The Dolores Legacy: A User's Guide to the Dolores Archaeological Program Data

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Editor's Preface

This volume is an experiment. It is part of a search for a model user's guide for archaeological databases. As with most early experiments, it is likely that there is much that could be improved. Possibly some things are done better than most readers might have expected. We have worked hard to make an old data set available, and we now need your help in improving this initial effort. You are holding in your hands one of only about 50 volumes of this user's guide that we are distributing to potentially interested readers. Please read through the text, work with the data on the CD-ROM, and then tell us what needs improvement and where we might be wrong. We need comments by approximately December 1999 if they are to be incorporated into a revised version of this guide.

Please excuse the rough quality of the figures and the text reproduction. Until we get comments on the present version, we have focused on producing an accurate, rather than a pretty, text. Figures are simple xerox copies and are at the end of the appropriate section. If you have suggestions on other figures that are needed, please offer these comments as well.

Send comments to Richard Wilshusen, University Museum, University of Colorado, Boulder, CO 80309-0218. You can also send comments via email to rhw@indra.com. All comments will be appreciated, but constructive comments are especially welcomed. If you are interested in reproducing or citing the manuscript in a research context, please feel free to contact us at the above address.

Richard H. Wilshusen
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This project was paid for in part by a State Historical Fund grant from the Colorado Historical Society. There is no way that this project could have occurred without this grant. We are most grateful for the Society's support of this endeavor and for all the aid their staff has offered us as we have labored on this project.

LouAnn Jacobson (Bureau of Land Management, Anasazi Heritage Center) and Stephen Lekson (University of Colorado) wrote the project grant proposal and helped oversee the two main aspects of the Dolores Database Project. At the University of Colorado (CU) Richard Wilshusen and a class of graduate student contributors wrote the user's guide and pulled together the data on the accompanying CD. Victoria Atkins and Susan Thomas, with the assistance of Patricia Lacey, coordinated the ARGUS data conversions for the Anasazi Heritage Center's DAP database.

There were many, many people—especially many ex-DAP researchers—who aided in CU's updating a data set that is over 20 years old. While we hesitate to single individuals out, Paul Farley, who was the Lab Director at Dolores two decades ago, participated in all the CU classes, answered hundreds of questions by the authors, and truly made this volume substantially better. A second individual, Lee Gripp, did not work at Dolores but was nonetheless able to provide vital clues about organizing the data. There were many other guest speakers, consultants, and "informants" who worked with us at key points in the project; and each of these individuals probably saved us from total disaster at least once. While they are not responsible for any remaining errors in the guide—Victoria Atkins, Eric Blinman, Dave Breternitz, Joel Brisbin, Don Elsborg, Megg Heath, Ernest House, Ruthann Knudson, Al Kane, Tim Kohler, LouAnn Jacobson, Patricia Lacey, Bill Lipe, Carl Phagan, Jim Potter, Art Rohr, Susan Thomas, Lynn Udick, Mark Varien, Dean Wilson, and probably others who escape our memory at this time—all helped answer crucial questions we had in writing this guide. Lee Gripp, Dave Rhoadarmer, and Mike Neufeld provided critical help with the data conversions from old formats.

We dedicate this book to all the DAP researchers who made this data possible and to the researchers of the future who may totally change our views of southwestern prehistory using data such as these.

1
Introduction

THE LEGACY OF THE DOLORES ARCHAEOLOGICAL PROGRAM: A BEQUEST OF OLD DATA AND A NEW USER'S GUIDE

Richard H. Wilshusen

The Dolores Archaeological Program was the largest federally funded archaeological project awarded under a single contract. The project area was located exactly in the middle of the earliest large pueblos of the northern Southwest, and more than a thousand archaeological sites were recorded during the construction of McPhee Reservoir (Figure 1.1). The project lasted from 1978 to 1985, employed hundreds of archaeologists, and produced the largest archaeological data set that anyone had thought possible at that time. The project is now more than twenty years old and most of its archaeologists have passed safely into middle or older age, yet the data set is remarkably youthful and vigorous for being a relic of a time before personal computers. The volume that follows makes this data set available for use on personal computers and tries to initiate the reader into the research of the Dolores Program. The data set remains a unique treasure in American archaeology.

This chapter introduces the reader to four basic topics. First, it offers a historical context for the work at Dolores and the data that were obtained. Second, it explains the construction, organization, and logic of the original data set as a research tool. As with any set of data files, the strengths and weaknesses of the data become evident in understanding its history. Third, the introduction proposes why the Dolores data set remains an extremely important archaeological resource for studying topics such as village formation, ethnic diversity in the past, and prehistoric change in the American Southwest. Finally, it summarizes the organization of the present volume.

A BRIEF HISTORY OF THE DOLORES PROGRAM AND ITS DATA SET

The Dolores Program came at the end of a heady time in American archaeology, a period called the "New Archaeology" by its proponents. It was a time in which archaeologists proposed to make archaeology a much "harder" science. The hope was that human prehistory could be placed into an ecological framework so that adaptive changes through time could be isolated and understood. In its most awe-inspiring moments, the New Archaeology had the strange feel of a computer science convention that had turned into a religious revival.

