreting Religion and Society Through Rock Art*. AltaMira Press, Walnut Creek, Maryland.
- Lewis-Williams, J. David and Thomas A. Dowson
1988 Signs of All Times: Entoptic Phenomena in Upper Paleolithic Art. *Current Anthropology* 29(2):201-245.
- Llewellyn, Dan
2007 A Short Education on Color, Infrared and Ultraviolet Light.
<http://www.maxmax.com/aVisionFAQ.htm>, accessed January 30, 2008.
- Loubser, Johannes
2001 Management Planning for Conservation. In *Handbook of Rock Art Research*, edited by David S. Whitley, 80-115. AltaMira Press, Walnut Creek, California.
- Mallery, Garrick
1972[1893] *Picture-Writing of the American Indians: with 54 Plates & 1290 Text Illustrations* Volume One. Dover Publications Inc, New York, New York.
- Mark, Robert K., and Evelyn Billo
2002 Application of Digital Image Enhancement in Rock Art Recording. *American Indian Rock Art* 28:121-128.
<http://www.rupestrian.com/Enhancement.pdf>, accessed and printed May 2006 at The Shumla School.
- 2006 Computer-Assisted Documentation of Rock Art: CSIC Thematic Network on Cultural Heritage, Coalition Electronic Newsletter, No. 11, p.10-14
http://www.rupestrian.com/Mark_Billo_2006.pdf, accessed and printed May 2006 at The Shumla School.
- Mayer, Ralph
1981 *The Artist's Handbook of Materials and Techniques, Fourth Edition Revised and Updated*. The Viking Press, New York.
- McDonald, Jo
1998 Shelter Rock-Art in the Sydney Basin-A Space-Time Continuum: Exploring Different Influences on Stylistic Change. In *The Archaeology of Rock-Art*. Edited by Christopher Chippindale and Paul S.C. Tacon, 319-335. Cambridge University Press, Cambridge.
- 2005 Archaic Faces to Headdresses: The Changing Role of Rock Art Across the Arid Zone. In *Desert Peoples: Archaeological Perspectives*. Edited by Peter Veth, Mike Smith, and Peter Hiscock, 116-141. Blackwell Publishing, Malden Massachusetts.

2008 *Dreamtime Superhighway: Sydney Basin Rock Art and Prehistoric Information Exchange*. Terra Australis Series, Number 27. ANU E Press Canberra Australia.

Mowaljarlai, David

1992 Ngarinyin Perspective of Repainting: Mowaljarlai's Statement. In *Retouch: Maintenance and Conservation of Aboriginal Rock Imagery*, No. 5 edited by Graeme K. Ward, 8-9. Australian Rock Art Research Association, Melbourne, Australia.

Palmer, Frederick

1984 *Encyclopaedia of Oil Painting Materials and Techniques*. North Light, Cincinnati, Ohio.

Parsons, Mark L.

1986 Painted Pebbles: Styles and Chronology. In *Ancient Texans: Rock Art and Lifeways Along the Lower Pecos*, compiled by Harry J. Shafer with illustrations by George Strickland and photography by Jim Zintgraff, pp. 180-185. Texas Monthly Press Inc., Austin, Texas.

Pearce, J. E. and A. T. Jackson

1933 *A Prehistoric Rock Shelter in Val Verde County, Texas*. Anthropological Papers Vol. I, No. 3, The University of Texas Bulletin No. 3327, Bureau of Research in the Social Sciences Study No. 6. The University of Texas Publications, Austin, Texas.

Read, Herbert (editor)

1984 *The Thames and Hudson Dictionary of Art and Artists*. Thames and Hudson, London.

Reese, Ronnie Lynn

1994 DNA Studies of the Ancient Paint Binder/Vehicles Used in Lower Pecos Rock Art Pictographs. Unpublished Ph.D. dissertation, Texas A&M University, College Station, Texas.

Rock Art Foundation

2005 Rock Art Foundation. Electronic document, <http://www.rockart.org/index.html>, accessed, October 10, 2007.

Rowe, Marvin W.

2003 Radiocarbon Dating of a Deer Image from the Lower Pecos River Region, Texas. *Bulletin of the Texas Archaeological Society* 74:83-88.

