HUMAN ADAPTATIONS ON CEDAR MESA, SOUTHEASTERN UTAH

June, 1990

R.G. Matson
William D. Lipe
William R. Haase IV
Table of Contents

List of Figures --
List of Tables --
List of Plates --

Chapter I, Introduction I-1, 40
Chapter II, Research Design II-1, 24
Chapter III, Methodology III-1, 76
Chapter IV, Overview of Archaeology IV-1, 20
Chapter V, Basketmaker II; Architecture, Artifacts and Sites. V-1, 141
Chapter VI, The Mossbacks Phase; the Basketmaker III VI-1, 41
Chapter VII, The Pueblo Assemblages VII-1, 118
Chapter VIII, Approach to Settlement Pattern on Cedar Mesa VIII-1, 24

Chapter IX, Grand Gulch Settlement Patterns IX-1, 87
Chapter X, The Mossbacks Settlement Patterns X-1, 35
Chapter XI, Pueblo Settlement Patterns XI-1, 123
Chapter XII, Cedar Mesa Adaptations; change and continuities XII-1, 75

Bibliography 1, 31

Appendix A The Stone Tool typology;
   I: Chipped Stone
   II: Ground Stone

Appendix B The Ceramic Classification

Appendix C The Survey Data;
   Sites by Stone Tool and Ceramic Classifications
# Table of Contents

## Tables

<table>
<thead>
<tr>
<th>Table Number</th>
<th>Table Heading</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-1</td>
<td>Natural Bridges Climatic Information</td>
<td>--</td>
</tr>
<tr>
<td>II</td>
<td>No Tables in Chapter II</td>
<td></td>
</tr>
<tr>
<td>III-1</td>
<td>Drainage Canyon Sampling Summary</td>
<td>III-21,22</td>
</tr>
<tr>
<td>III-2</td>
<td>Comparison of Normal Confidence Intervals with Binomial Intervals</td>
<td>III-41,42</td>
</tr>
<tr>
<td>III-3</td>
<td>Bullet Drainage Summary</td>
<td>III-42,43</td>
</tr>
<tr>
<td>III-4</td>
<td>Comparison of Simulation of 400 meter quadrats with 800 meter quadrat sampling simulation.</td>
<td>III-49,50</td>
</tr>
<tr>
<td>III-5</td>
<td>Upper Grand Gulch 400 meter quadrat simulation</td>
<td>III-4</td>
</tr>
<tr>
<td>III-6</td>
<td>Comparison of Simulation of 400 meter quadrats with 200 meter quadrat samples.</td>
<td>III-53</td>
</tr>
<tr>
<td>III-7</td>
<td>Hypothetical Data Array</td>
<td>III-59</td>
</tr>
<tr>
<td>III-8</td>
<td>Matrix of Jaccard's Distance, A, B, C, and D.</td>
<td>III-60</td>
</tr>
<tr>
<td>III-9</td>
<td>Recalculated Distance Matrix</td>
<td>III-62</td>
</tr>
<tr>
<td>III-10</td>
<td>Hypothetical Data Array, A, B, C, D, E and F.</td>
<td>III-63</td>
</tr>
<tr>
<td>IV-1a</td>
<td>Cedar Mesa Quadrat Site Drainage Summary Statistics</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Cedar Mesa Quadrat Artifact Drainage Summary Statistics</td>
<td>--</td>
</tr>
<tr>
<td>IV-2</td>
<td>Drainage Canyon Survey Summary</td>
<td>--</td>
</tr>
<tr>
<td>IV-3a</td>
<td>Grand Gulch Extension Quadrat Surveys</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Grand Gulch Extension Canyon Inventories</td>
<td>--</td>
</tr>
<tr>
<td>V-1</td>
<td>Basketmaker II Feature Tabulation</td>
<td>--</td>
</tr>
<tr>
<td>V-2</td>
<td>Condensed Artifact List for Basketmaker II Q-Mode</td>
<td>--</td>
</tr>
<tr>
<td>V-3</td>
<td>Cedar Mesa Basketmaker II Radiocarbon Dates</td>
<td>--</td>
</tr>
<tr>
<td>V-4</td>
<td>Cedar Mesa Basketmaker II Tree-ring Dates</td>
<td>--</td>
</tr>
<tr>
<td>V-5</td>
<td>Black Mesa Basketmaker Radiocarbon Dates</td>
<td>--</td>
</tr>
</tbody>
</table>
Matson, Lipe and Haase, Tables - ii

V-6 Twenty-nine Tool types used in R-Mod Analysis

V-7 Occurrence of Artifact Types in Basketmaker II Sites

V-8 Grand Gulch Pithouse Artifact Frequencies

V-9 Ward's Method Unstandardized Distance

V-10 Comparison of Unstandardized Cluster Analyses

V-11 Farthest Neighbor, Unstandardized Distance, Median Values.

V-12 Comparison between Farthest Neighbor and Ward's Cluster Analyses.