While the Dolores Program was not one of the New Archaeology's poster children, there was a sense that it was one of the few projects big enough to actually attain some of the New

Archaeology's goals. The Dolores Program was the last of the large contract archaeology programs associated with the construction of a large reservoir. There had been hundreds of reservoirs constructed since the 1930s, and many of them since 1946 had significant archaeological research associated with them (Brew 1961; Johnson 1966). However, by the 1970s there were few excellent spots left for major reservoirs that were not also National Parks. Dolores offered the last, best chance to do major archaeological research in the construction zone of a major new reservoir. The work occurred just as archaeologists were truly beginning to use readily accessible computer systems. The computer data set that resulted was five to twenty times larger than anything that had been attempted in archaeology before.

The project was located on the northern frontier of the Anasazi culture, an area encompassing the Great Sage Plain and Mesa Verde where ancestral Pueblo people lived until the late thirteenth century. For many years, the focus of archaeological thinking about this region was centered on Mesa Verde National Park, a wonderfully different place with its cliff dwellings, striking landscapes, and park. Unfortunately, Mesa Verde was also a place that was increasingly understood as more of an anomaly than an exemplar of the prehistory of the area. The Dolores Program offered the opportunity to intensively examine the prehistory of an area of 65 sq. km that is only 15 km north of Mesa Verde (Figure 1.2).

The majority of the sites in the project area dated between A.D. 600 and 900, or Basketmaker III and Pueblo I in the Pecos Classification. The relative lack of sites dating to other periods was originally seen as a potential weakness in the research opportunities presented by the research. Up until the 1970s archaeologists had largely focused their efforts on "type sites" and the development of distinct phase sequences of chronological development. To do this kind of archaeology required relatively long-lived occupation sequences. The sites in the Dolores Program area instead focused our attention on a relatively compressed period of occupation, but this actually worked well for the requirements of the more "scientific" and data-rich archaeology of the 1970s. The intensive Pueblo I occupation—with its settlement shift from a dispersed settlement pattern in the mid-eighth century to the aggregated villages of the mid-ninth century—provided an excellent framework for investigating aggregation. Did people aggregate in areas such as Dolores in the mid-ninth century because of a favorable upland setting for the climate of this period, or did villages form more as a result of overall increasing population, social interaction, and changing social organization? Dolores, more than any other project of its time, focused our attention on a very limited period of time and a very limited series of changes.

The size and scope of the Dolores Archaeological Program were such that it defined a large archaeological project. In a sense, what Dolores taught us was how to run a large archaeological project (Breternitz 1993) in a cost-effective way within a finite time frame. Though there had been some very large National Science Foundation (NSF) projects in the 1960s, these had not been on tight excavation, analysis, and publishing schedules such as became the norm for cultural resource management projects in the 1970s and '80s (Altschul 1997). Large projects had to balance the various competing needs of logistics, documentation, and curation of the artifacts and data.

The causes of the Dolores Archaeological Program—a large dam and the resulting reservoir—necessarily limited the scope and time frame of the research. There were only seven years to complete the project, and money and personnel were thrown at trying to deal with the 1626 sites which would be studied as a result of the reservoir project. Sites were slated for excavation not necessarily in the order that would allow one to learn the most information the quickest, but oftentimes based on the order in which they would be destroyed by dam construction. Excavation crews could not work during winter, so the research in the summer was intense. Multidisciplinary research on the past climate, flora, fauna, and geology of the area had to be coordinated with the more mundane aspects of excavation research at prehistoric sites. At any one time, up to eight crews had to survey, excavate, document, and turn in records and materials in a comparable fashion. Though for most industries this does not sound challenging, this was something quite new for the independent souls who are typically drawn to archaeology. The attempts to collect data in a consistent manner, whether it was collected by Joel Brisbin's crew in 1979 or Mark Varien's crew in 1983, fundamentally shaped the nature of the project and resulted in what is still a high-quality data set.

From the beginning of the project, all archaeological locations, or proveniences, were consistently recorded on a Field Provenience Description form (see Figure 2.1). Because this form was the means for tracking field specimens (FSs), or artifacts and samples, through the laboratory, the form quickly became known as the FS form. The information on this form was central in creating a common piece of data for linking particular locations at particular sites with the items from these locations. By lumping all the items from all the proveniences at a site, one could gather the data needed to tell the history of that site, and by comparing proveniences between different sites, it was possible to understand how various places in the project area had been variously used through time. Field forms consisted of both an area for written notes and a series of boxes that needed to be filled in with numerical codes to characterize and describe a particular unit. Dolores was unique at the time for having an incredibly well defined and comprehensive design for recording what amounted to behavioral interpretations of proveniences in numerical format.

The seven years of research at Dolores produced three interrelated, but very different kinds of products: an immense computer data set (130 megabytes of efficiently stored files), hundreds of unpublished reports and thirteen volumes (16 books) of published reports, and more than a million artifacts. The Anasazi Heritage Center (AHC) is the repository for the artifacts, all records, the data set, and the unpublished reports. The Heritage Center has seen various reanalyses and special studies done by researchers over the last fifteen years, but the data set has not been used as much as might be anticipated, given the circumstances under which it was constructed. The large size, wide analytical scope, and complicated nature of the DAP data set made its use formidable for all but the most devoted of the Dolores researchers and most capable of "outside" computer users. With the advent of powerful personal computing, the possibility of an individual researcher using the whole Dolores data set has finally come into its own.