- 2005 Chapter 12: Dating Studies of Prehistoric Pictographs. In *Discovering North American Rock Art*, edited by Lawrence L. Loendorf, Christopher Chippindale, and David S. Whitley, 240-63. University of Arizona Press, Tucson, Arizona.
- 2009 Radiocarbon Dating of Ancient Rock Paintings. *Analytical Chemistry* 81(5):1728-1735.
- Russ, Jon, Russell L. Palma, David H. Loyd, Thomas W. Boutton, and Michael A. Coy
1996 Origin of the Whewellite-Rich Rock Crust in the Lower Pecos Region of Southwest Texas and its Significance to Paleoclimate Reconstructions. *Quaternary Research* 46:27-36.
- Russ, Jon, Warna D. Kaluarachchi, Louise Drummond, and Howell G. M. Edwards
1999 The Nature of a Whewellite-Rich Rock Crust Associated with Pictographs in Southwestern Texas. *Studies in Conservation* 44(2):91-103.
- Russ, Jon, David H. Loyd, and Thomas W. Boutton
2000 A Paleoclimate Reconstruction for Southwestern Texas Using Oxalate Residue from Lichen as a Paleoclimate Proxy. *Quaternary International* 67:29-36.
- Shafer, H. K.
1975 Clay Figurines from the Lower Pecos Region, Texas. *American Antiquity* 40(2):148-158.
- Shafer, Harry J. (author and compiler)
1986 *Ancient Texans: Rock Art and Lifeways Along the Lower Pecos*, with illustrations by George Strickland and photography by Jim Zintgraff. Published for the Whitte Museum of the San Antonio Museum Association, San Antonio, Texas, Georg Zappler, general editor, Texas Monthly Press Inc., Austin, Texas.
- Silver, Constance S.
1985 *The Rock Art of Seminole Canyon State Historical Park: Deterioration and Prospects for Conservation*.
- Smith, Ray
1987 *The Artist's Handbook*. Alfred A. Knopf, New York.
- Taçon, Paul S. C.
2001 Australia. In *Handbook of Rock Art Research*, edited by David S. Whitley, 530-575. AltaMira Press, Walnut Creek, California.
- Taylor, Herbert C., Jr.
1949 A Tentative Cultural Sequence for the Area about the Mouth of the Pecos, *Bulletin of the Texas Archeological and Paleontological Society*, 20:73-88.

Texas Beyond History

2006 Lower Pecos-Rockshelters at College of Liberal Arts, The University of Texas at Austin. Electronic Document, <http://www.texasbeyondhistory.net/pecos/rockshelters.tml>, accessed October 10, 2007.

Turpin, Solveig A.

1982 The Archaeology and Rock Art of Seminole Canyon: A Study in the Lower Pecos River Region of Southwest Texas. Unpublished Ph.D. dissertation, The University of Texas at Austin, Austin, Texas.

1984 Prehistory on the Lower Pecos: An Overview. *Texas Archaeological Research Survey, Report 90*. An unpublished report. Performed pursuant to Contract C3530(70) between the National Park Service and the University of Texas at Austin. University of Texas, Austin, Texas.

1986a Pictographs of the Red Monochrome Style in the Lower Pecos River Region, Texas. *Bulletin of the Texas Archeological Society* 55:123-144.

1986b The Red Monochrome Style and Later Pictographs: The Art of Newcomers to the Lower Pecos. In *Ancient Texans: Rock Art and Lifeways Along the Lower Pecos*, compiled by Harry J. Shafer with illustrations by George Strickland and photography by Jim Zintgraff, pp. 186-189. Texas Monthly Press Inc., Austin, Texas.

1986c Toward a Definition of Style: The Lower Pecos Bold Line Geometrics. *Plains Anthropologist* 31(112):153-161.

1989 The Iconography of Contact: Spanish Influences in the Rock Art of the Middle Rio Grande. In *Columbian Consequences: Archaeological and historical perspectives on the Spanish borderlands West*, Volume 1, edited by David Hurst Thomas, 277-299. Smithsonian Institution Press, Washington, D.C.

1990 Rock Art and Hunter-Gatherer Archaeology: A Case Study from SW Texas and Northern Mexico. *Journal of Field Archaeology* 17(3):263-281.

1991 Shields and Shield Bearers in the Rock Art of the Middle Rio Grande. *La Tierra* 18(2):5-12.

1994a The Were-Cougar Theme in Pecos River-Style Art and Its Implications for Traditional Archaeology. In *New Light on Old Art: Recent Advances in Hunter-Gatherer Rock Art Research*, Monograph 36, edited by David S. Whitley and Lawrence L. Loendorf, 75-80. Institute of Archaeology University of California, with assistance from UCLA Rock Art Archive, Los Angeles, California.

1994b On a Wing and a Prayer: Flight Metaphors in Pecos River Art, in *Shamanism and Rock Art in North America, Special Publication 1*, edited by Solveig Turpin, 73-102. Rock Art Foundation, Inc., San Antonio, Texas with assistance from The University of Texas at Austin, Austin, Texas.

2001 Archaic North America. In *Handbook of Rock Art Research*, edited by David S. Whitley, 361-413. AltaMira Press, Walnut Creek, California.