V-13 Farthest Neighbor, Standardized Distance, Median Values.

V-14 Comparison of Clusters

V-15 Final Basketmaker II Site Classes

V-16 Multicomponent Basketmaker II site Classification V-104

V-17 Final Basketmaker II Site Totals V-105

V-18 Debitage Classes

V-19 Bifaces and Bifacial Resharpening Flakes

VI-1 Mossbacks Tree-ring Dates.

VI-2 Basketmaker III Components

VI-3 Distribution and Abundance of Mossbacks Artifact Types.

VI-4 Classes used in Preliminary R-mode Analysis

VI-5 Artifact Classes used in Q-mode Mossbacks Analysis

VI-6 Summary Statistics of Farthest Neighbor Q-mode Cluster Analysis

VI-7 Summary Statistics of Ward's Q-mode Cluster Analysis

VI-8 Comparison of Ward's and Farthest Neighbor
Matson, Lipe and Haase, Tables - ii

VI-9  Baskerntaker III Feature Summary
VI-10 Lithic Debitage in Farthest Neighbor Clusters
VI-11 Debitage in "Known" site Classes
VI-12 Final Mossbacks Site Classification
VII-1 Pottery Types used in Seriation
VII-2 Ceramic Data for Redhouse Phase (Group I) Sites
VII-3 Ceramic Data for Woodenshoe Phase (Group II) Sites
VII-4 Ceramic Data for Windgate Phase (Group III) Sites
VII-5 Ceramic Data for Clay Hills Phase (Group IV) Sites
VII-6 Comparison of Groups III(Windgate) and IV( Clay Hills)
VII-7 Comparison of Woodenshoe and Clay Hills
VII-8 Comparison of Redhouse and Woodenshoe
VII-9 Comparison of Windgate and Woodenshoe
VII-10 Comparison of Vector 2 rank of Clay Hills with time sensitive ceramics.
VII-11 Comparison of Early Clay Hills with Late Windgate
VII-12 Comparison of Early Woodenshoe (Group II)
with Late Clay Hills (Group IV)
VII-13 Ceramic Variables used in Discriminant Analysis.
VII-14 Results of Discriminant Analysis on 47 seriation sites
VII-15 Classification of 32 Pueblo Assemblages
VII-16 Placement of Non-seriated sites by Discriminant Analysis
VII-17 Classification of 22 Canyon site using Discriminant Analysis
VII-18 Tree-ring Dates Relevant to Pueblo Phases
VII-19 Distribution and Abundance of Pueblo Artifact Types
Matson, Lipe and Haase, Tables - iv

VII-20  Artifacts used in Pueblo Preliminary R-mode Analysis --
VII-21  Condensed Q-mode Tool Types --
VII-22  Summary of Farthest Neighbor Pueblo Clusters --
VII-23  Pueblo Architecture, Large Sites --
VII-24  Cluster V versus Overall Lithic Technology --
VII-25  Temporal Affiliation of Clusters and Dimension --
VII-26  Pueblo Architecture, Small Sites --
VII-27  Comparison of Small L.A. Sites with Large Pueblo Sites --
VII-28  Comparison of Debitage between Small L.A. Sites and Large Pueblo sites. --
VII-29  Pueblo Sites without Lithics --
VII-30  Sites with Mixed Pueblo Components --
VII-31  Pueblo Sites with Basketmaker II Components --
VII-32  Pueblo Sites with Basketmaker III Components --
VII-33  Summary of Pueblo Quadrat Site Classification --
VII-34  Pueblo Drainage Canyon Sites --

VIII  No Tables in Chapter VIII

IX-1  Quadrat Elevations Population Parameters, Grand Gulch Phase site classes --
IX-2  Differences in Dispersions of Elevations between Habitation and Nonhabitation quadrats --
IX-3  Differences in Dispersions of Elevations Between Limited Activity and Habitation quadrats --
IX-4  Elevation and Percent Dense P.-J. Coverage of Campsite Quadrats. --
IX-5  Fit of Poisson Distribution with Habitation Quadrat Distribution --
IX-6  Fit of Negative Binomial Distribution with Habitation Quadrat Distribution
IX-7  Fit of Poisson Distribution with 200 meter Quadrats (Habitation sites)
IX-8  Fit of Negative Binomial Distribution with 200 meter Quadrats (Habitation sites)
X-1   Basketmaker III Dwellings
X-2   Quadrats by Number of Habitation sites
X-3   Quadrats by Number of Inferred Dwellings
X-4   Fit of Poisson Distribution with Basketmaker III Dwelling Distribution
X-5   Fit Negative Binomial Distribution with Basketmaker III Dwelling Distribution
XI-1  Distance to Canyons, Habitation Sites
XI-2  Special Purpose L.A. Pueblo Sites
XI-3  Distribution of Pueblo Sites
XI-4  Rank of Watershed Divide Nearest to Sites
XI-5  Number of Features on Pueblo Field Stations
XI-6  Distance from Nearest known Contemporary Habitation site by number of Features
XI-7  Drainage Tree-Ring Dates
XI-8  Drainage Quadrats, Pueblo Habitation sites
XI-9  Distribution of Pueblo Habitation sites per Quadrat
XI-10 Clusters of Habitation sites
XI-11 Pueblo Habitation Quadrats compared with Poisson distribution
XI-12 Pueblo Habitation Quadrats compared with Negative Binomial Distribution
XII No Tables in Chapter XII
Matson, Lipe and Haase -- Figures - i