THE DESIGN AND CONSTRUCTION OF THE DOLORES DATA FILES

The Dolores data processing operation was a thing to marvel at twenty years ago. Very few archaeological groups had a ten-megabyte hard disk, two remote terminals with monitors (a.k.a. CRTs), tape backup, and direct access to a large mainframe computer at that time (Robinson et al. 1986; Udick and Wilshusen, this volume). The amount of computing time used by Dolores researchers was the equivalent of almost one-tenth of the project budget. While the data set available with this user's guide is superficially somewhat different from the original DAP data set, it is nonetheless a direct lineal descendent of the 1985 data set left for curation at the AHC. To understand both the strengths and weaknesses of the data, it is necessary to discuss the creation of the original data set, its curation at the AHC, and the particular idiosyncrasies of the DAP data set. Whatever its weaknesses, it stands alone as the only readily available big project data set left from the big projects of the 1970s and early 1980s.

The DAP data set, as it came into being between 1978 and 1985, consisted of flat files (i.e., tabular data) for provenience information, material culture analyses, inventory information (e.g., data on records such as maps, photos, and samples), and temporal-spatial information. The provenience file is derived from the information on the FS form and has details about a particular archaeological provenience such as the site number, study unit type and number, more specific horizontal and vertical location information, and specific facts about the type of fill and vertical location of the fill relative to the total unit. The FS numbers were sequential for each site, so with a site and FS number it is possible to construct a "key" field to pull all other information related to this provenience. The data for different classes of artifacts—such as flaked lithic tools, ceramic sherds, botanical remains, and other material culture collected from the different provenience units—were organized in separate analytical files. Each record, or line of data, in an artifact data file might represent the analytical results of a particular item from a particular provenience. In some files, such as the ceramic and fauna files, a record might actually represent a common lot of materials (e.g., plain gray ware sherds) from a single provenience. The provenience and artifact analysis files remain the most fundamental of the DAP data.

There were also data files for various documentary materials produced by the project and data produced as part of the final temporal-spatial synthesis work on the project. The documentary materials range from lists of all the maps drawn on the project to information on samples. There are also data on surveyed sites.

In contrast to the descriptive nature of most of the inventory files, the temporal-spatial files are interpretative data that associate specific proveniences with various time periods and locations of past behavior. At the most specific, the materials in a provenience unit might be associated with a particular activity and dated to a specific forty-year period of time (e.g., sometime between A.D. 840 and 880). More generally a provenience might be simply associated with the Anasazi (or Ancestral Pueblo) occupation of the Dolores area. These spatial and temporal inferences about different archaeological contexts resulted in a fairly complex matrix of temporal-spatial associations. The details of this scheme are explained later in the user's guide, but the above discussion should warn any reader that the DAP data files were more than just a glorified catalog of items found.

In addition to being a comprehensive record of the archaeological findings, the Dolores data set was distinguished by its high quality and consistency. Data were input directly from corrected field or analytical lab forms and then these data were verified. Finally, data were reviewed for consistency and logic to isolate possible coding or input errors. When output was generated from these data for site reports and other publications, these data were checked by the crew chiefs and independently checked by a data-checking team of the editorial staff. All of these measures led to remarkably "clean" and useful data files. While there certainly must be some errors in the data, they exist only because they have so far defied detection or because some of our archaeological interpretations were wrong in the first place. This is the nature of all scientific data.

Once the University of Colorado completed the Dolores contract, responsibility and maintenance of the DAP data files was turned over to the AHC. The AHC is part of the Colorado Bureau of Land Management (BLM) and these data have recently been converted into Questor System's ARGUS database. ARGUS is a data management software designed for managing both museum collections and site files. It runs on mainframe computers and generally is used by larger institutions such as the BLM, the Denver Museum of Natural History, and the Colorado Historical Society. At present, if one uses the database at AHC, ARGUS is the primary system for finding artifacts and asking questions of the data. For personal use, we present all data files in a commonly accessible database format (.DBF) and some files within a basic relational database format using the Microsoft Access program (i.e., .MDB files).

There are several reasons the Dolores data set has remained an incredibly powerful tool for doing archaeological research, even though it was largely assembled more than 15 years ago. First, the file structure, analytical rules, and data definitions were well-described, especially considering this relatively early time of archaeologists using computers. Second, there was great care taken gathering, assembling, and structuring the data. Though the files are in a relatively simple format, this actually has permitted them to be transferred into new programs with few problems. Third, the data, the artifacts and records that these data describe, and the reports that incorporate aspects of these data are accessible at the Heritage Center. This allows previous analyses to be replicated and verified, or challenged. Finally, there is sufficient documentation to understand both the strengths and the weaknesses of the data.

Though the next section offers reasons that the data set remains a treasure trove for current archaeological research, before turning to this issue, it is important to ponder what the Dolores data set represents. Though it is an "artifact" of a research project that began more than twenty years ago, it is also an image of the future. At present archaeologists have to curate all their artifacts and important notes in a recognized archaeological curation facility. Typically $50-400 are needed for each cubic foot of storage. While this was not the case even twenty years ago, curation—or long-term storage at a facility where they can be later accessed—is an ethical and oftentimes legal imperative for a working archaeologist. We are only now seeing the beginnings of curation standards and practice for archaeological databases. The fact that the Dolores data set dates to two decades ago and yet remains a viable, working data set is a testament to how data curation can work. We have no doubt that it will become an increasingly important topic.