2004 The Lower Pecos River Region of Texas and Northern Mexico. In *The Prehistory of Texas*, edited by Timothy K. Perttula, 266-280. Texas A&M University Anthropology Series Number 9, D. Gentry Steele, general editor, Texas A&M University Press, College Station, Texas.

Turpin, Solveig A. and Michael W. Davis

1993 The 1989 TAS Field School: Devils River State Natural Area. *Bulletin of the Texas Archeological Society* 61:1-58.

Turpin, Solveig A. and Lisa Middleton

1998 Painted Pebbles from Archaic Contexts in 41VV156, a Rockshelter in the Lower Pecos Region, Val Verde County, Texas. *La Tierra* 25(3):51-54.

Turpin, Solveig A., Richard P. Watson, Sarah Dennett, and Hans Muessig

1979 Stereophotogrammetric Documentation of Exposed Archaeological Features. *Journal of Field Archaeology* 6(3):329-337.

Utemara, Daisy and Patricia Vinnicombe

1992 North-Western Kimberley Belief Systems. In *Rock Art and Ethnography*, No. 5 edited by M. J. Morwood and D.R. Hobbs, 25-26. Australian Rock Art Research Association, Melbourne, Australia.

Valdez, Benjamin, Juan Cobo, Michael Schorr, Roumen Zlatev, and Leonel Cota

2008 Characterisation of Materials and Techniques Used in Mexican Rock Paintings. *Rock Art Research* 25(2):131-135.

Vinnicombe, Patricia

1967 Rock Painting Analysis. *South African Archaeological Bulletin* 22(88):129-141.

1972 Myth, Motive, and Selection in Southern African Rock Art. *Africa: Journal of the International African Institute* 42(3):192-204.

Vinnicombe, Pat

1992 Kimberley Ideology and the Maintenance of Sites. In *Retouch: Maintenance and Conservation of Aboriginal Rock Imagery*, No. 5 edited by Graeme K. Ward, 10-11. Australian Rock Art Research Association, Melbourne, Australia.

Walsh, G. L.

1992 Rock Art Retouch: Can a Claim of Aboriginal Descent Establish Curation Rights Over Humanity's Cultural Heritage? In *Rock Art and Ethnography*, No. 5 edited by M. J. Morwood and D.R. Hobbs, 47-60. Australian Rock Art Research Association, Melbourne, Australia.

Wellmann, Klaus F.

1975 X-Ray Motifs in North American Indian Rock Art. In *American Indian Rock Art: Papers Presented at the 1974 Rock Art Symposium* edited by Shari T. Grove, 137-146. San Juan County Museum Association, Farmington, New Mexico.

1979 A Quantitative Analysis of Superimpositions in the Rock Art of the Coso Range, California. *American Antiquity* 44(3):546-556.

Whitley, David S.

2005 *Introduction to Rock Art Research*. Left Coast Press, Walnut Creek, California.

1998 Finding Rain in the Desert: Landscape, Gender, and Far Western North American Rock-Art. In *The Archaeology of Rock-Art*, edited by Christopher Chippindale and Paul S.C. Taçon, 11-29. Cambridge University Press, Cambridge, United Kingdom.

Wier, Sandra K.

2006 Pecos River Style Rock Art. Unpublished BA thesis, Texas State University, San Marcos.

Wier, Sandra K. and Angel Johnson

2007 Over-Painting and Stylistic Variations in the Pecos River Style Rock Art at Curly Tail Panther. Paper presented at the 78th Annual Meeting of the Texas Archaeological Society, San Antonio, Texas.

Williams, Robin and Gigi Williams

2002 Fluorescence Photography. In *Medical and Scientific Photography: An Online Resource for Doctors, Scientists, and Students*.
http://msp.rmit.edu.au/Article_02/02b.html, accessed February 5, 2008

Yates, Royden and Anthony Manhire

1991 Shamanism and Rock Paintings: Aspects of the Use of Rock Art in the South-Western Cape, South Africa. *South African Archaeological Bulletin* 46(153):3-11.

Zintgraff, Jim and Solveig A. Turpin

1991 *Pecos River Rock Art: A Photographic Essay*. Sandy McPherson, San Antonio, Texas.

VITA

Sandra Kay Wier was born in Tulsa, Oklahoma, the daughter of Joyce Ann Chafee and Myron Landis Wier. After graduation from Monahans High School and starting at Texas State University-San Marcos, she decided to study Anthropology and Art History. After receiving Bachelor of Arts degrees in both disciplines, she applied and was admitted to the Texas State University-San Marcos Masters program in Anthropology.

Permanent Address: 7707 IH35 South

Austin, Texas 78744

This thesis was typed by Sandra K. Wier.