**Figure Headings**

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Heading</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-1</td>
<td>Location of Cedar Mesa and Surroundings</td>
<td>--</td>
</tr>
<tr>
<td>I-2</td>
<td>Cedar Mesa Drainages</td>
<td>--</td>
</tr>
<tr>
<td>I-3</td>
<td>West to East Transect Across Cedar Mesa</td>
<td>--</td>
</tr>
<tr>
<td>I-4</td>
<td>Climatic Summary for Natural Bridges</td>
<td>--</td>
</tr>
<tr>
<td>I-5</td>
<td>Length of Droughts</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>a) Spring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Fall</td>
<td></td>
</tr>
<tr>
<td>I-6</td>
<td>Monsoon</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>a) Date of Inception</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Amount of Precipitation</td>
<td></td>
</tr>
<tr>
<td>I-7</td>
<td>Growing Season</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>a) Date of Last Frost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Date of First Frost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Growing Season Length</td>
<td></td>
</tr>
<tr>
<td>I-8</td>
<td>Walter Climatic Diagram for Natural Bridges</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>a) Number of years of observation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Elevation (Meters)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Mean annual temperature ($^\circ$C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d) Mean annual Precipitation (mm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e) Humid period (Mean temperature above $0^\circ$C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f) Arid period</td>
<td></td>
</tr>
<tr>
<td></td>
<td>g) Months with mean daily temperature below $0^\circ$C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>h) Months with minimum temperature below $0^\circ$C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i) Months with minimum temperature above $0^\circ$C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>j) Humid period with mean temperature below $0^\circ$C</td>
<td></td>
</tr>
<tr>
<td>I-9</td>
<td>Walter Climatic Diagrams for Mesa Verde and Betakim</td>
<td>--</td>
</tr>
</tbody>
</table>

No Figures in Chapter II, Methodology

<table>
<thead>
<tr>
<th>III-1</th>
<th>Setting of Springs with Respect to Canyons and Mesa top --</th>
</tr>
</thead>
<tbody>
<tr>
<td>III-2</td>
<td>Cedar Mesa Sample; Sampled Drainages and Quadrats --</td>
</tr>
<tr>
<td>III-3</td>
<td>&quot;Typical&quot; Site Map.</td>
</tr>
<tr>
<td></td>
<td>a) Large Scale Site Map</td>
</tr>
<tr>
<td></td>
<td>b) Feature Map</td>
</tr>
<tr>
<td>III-4</td>
<td>Cultural Form</td>
</tr>
<tr>
<td>III-5</td>
<td>Botanical Form</td>
</tr>
<tr>
<td>III-6</td>
<td>Physiographic Form</td>
</tr>
<tr>
<td>III-7</td>
<td>Canyon Inventory</td>
</tr>
<tr>
<td></td>
<td>a) Form, Page 1</td>
</tr>
<tr>
<td></td>
<td>b) Form, Page 2, with sample sketch</td>
</tr>
<tr>
<td>III-8</td>
<td>Water Resources Survey Form</td>
</tr>
<tr>
<td>IV-1</td>
<td>Areas surveyed, including Slickhorn and Pine-Dripping Springs drainages</td>
</tr>
<tr>
<td>IV-2</td>
<td>Sites per Drainage</td>
</tr>
<tr>
<td>IV-3</td>
<td>Artifacts per Quadrat per Drainage (Log. Scale)</td>
</tr>
<tr>
<td></td>
<td>a) Logarithmic Scale</td>
</tr>
<tr>
<td></td>
<td>b) Arithmatic Scale</td>
</tr>
<tr>
<td>IV-4</td>
<td>Archaeological remains by Elevation (Five Drainages)</td>
</tr>
<tr>
<td></td>
<td>a) Number of sites</td>
</tr>
<tr>
<td></td>
<td>b) Number of Artifacts</td>
</tr>
<tr>
<td>IV-5</td>
<td>Basketmaker II Sites per Quadrat</td>
</tr>
<tr>
<td>IV-6</td>
<td>Basketmaker II Artifacts per Quadrat</td>
</tr>
<tr>
<td>IV-7</td>
<td>Basketmaker II Artifacts by Elevation</td>
</tr>
<tr>
<td>IV-8</td>
<td>Basketmaker III sites by Drainage</td>
</tr>
<tr>
<td>IV-9</td>
<td>Basketmaker III sites by Transect</td>
</tr>
<tr>
<td>IV-10</td>
<td>Basketmaker III sites by Elevation</td>
</tr>
<tr>
<td>IV-11</td>
<td>Basketmaker III Artifacts by Transect</td>
</tr>
<tr>
<td>IV-12</td>
<td>Pueblo Sites by Drainages</td>
</tr>
<tr>
<td>IV-13</td>
<td>Pueblo Artifacts by Drainages</td>
</tr>
<tr>
<td>IV-14</td>
<td>Pueblo Sites by Transect</td>
</tr>
<tr>
<td>IV-15</td>
<td>Pueblo Artifacts by Transect</td>
</tr>
<tr>
<td>V-1</td>
<td>Marsh Pass, Monument Valley and Red Rock Plateau Locations</td>
</tr>
<tr>
<td>V-2</td>
<td>Red Rock Plateau Basketmaker II Sites</td>
</tr>
</tbody>
</table>
Matson, Lipe and Haase—Figures—iii