Why the Dolores Data Set is Still an Important Research Tool

Strange though it may sound, the Dolores data set may be more useful now than it was fifteen years ago. In the years since the end of the DAP, the archaeology of the northern San Juan (or Mesa Verde region) has become much more well-understood (Varien et al. 1996) and the place of Pueblo I much more important (Lipe, this volume). In part this is due to the results of the Dolores research (Kane 1986a, 1986b, 1989), but it is also due to a growing recognition in the Southwest that populations, cultures, and ideas have moved around much more vigorously than we have thought possible for the last fifty years (Reid 1997).

In the case of the Pueblo I period in this region, we now recognize that the movement of population and creation of the Dolores villages was not an isolated phenomenon. It is now clear that a substantial fraction of the Pueblo population of the mid-ninth century Southwest was in the northern San Juan and that the big villages of the Dolores area (Figure 1.3) are simply part of a long string of villages along the 2100 m elevation mark (Wilshusen 1991). The Pueblo I villages in the northern San Juan date to three different intervals occurring between A.D. 750 and 900, with the last and greatest example of village formation occurring between A.D. 830 and 880 (Orcutt et al. 1990). There are at least 21 documented villages, averaging 180-220 people apiece, that are dated to this last interval of village formation. It is likely that there were at least double, if not triple, this number of contemporary villages in what is now Montezuma County.

It should be emphasized that a village is, under our terms, an aggregated habitation site with an estimated population of at least 100 people. It is fundamentally different from a hamlet, a habitation site with anywhere from a single household to up to 20 to 30 people. The shift from a settlement pattern based on one of hamlets to a settlement pattern of villages is a fundamental shift in prehistory, whether we are looking at the Dolores villages in the American Southwest or Çatal Hüyük in Anatolia.

In the time since the end of the Program, the Dolores data set has gone from being just an interesting investigation of some large Pueblo I sites, to being one of the few cases in world archaeology where we can study pre-state village formation at a regional level. The ethnic composition of these villages appears to betray evidence of two or possibly three different cultural groups. The complexity of the growth and competition between these villages is much more striking than was ever thought when the original Dolores work was done. Recent investigations suggest that the east and west sides of the river are dominated by different ethnic groups and that these populations not only came from different locales, but when the villages broke up in the late A.D. 870s or early 880s, that the populations returned to their old home areas (Wilshusen and Wilson 1995; Wilshusen and Ortman 1999).

To really get at village formation in Pueblo I in the Southwest will require far more than we can undertake in this user's manual, but what we hope to demonstrate in our examples is the possibility for addressing new topics with the Dolores data. Fortunately in the last ten to fifteen years, regional research has placed the general circumstances of the Dolores villages in much clearer focus. Our present understanding is that:

- The population in the Dolores area was diverse and immigrated between 10 and 100 km to join the villages of this area.
- The villages in this area began by about A.D. 845 or 850 and only lasted until about A.D. 880 or so.
- The overall regional population density is low (1-2 people per sq. km), but the immediate population density in areas of villages such as the Dolores area was approximately 50 people per sq. km at the height of the occupation.
- There was relatively little population in the locale for the 40 years prior to the formation of the villages.
- The seven to eight main villages in the Dolores area were contemporary with one another.
- The majority of the subsistence in the villages had to be tied to agriculture.
- The villages were abandoned at the same time that the majority of the Mesa Verde region was being depopulated in about A.D. 880-885.

The investigation with the Dolores data is just beginning to understand how villages form and to test some of the ideas of what villages might "do" that make them attractive to newcomers. The following possibilities are just a beginning, and by no means complete the list. They are only hypotheses to be tested with data sets such as the DAP data.

The pre-state villages at Dolores were places where:

- people of potentially diverse cultural backgrounds were united under a common religious and ethnic identity
- natural resources may be much more concentrated in particular locales at particular time periods
- much more food per unit of land could be produced with village-organized labor
- people could live in more defensible residential settings in villages
- access to key resources such as nearby agricultural land or game "reserves" may have been guaranteed by the presence of a village
- leaders probably had to compete to take care of their followers

It also appears that the Dolores villages had a big impact on local, regional, and possibly interregional affairs. Ways in which these effects are seen in the archaeology of these villages include evidence that the villages:

- did not last very long and possibly "depleted" their leadership
- "consumed" the landscape around them

- were tied to changes in population distribution and resource availability that occurred over tens of thousands, and not just hundreds, of sq. km
- were tied to social changes that occur over tens of thousands of sq. km

The Dolores villages (residential sites with more than 100 people) were different from hamlets (residential sites with 5-25 people) in a number of ways. The tracts with Pueblo I hamlets in this region never come close to the population densities seen in the areas with villages. Also, there appears to be less overall dependence on stored foods in these hamlets, and in most cases the hamlets appear to be much less defensible than the villages (Figure 1.4). Villages are consistently in locales with access to multiple natural resources, and hamlets are less consistently found where wood, water, agricultural soil, and setting are all favorable for residences. It also appears that villages and hamlets were mutually exclusive in the areas they occupied (Wilshusen 1991), so that when villages were evident at Dolores, separate hamlets are rare to nonexistent. The clear image of pre-state village formation in the Southwest is especially remarkable when compared to the archaeological record of formative villages worldwide.

Outside of the Southwest, the limited spatial exposure of Neolithic villages (usually less than 100 sq. m exposed in excavation), the imprecision in dating their formation and breakup (usually no better than 100 to 300 year intervals), and the lack of understanding of regional settlement patterns and histories, all contribute to our lack of knowledge about how and why villages form and break up in these other situations. Though historic studies of villages at the edge of state systems are quite helpful in appreciating the complexity and instability of villages, they are unfortunately examples that are not quite free of the effects of the historic global economy of the last few centuries.