V-3 Basketmaker II Pithouse Architecture

V-4 Site Map of Bullet 4-2; Basketmaker II Pithouse site

V-5 Occurrences of 16 Artifact Types on 96 "Large"
Basketmaker II sites; Medians and Interquartile Ranges

V-6 Occurrences of 16 Artifact Types on 22 small
Basketmaker II sites; Median and Interquartile Ranges

V-7 Occurrences of 16 Artifact Types on 22 small and 96
"Large" sites; Means.

V-8 Cedar Mesa Basketmaker II Projectile Points

V-9 Basketmaker II R-Mode Analysis; Farthest Neighbor
Cluster Analysis using Spearman Correlations Distances

V-10 Basketmaker II R-Mode Analysis; Multidimensional scaling
Dimensions 1 (17% of trace) and 2 (14% of trace);
Spearman Correlations Distances

V-11 Basketmaker II R-Mode Analysis; Multidimensional scaling
Dimension 3 (10% of trace) and 4 (9%)

V-12 Basketmaker II R-Mode Analysis; Farthest Neighbor
Cluster Analysis using Pearson Correlation Coefficients

V-13 Basketmaker II R-Mode Analysis; Principal Components
Analysis; Components 1 and 2

V-14 Frequencies of 16 Artifact types on 8 Grand Gulch
Pithouse sites

V-15 Basketmaker II Q-Mode Analysis; Ward’s Cluster Analysis
Unstandardized Distance; Summary of Artifacts

V-16 Basketmaker II Q-Mode Analysis; Farthest Neighbor
Cluster Analysis, Unstandardized Distance; Summary

V-17 Basketmaker II Q-Mode Cluster Analysis Dendrograms
a) Ward’s Unstandardized Distance
b) Farthest Neighbor, Unstandardized Distance
c) Farthest Neighbor, Standardized Distance

V-18 Basketmaker II Q-Mode Analysis; Farthest Neighbor
Cluster Analysis, Standardized Distance; Artifact Summary

V-19 Final R-Mode Analysis; Farthest Neighbor Dendrogram

V-20 Final R-Mode Analysis; Ward’s Dendrogram
Final R-Mode Analysis; Multidimensional Scaling; Dimensions 1 and 2 (44% of trace) --

Final R-Mode Analysis; Multidimensional Scaling; Dimensions 3 and 4 (24% of trace) --

Q-Mode, Multidimensional Scaling; Dimensions 1 and 2 (47% of trace) --

Dimension 1, Q-Mode; Artifact Summary --

Dimension 2, Q-Mode; Artifact Summary --

Upper Right Hand Quadrant of Dimensions 1 and 2; Q-Mode Artifact and Feature Summary --

Lower Left Hand Quadrant of Dimensions 1 and 2; Q-Mode Artifact and Feature Summary --

Q-Mode, Multidimensional Scaling; Dimension 3 and 4 (24% of trace) --

Dimension 3, Q-Mode; Artifact Summary --

Dimension 4, Q-Mode; Artifact Summary --

Debitage Distributions; 96 "large" and 22 small sites --

Debitage Distributions; Final Site Classes --

Distribution of 16 Artifact Types, 96 "Large" sites; Medians and Interquartile Ranges --

Distribution of 16 Artifact Types, 22 Small sites; Medians and Interquartile Ranges --

Distribution of 16 Artifact Types, 22 Small and 96 "Large" sites; Means --

Hammerstone and Ground Stone Proportions by Site Size --

Complete and Fragmentary Hammerstone Proportions by Site Size --

Hammerstone and Mano Proportions by Site Size --

Complete and Fragmentary Hammerstone Proportions by Site Size --

Pebble Hammerstones Proportions by Site Size --

Metate Proportions by Site Size --
Matson, Lipe and Haase-- Figures - v

V-42 Flake Scraper Proportions by Site Size

V-43 Sandstone Hearths by Site Size
   a) "Raw" counts per site
   b) Total hearths divided by total assemblage per class

V-44 Ash Hearth by Site Size
   a) "Raw" counts per site
   b) Total hearths divided by total assemblage per class

V-45 Proportions of Sites without Facilities
   a) Irregular and Pebble Hammerstones
   b) Manos and Metates
   c) Flake Scrapers

V-46 Proportions of Sites with only Ash Hearths
   a) Irregular and Pebble Hammerstones
   b) Manos and Metates
   c) Flake Scrapers

V-47 Proportions of Sites with Slab Hearths
   a) Irregular and Pebble Hammerstones
   b) Manos and Metates
   c) Flake Scrapers

V-48 Proportions of sites with Sandstone Slab Cists
   a) Irregular and Pebble Hammerstones
   b) Manos and Metates
   c) Flake Scrapers

V-49 Proportions of sites with Pithouses
   a) Irregular and Pebble Hammerstones
   b) Manos and Metates
   c) Flake Scrapers

V-50 Flake Scrapers and Assemblage Size by Facility Site Class

V-51 Core and Ground Stone Tools by Facility Site Class
   a) Irregular and Pebble Hammerstones
   b) Manos and Metates

V-52 Final Tabulation of 16 Artifact Types and Features by Final Site Classes.
   a) 16 Artifact Classes
   b) Feature Classes CHRS
VI-1  Farthest Neighbor R-Mode Cluster Analysis Dendrogram

VI-2  R-Mode Multidimensional Scaling; Dimensions 1 (30 % of trace) and 2 (23 % of trace)

VI-3  R-Mode Multidimensional Scaling; Dimensions 3 (19 % of trace) and 4 (18 % of trace)

VI-4  Comparison of Basketmaker II and III Assemblages; Percent of total tools; Tools classes, Debitage categories; Tool types

VI-5  Small Basketmaker III Assemblages (Sum of tools less than 11); Medians and Interquartile Ranges; Means (n=11)

VI-6  Large Basketmaker III Assemblages (Sum of tools greater than 11); Medians and Interquartile Ranges; Means (n=23)

VI-7  Comparison of Basketmaker II and III Assemblages; 16 Types; Means; Both Large and Small sites

VI-8  Comparison of Basketmaker II and III Large Site Assemblages; 16 Types; Medians and Interquartile Ranges;

VI-9  Artifact Abundances on Basketmaker III Pithouse sites; Medians and Interquartile Ranges; Means

VI-10 Farthest Neighbor Q-Mode Cluster Analysis Dendrogram (Unstandardized Distance)

VI-11 Farthest Neighbor Q-Mode Cluster Analysis Artifact Summaries

VI-12 Ward’s Q-Mode Cluster Analysis Dendrogram (Unstandardized Distance)

VI-13 Q-Mode Multidimensional Scaling; Dimensions 1 and 2 (71 % of total pairwise distance)

VI-14 R-Mode Multidimensional Scaling; Dimensions 1 and 2 (75 % of total pairwise distance)

VI-15 Q-Mode Multidimensional Scaling; Dimensions 3 and 4 (16 % of total pairwise distance)

VI-16 R-Mode Multidimensional Scaling; Dimensions 3 and 4 (23 % of total pairwise distance)
Matson, Lipe and Haase -- Figures - vii

VI-17 Distribution of Lithic Debitage Categories
   a) Farthest Neighbor Clusters
   b) Limited Activity and Habitation sites

VI-18 Final Tabulation of 16 Artifact Types and Features;
      Final Mossbacks Site Classes
      a) 16 Artifact Types
      b) Features

VII-1 Seriation of 47 Pueblo sites; Multidimensional
       Scaling; Dimensions 1 and 2 (73 % of trace);
       14 decorated types

VII-2 Farthest Neighbor Cluster Analysis of Dimensions
       1 and 2 of VII-1

VII-3 R-Mode Analysis of 14 decorated types; Farthest
       Neighbor of Spearman Distances

VII-4 R-Mode Analysis of 14 decorated types; Non-Metric
       Multidimensional Scaling; Spearman Distances;
       Two dimensional solutions; 10.6% Kruskal Stress

VII-5 R-Mode Analysis of 14 decorated types; Metric
       Multidimensional Scaling; Spearman Distances;
       Dimensions 1 and 2; 71 % of trace

VII-6 Q-Mode Analysis of 22 Pueblo sites using 7 Kayenta
       pottery types. Metric Multidimensional Scaling;
       Dimensions 1 and 2; 65 % of trace

VII-7 Q-Mode Analysis of 42 Pueblo sites using 6 Mesa Verde
       pottery types. Metric Multidimensional Scaling;
       Dimensions 1 and 2; 91 % of trace

VII-8 Quadrat Red House Phase Ceramic Assemblages

VII-9 Canyon Red House Phase Ceramic Assemblages

VII-10 Comparison of Corrugated Pottery between Quadrat
       Red House and Canyon Red House Sites

VII-11 Changes in Corrugated Pottery through time

VII-12 Q-Mode Metric Multidimensional Scaling of Original 47
       sites plus Drainage Canyon sites using 14 Decorated
       types. Dimensions 1 and 2; 79 % of trace