By focusing on the detailed archaeological record now available for early southwestern villages, it is possible to concentrate on some of best available data on village formation anywhere in the world. After fifty years of thinking about how villages <u>should</u> occur, we are finally in a position to understand many of the pieces of the puzzle of how it actually <u>does</u> occur. Data sets such as the Dolores Pueblo I archaeological data may be our best bet of doing this.

THE ORGANIZATION OF THE PRESENT VOLUME

This initial chapter only introduces the reader to the most basic information about the Dolores Program and the resulting data set. For additional, more technical, information on the work at Dolores a *Final Synthetic Report* was produced by the project (Breternitz et al. 1986), and there have been several recent attempts to summarize the Pueblo I data as it has become better known in the fifteen years since Dolores (Kohler 1993; Schlanger and Wilshusen 1993; Wilshusen and Blinman 1992; Wilshusen and Ortman 1999). A second introductory chapter offers a more detailed historical background to the DAP computer data. While some of the same topics covered in this chapter are addressed, Chapter 2 is much more focused on the design of the computer files and their quality.

As part of this user's guide we have divided the Dolores data into twelve classes. Six of these classes are primarily focused on the ways in which excavation data were organized and the resulting documentary data set. The data classes in this general category include:

- Provenience

This is the system that describes how the archaeological locations at Dolores were recorded. A basic Field Provenience Description form was central in recording these data in the field and this form is the basis of much of this data set.

- The temporal-spatial system

This system details how time and space associations were integrated into the larger analytical framework. Spatial interpretations about household and community associations and temporal interpretations about the time of occupation are the core of this file. Confidence and integrity measures of temporal and spatial associations are also in this file.

- Samples

These data list the DAP special specimens such as pollen, sediment, bulk soil, botanical, soil peels, soil monoliths, dating (archaeomagnetic, dendrochronological, C-14) and other samples. It is primarily an inventory of samples, and for results one has to link to other data sources.

- Special studies

These studies illustrate how special archaeological problems were solved 20 years ago. While we do not provide computer data on the studies in this user's guide, the reader should be aware of these studies, given their place in the Dolores work. These studies include the probability sample, the archaeomagnetic-dating program, the roomblock rubble estimates for demographic studies, site survey files, catchment studies, pitstructure and architecture investigations, and the experimental garden work.

- Photos

There were documentary, publication, and artifact photos taken as part of the Dolores Program. This file is an inventory of all the DAP photographic documentation at the Heritage Center.

- Maps

Both field and published maps were produced as part of the Dolores Program. This file is a basic inventory of all maps.

For many archaeologists the even more fundamental data are the artifact analysis files. This aspect of the data occupies far more memory and these artifact analyses are typically more problem-oriented. General classes of data include:

- Flaked lithic analysis, which includes data for flaked lithic tools, flaked lithic debitage, flaked lithic reduction studies, hafted tools, and projectile points
- Bone and shell, with data on the faunal analysis, worked bone, a special study of cottontail rabbit bones, and shell
- Nonflaked lithic analysis, with information on ground stone tools such as manos, metates, and similar items
- Botanical analysis, with data on macrobotanical remains recovered from flotation samples or excavation contexts, as well as a few specialized studies of domesticates such as corn
- Ceramic analysis, which includes the basic ceramic analysis plus the special work on

particular topics (red ware, proto-historic pottery, etc.)

- Ornaments and miscellaneous, which are small data files on ornaments, rare rocks, and geologic items

Each of these data classes is described in general in the following chapters. The reader is given a broad knowledge of why the class is important, how the DAP dealt with these particular data, and what some of the main conclusions were. These introductions are extremely brief. For more comprehensive explanations the reader should examine the references cited in text or they should examine the short annotated list of published DAP volumes in Appendix IV.

After the introduction of a particular data class, then the organization of these particular DAP files is summarized. This also includes an explanation of the attributes and values within each file. Whether using the ARGUS data screens at the Heritage Center or the data on the CD in this user's guide, the attributes and values remain the same for the data set. It is critical that a user understand the basics of the data set before using it, given that the structure of the data, the necessary limits of the DAP excavations and analysis, and the assumptions inherent in these data restrict what can be realistically done with the data.

Finally, the DAP data are examined to address examples of current questions in archaeology. Each main data class (Flaked lithic, Ceramic, etc.) is used to address at least one exemplary archaeological question as part of a basic tutorial. These problems represent a range of the kinds of requests that might be expected for this data class. At the simplest, we illustrate a request for the pulling of particular items for reanalysis and give a reason for the reanalysis. For example, a ceramic researcher might want to do a stylistic analysis of certain white ware sherds to see if there were different "styles" associated with different villages in A.D. 860. How would one write such a request in plain English? Or in a database program such as Access? A slightly more complicated request would call for finding all the projectile points from a certain locale in the project area and plotting the variability in their key attributes. How would you write a request for these data and then plot the variability? The most complicated examples call for some sort of comparison or test of a hypothesis. For example, how do certain mano attributes change from A.D. 650 to A.D. 850? Do these data support a hypothesis that the use of corn as a dietary staple became more intensive through time?