VII-13 Distributions of total lithic tools on Pueblo sites
<table>
<thead>
<tr>
<th>VII-14</th>
<th>Comparison of Basketmaker II, III and Pueblo Lithic tool distributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>VII-15</td>
<td>Comparison of Basketmaker II, III and Pueblo Lithic Debitage distributions------------------------</td>
</tr>
<tr>
<td>VII-16</td>
<td>Farthest Neighbor R-Mode Cluster Analysis of Pueblo sites Dendrogram; Spearman Distance-----------</td>
</tr>
<tr>
<td>VII-17</td>
<td>Ward’s R-Mode Cluster Analysis of Pueblo site Dendrogram; Spearman distance----------------------</td>
</tr>
<tr>
<td>VII-18</td>
<td>Multidimensional Scaling R-Mode Analysis of Pueblo sites; Spearman Distance; Dimensions 1 and 2; 56 % of the total pairwise distance----------</td>
</tr>
<tr>
<td>VII-19</td>
<td>Farthest Neighbor Q-Mode Analysis of Pueblo Sites Dendrogram-------------------------------------</td>
</tr>
<tr>
<td>VII-20</td>
<td>Artifact Summary of Farthest Neighbor Q-Mode Cluster Analysis-------------------------------------</td>
</tr>
<tr>
<td>VII-21</td>
<td>Multidimensional Scaling Q-Mode Analysis of Pueblo sites; Dimensions 1 and 2; 67 % of total pairwise distance-----------------------------</td>
</tr>
<tr>
<td>VII-22</td>
<td>Final R-Mode Farthest Neighbor Cluster Analysis Dendrogram; Spearman distance----------------------</td>
</tr>
<tr>
<td>VII-23</td>
<td>Final R-Mode Ward’s Cluster Analysis Dendrogram; Spearman distance------------------------------</td>
</tr>
<tr>
<td>VII-24</td>
<td>Final R-Mode Multidimensional Scaling; Dimensions 1 and 2; 61 % of total pairwise distance; Spearman distance-----------------------------</td>
</tr>
<tr>
<td>VII-25</td>
<td>Final R-Mode Multidimensional Scaling; Dimensions 3 and 4; 20 % of total pairwise distance; Spearman distance-----------------------------</td>
</tr>
<tr>
<td>VII-26</td>
<td>Multidimensional Scaling Q-Mode Analysis of Pueblo sites; Dimensions 3 and 4; 15 % of total pairwise distance-----------------------------</td>
</tr>
<tr>
<td>VII-27</td>
<td>Final Tabulation of 16 Lithic types on Small and Large Pueblo Sites-------------------------------</td>
</tr>
<tr>
<td>VII-28</td>
<td>Final Tabulation of Lithic Debitage Classes on Large and Small Pueblo Sites---------------------</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>IX-1</td>
<td>Elevation of Quadrats with Grand Gulch Habitation sites and those without</td>
</tr>
<tr>
<td>IX-2</td>
<td>Total Grand Gulch Tools Per Quadrat Plotted against Elevation</td>
</tr>
<tr>
<td>IX-3</td>
<td>Amount of Quadrats covered by Dense Pinyon-Juniper; All Quadrats; Quadrats with Grand Gulch Habitation site; Quadrats without</td>
</tr>
<tr>
<td>IX-4</td>
<td>Reconstruction of n-dimensional Hypervolume niche space by Multidimensional Scaling; Dimensions 1 and 2; 65.5% of trace; City Block Unstandardized Distance; Percent of cover by plant communities and Slickrock; Quadrats with Grand Gulch Habitation sites indicated</td>
</tr>
<tr>
<td>IX-5</td>
<td>Reconstruction of n-dimensional Hypervolume niche space by Multidimensional Scaling; Dimensions 3 and 4; 23.6% of trace; Same basis as Figure IX-4</td>
</tr>
<tr>
<td>IX-6</td>
<td>Hypervolume; Dimensions 1 and 2; Coded for Grand Gulch Limited Activity sites; Same plot as IX-4</td>
</tr>
<tr>
<td>IX-7</td>
<td>Hypervolume; Dimensions 3 and 4; Coded for Grand Gulch Limited Activity sites; Same plot as IX-5</td>
</tr>
<tr>
<td>IX-8</td>
<td>Distance from 50m Canyon Rims; Grand Gulch Habitation and Non-Habitation Quadrats</td>
</tr>
<tr>
<td>IX-9</td>
<td>Plot of Quadrats by Elevation and Distance from 50m Canyon Rims; Quadrats coded for Grand Gulch Habitation sites present, No Grand Gulch Habitation site but Limited Activity Sites Present, and No Grand Gulch Site Present</td>
</tr>
<tr>
<td>IX-10</td>
<td>Hypervolume; Dimensions 1 and 2; Coded for Limited Activity Sites Groups 0 and 1; Same plot as IX-4</td>
</tr>
<tr>
<td>IX-11</td>
<td>Hypervolume: Dimensions 3 and 4; Coded for Limited Activity Sites Groups 0 and 1; Same plot as IX-4</td>
</tr>
<tr>
<td>IX-12</td>
<td>Hypothetical Relationships between Limited Activity and Habitation sites; Group 0 and 1 L.A.S.; Group 2 Campsites</td>
</tr>
<tr>
<td>IX-13</td>
<td>Elevations of Grand Gulch Limited Activity Quadrats; Group 0 and 1; Group 2 Campsites</td>
</tr>
</tbody>
</table>
Matson, Lipe and Haase-- Figures - x