For consistency we used village formation as a general theme for our examples. There clearly are many other topics that could be researched with this data set, but we leave these to future researchers. The measure of the effectiveness of this user's guide will be how much future research is done with the Dolores data.

We have created several different ways of accessing data from the data set. If a researcher is working at the Anasazi Heritage Center, then most likely they will be working with the BLM personnel and using the ARGUS database management system. We anticipate that the majority of the requests in ARGUS will be requests for artifacts or documentation. ARGUS is primarily designed as a museum inventory management tool and so its focus is on the retrieval of particular items or groups of items rather than statistical analysis.

The data are included on a CD-ROM that accompanies this book. To begin the CD, all one needs to do is to extract it carefully from the "jewel box," insert it into your computer CD drive, and then activate the appropriate drive for your computer's CD (oftentimes the D: drive). The various tutorials will take one through the details of specific examples of how to access the data. Use the directory function on your file management or database program to see the organization of these data. There is also a file called "Directory" (or "Director" for those with older computer software) on the CD and a printed directory in Appendix III of the text.

To run the tutorials on your computer you will need Microsoft Access 97. We used this database program in our class work simply because it was the most widely available program among the members of the class. If you use Paradox, Filemaker, SPSS, or similar programs, you still should be able to benefit from the written tutorials, since they detail the key attributes and relationships that are required to solve a particular problem. In future versions of the user's guide it may be possible to run the tutorials with a more diverse set of programs. We stored as much of the DAP data as possible in DBF format, since this database format is the most widely importable into a variety of programs. If you want the data as we used it at Dolores, then we also have included archived ASCII strings of the old, "original" data.

The DAP data set is a classic example of legacy data. It is amazing that these data may be more vital 15 years after we completed them than they were in 1985. It is likely that in 15 more years that this user's guide—with its instructions for what will be archaic machines in 2015—will be totally outdated. Our bet is that the data will remain as vital as ever.

1.1 Map of location of Dolores Project in relation to major geographic features.
From Robinson et al. 1986: Fig. 1.1.

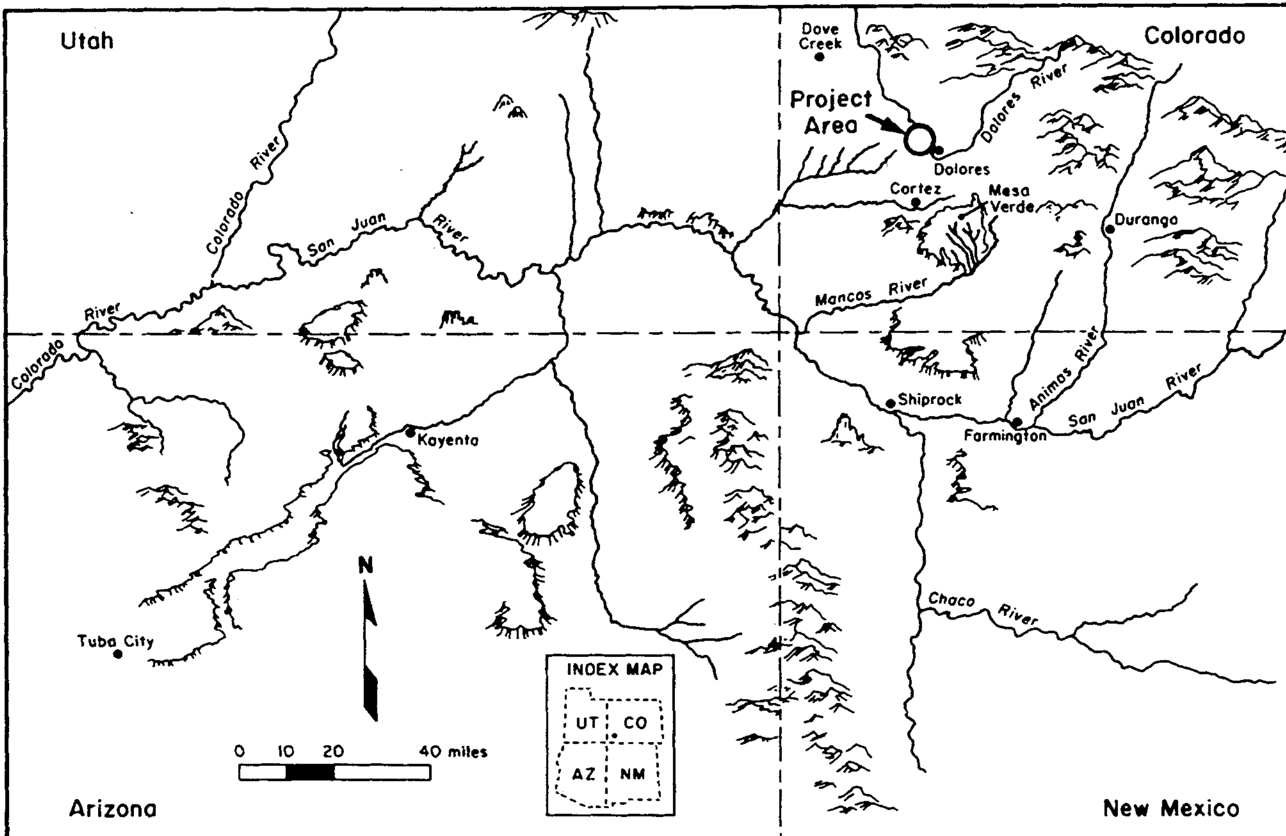


Figure 1.1 – Location of the Dolores Project area, southwestern Colorado.