IX-14 Hypervolume; Dimensions 1 and 2; Coded for Grand Gulch Group 2 Campsites; Same plot as IX-4

IX-15 Hypervolume; Dimensions 3 and 4; Coded for Grand Gulch Group 2 Campsites; Same plot as IX-5

IX-16 Grand Gulch Group 2 Campsite Quadrat Elevation; "Hunting" versus "Vegetable Processing" Campsites

IX-17 Grand Gulch Group 2 Campsite Quadrat Dense Pinyon-Juniper Coverage; "Hunting" versus "Vegetable Processing" Campsites

IX-18 Number of Grand Gulch Habitation sites per Quadrat

IX-19 Total Number of Grand Gulch Habitation per Quadrat size class

IX-20 Rose Diagram showing exposures of Grand Gulch Habitation Sites

IX-21 Rose Diagram of Grand Gulch Pithouse Sites

IX-22 Rose Diagram of all 76 Quadrats

IX-23 Rose Diagram of Grand Gulch Limited Activity Sites

IX-24 Rose Diagram of Grand Gulch Limited Activity Sites
   a) Limited Activity Quadrats between 6190 and 6540 ft
   b) Limited Activity Quadrats with greater than 50% dense Pinyon-Juniper coverage

IX-25 Rose Diagram of Grand Gulch Group 2 Campsites

IX-26 Rose Diagram of Grand Gulch Group 2 Campsites
   a) "Vegetable Processing" Campsites
   b) "Hunting" Campsites

IX-27 Possible explanation of fields and related field station exposures.

IX-28 Grand Gulch Population on Cedar Mesa; Population by Pithouse House Life; Assuming all Habitation sites have Pithouses Present

IX-29 Grand Gulch Population on Cedar Mesa; Population by Pithouse House Life; Assuming only Pithouses Identified in the Field Exist
Matson, Lipe and Haase-- Figures - xi

X-1 Mosbacks Quadrat Elevations; All Quadrats; Quadrats with Mosbacks Habitation sites; Quadrats with Limited Activity sites
X-2 Mosbacks Locations; Quadrats with Habitations sites; Quadrats with Limited Activity sites
X-3 Mosbacks Quadrats Coverage with Dense Pinyon-Juniper; All Quadrats; Quadrats with Habitation sites; Quadrats with Limited Activity Sites
X-4 Hypervolume; Dimension 1 and 2; Mosbacks Habitation Quadrats; Same plot of IX-4
X-5 Hypervolume; Dimension 3 and 4; Mosbacks Habitation Quadrats; Same plot of IX-5
X-6 Hypervolume; Dimension 1 and 2; Mosbacks Limited Activity Quadrats; Same plot of IX-4
X-7 Hypervolume; Dimension 3 and 4; Mosbacks Limited Activity Quadrats; Same plot of IX-4
X-8 Rose Diagram for Mosbacks Habitation Sites
X-9 Rose Diagram for Mosbacks Limited Activity Sites
X-10 Number of Habitation Sites per Quadrat
X-11 Number of Dwelling per Quadrat
X-12 Cedar Mesa Mosbacks Population; Population by Pithouse House Life