1.3 Map of Dolores area villages, A.D. 840-880. From Wilshusen and Ortman 1999: Fig. 4.

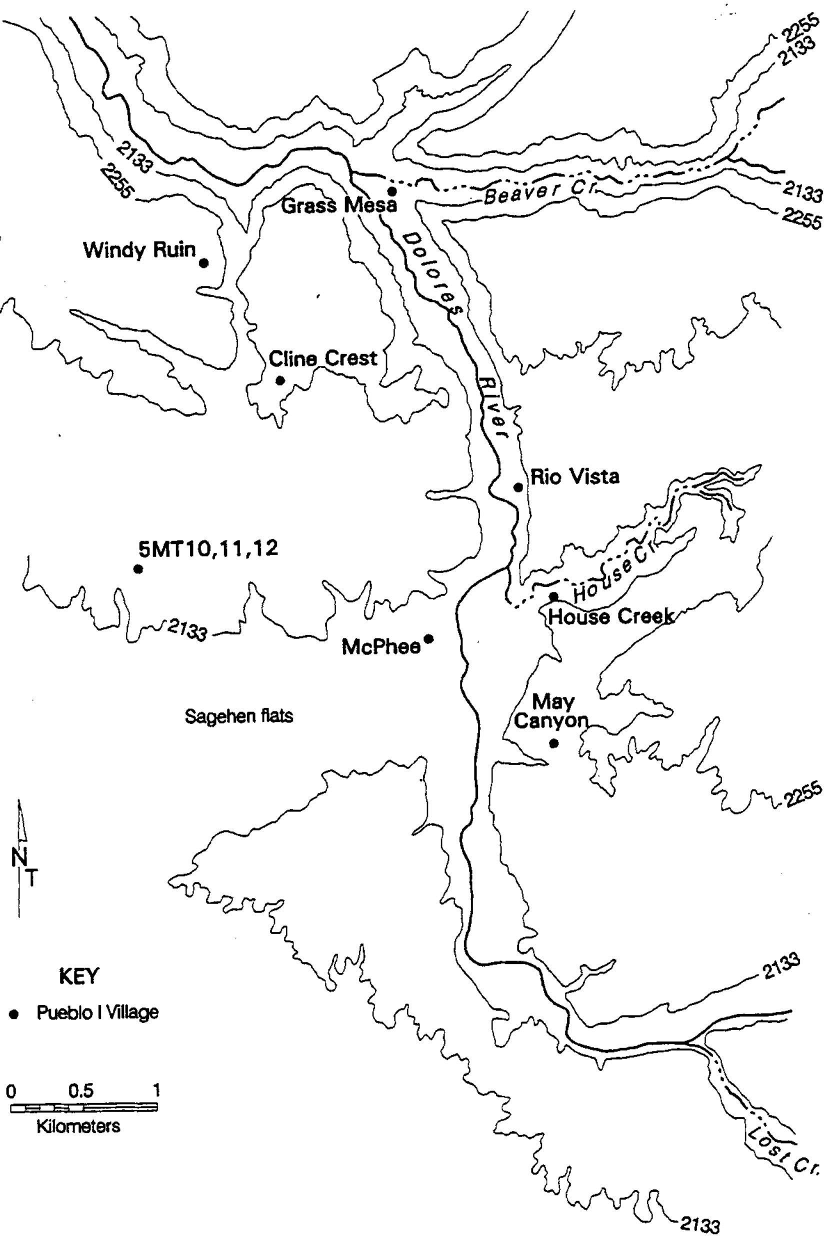


Figure 4. Dolores villages dating to A.D. 840 to 880 (from Kane 1986:Fig. 14).