XI-1 Pueblo Quadrat Elevations; All Quadrats; Quadrats with Pueblo Habitation sites; Quadrats with Limited Activity sites
XI-2 Pueblo Site Locations; Quadrats with Habitations sites; Quadrats with Limited Activity sites
XI-3 Pueblo Quadrats Coverage with Dense Pinyon-Juniper; All Quadrats; Quadrats with Habitation sites; Quadrats with Limited Activity Sites
XI-4 Hypervolume; Dimension 1 and 2; Pueblo Habitation Quadrats; Same plot as IX-4
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XI-5</td>
<td>Hypervolume; Dimension 3 and 4; Pueblo Habitation Quadrats; Same plot as IX-5</td>
</tr>
<tr>
<td>XI-6</td>
<td>Hypervolume; Dimension 1 and 2; Pueblo Limited Activity Quadrats; Same plot as IX-4</td>
</tr>
<tr>
<td>XI-7</td>
<td>Hypervolume; Dimension 3 and 4; Pueblo Limited Activity Quadrats; Same plot as IX-4</td>
</tr>
<tr>
<td>XI-8</td>
<td>Elevations of Pueblo Habitation Quadrat; 10 Quadrats with most Material; 25 remaining quadrats</td>
</tr>
<tr>
<td>XI-9</td>
<td>Rose Diagram of Pueblo sites; Random Points; Field Stations; Habitation sites</td>
</tr>
<tr>
<td>XI-10</td>
<td>Pueblo Sites Distances from Known Water Sources; Random Points; Habitation Sites; Field Stations</td>
</tr>
<tr>
<td>XI-11</td>
<td>Pueblo Sites Distances from Water Courses; Random Points; Habitation Sites; Field Stations</td>
</tr>
<tr>
<td>XI-12</td>
<td>Pueblo Sites Distances from Divides; Random Points; Habitation Sites; Field Stations</td>
</tr>
<tr>
<td>XI-13</td>
<td>Limited Activity Sites with Facilities by Distance from Nearest Known Contemporary Habitation site</td>
</tr>
<tr>
<td>XI-14</td>
<td>Location of Horse Flats relative to Cedar Mesa</td>
</tr>
<tr>
<td>XI-15</td>
<td>Distance to Water Source; Pueblo Habitations; Early/Late Phases; Field Stations</td>
</tr>
<tr>
<td>XI-16</td>
<td>Dense Pinyon-Juniper Coverage Red House versus other Pueblo Phases; Habitation Quadrats</td>
</tr>
<tr>
<td>XI-17</td>
<td>East/West Location of Pueblo and Basketmaker III Sites; Post-Windgate Phase; Windgate Phase; Basketmaker III Quadrats</td>
</tr>
<tr>
<td>XI-18</td>
<td>Number of Pueblo Habitation Sites per Quadrat</td>
</tr>
<tr>
<td>XI-19</td>
<td>Total Number of Pueblo Habitation Sites per Quadrat Size Class</td>
</tr>
</tbody>
</table>
| XI-20 | Pueblo Habitation Site Cluster Distribution  
  a) Habitation sites per Cluster  
  b) Total Number of Habitation sites per Cluster Size Class |
XI-21  Cedar Mesa Pueblo Population; Considering Small
       and Large Sites to be Occupied for the same Duration;
       By House Life; Large sites having a mean of 15 people

XI-22  Cedar Mesa Pueblo Population; Considering Small
       and Large Sites to be Occupied for different Durations;
       By House Life, with Large Sites being occupied twice
       as long as Small Sites; Large Sites having a mean of
       15 people

XI-23  Cedar Mesa Pueblo Population; Considering Small
       and Large Sites to be Occupied for the same Duration;
       By House Life; Large sites having a mean of 10 people

XI-24  Cedar Mesa Pueblo Population; Considering Small
       and Large Sites to be Occupied for different Durations;
       By House Life, with Large Sites being occupied twice
       as long as Small Sites; Large Sites having a mean of
       10 people

XII-1  Elevations of Habitation Quadrats; Grand Gulch;
       Mossbacks; Pueblo

XII-2  Elevations of Limited Activity Quadrats; All Quadrats;
       Grand Gulch; Mossbacks; Pueblo

XII-3  Dense Pinyon-Juniper Coverage of Limited Activity
       Quadrats; All Quadrats; Grand Gulch; Mossbacks; Pueblo

XII-4  Dense Pinyon-Juniper Coverage of Habitation Quadrats;
       Grand Gulch; Mossbacks Pueblo

XII-5  Dense Pinyon-Juniper Coverage of Red House Versus
       other Pueblo Phases

XII-6  Cedar Mesa and Red Rock Plateau Occupation sequences;
       Occupation Periods and Hiatuses

XII-7  Location of White Canyon (Natural Bridges N.M.);
       Cedar Mesa; Westwater Ruin and Black Mesa Coal Lease
       Area

XII-8  Anasazi Sequence from Berry (1982: Figure 12)
       a) From Jennings 1974:38
       b) From Guummerman and Euler 1976
       c) Developed in Berry 1982

XII-9  Comparison of Cedar Mesa, Red Rock Plateau and Berry's
       Anasazi Sequence
<table>
<thead>
<tr>
<th>Plate No.</th>
<th>Heading</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-1</td>
<td>Cedar Mesa Basketmaker II Corner Notched Projectile Points</td>
<td>--</td>
</tr>
<tr>
<td>V-2</td>
<td>Cedar Mesa Basketmaker II Corner Notched Projectile Points</td>
<td>--</td>
</tr>
<tr>
<td>V-3</td>
<td>Cedar Mesa Basketmaker II Side Notched Projectile Points</td>
<td>--</td>
</tr>
<tr>
<td>V-4</td>
<td>Cedar Mesa Basketmaker II Shallow Side-Notched Projectile Points (Type 22)</td>
<td>--</td>
</tr>
<tr>
<td>V-5</td>
<td>Cedar Mesa Archaic Points</td>
<td>--</td>
</tr>
</tbody>
</table>