1.4 Map of McPhee and Grass Mesa Villages. From Wilshusen and Ortman 1999: Fig. 5

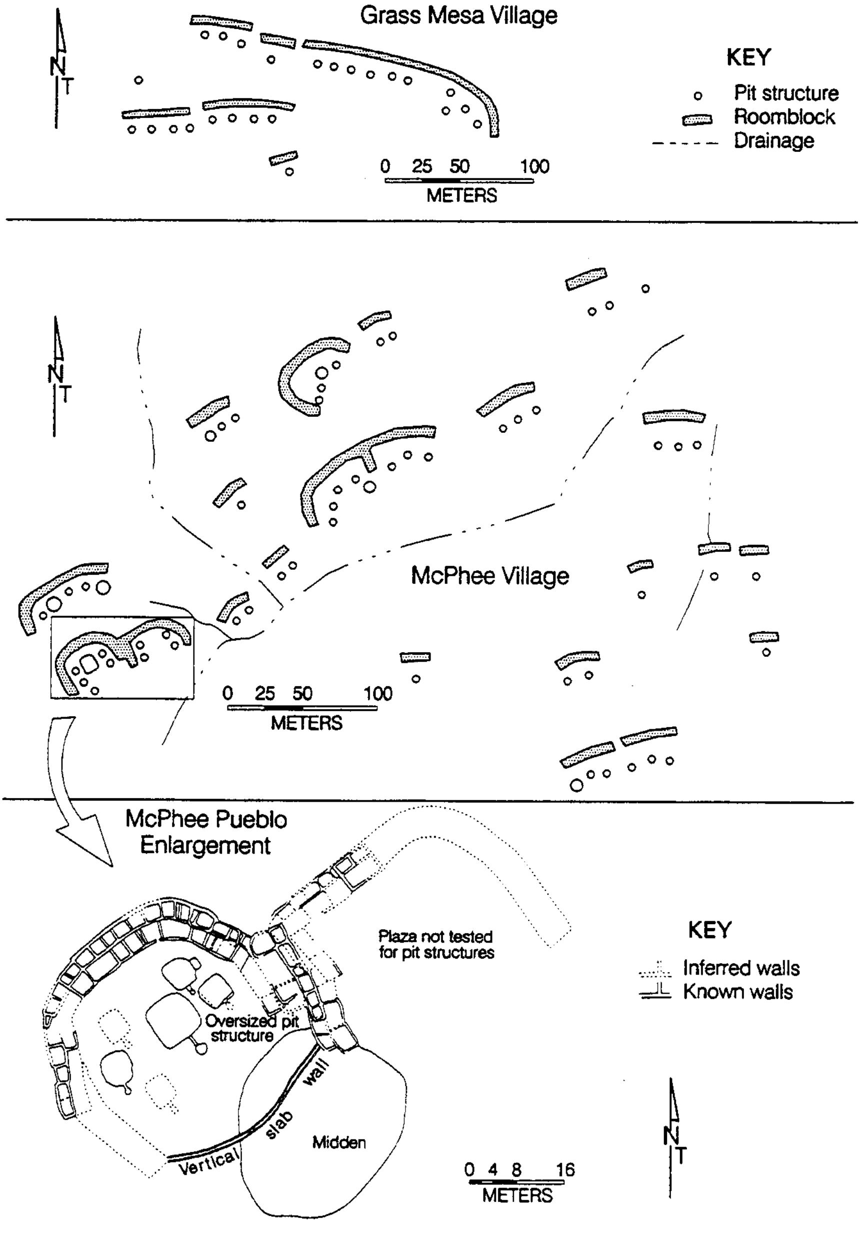


Figure 5. Grass Mesa Village and McPhee Village, A.D. 840 to 880; note detail of roomblock within McPhee Village (from Kane 1989:Fig. 11.7).

THE DAP DATA FILES: A SHORT HISTORY OF THEIR ORIGINAL DESIGN, PAST USES, AND POSSIBLE IMPORTANCE IN THE NEAR FUTURE

Lynn L. Udick and Richard H. Wilshusen

INTRODUCTION: PAST AND PRESENT USES OF THE DAP DATA

A visitor to the Anasazi Heritage Center in Dolores, Colorado, will view many items from the Dolores Archaeology Program (DAP). They are things we tend to associate with archaeological sites: ceramic vessels, stone tools, woven sandals and basketry. The DAP generated more than a million such artifacts. Yet another, very important, product of the DAP, can't be easily seen: it is the immense set of observations made about these objects in the course of excavation and analysis conducted by the DAP. This computerized data set, which is also curated at the Heritage Center, is truly one of the most significant "artifacts" of the Dolores project.

Twenty years ago the need for computer databases in archaeology was not nearly so prominent as it might be today. When the DAP began there were no personal computers as we currently know them, relational databases were restricted to a few uses, and designing programs for “special” uses such as archaeology required a knowledge of COBOL or FORTRAN. While the DAP data files—in their flat file, ASCII format—appear somewhat archaic in the present personal computing environment, the integrity and size of the DAP data files make them unique in American archaeology, even today.

The magnitude of the data set and the critical efforts by the Dolores data processing personnel to cope with this quantity of data and to ensure the quality of these data were unprecedented. The success of the DAP depended on it. A testimony to the outcome of this effort is that almost fifteen years after the conclusion of the DAP these data can be utilized for new research by individuals who are not DAP researchers. Though a number of other projects that conducted research in the 1970s and early 1980s had their data entered into computers, we are unaware of other projects that have reissued, or can reissue, their data sets for current use.

Since the formal conclusion of the mitigation work at Dolores in 1985, there essentially have been two computing “generations” of use. The years between 1985 and 1998 saw a slow stream of articles, dissertations, and other research presentations that used various bits and pieces of the Dolores data. While these research efforts utilized aspects of the DAP computer data files or published data, these uses typically were restricted to ex-DAP researchers who understood the intricacies of the DAP analyses and computer coding systems.

Within the last two years there has emerged a second “generation” of use of the DAP computer files. With the preparation of the DAP computer data set for public distribution and the emergence of personal computers with more than a gigabyte of memory and fast processing speeds, it has been possible for researchers not connected with the original Dolores Program to use the DAP data set in new and unanticipated ways. The size and quality of the DAP data should provide an interesting ground for archaeologists addressing new problems concerning cultural identity, population movement, and community formation and breakup.

The user's guide is designed for both old-style archaeologists who have limited computer skills as well as new-wave archaeologists who "excavate" data as fast as they move through provenience units. In order to allow newer archaeologists to understand the construction of these old files, it has been important to review the history of the construction and original uses of the data files. A second section reviews post-DAP research from the standpoint of how these data were used after the formal conclusion of the project to allow old and new users to understand present-day uses of the DAP data. Finally, a short section at the end of this paper suggests why a big data set that is almost fifteen years old may still produce important archaeological findings.

THE ORIGINS OF THE DAP DATA SET: WORKING WITH ARCHAEOLOGICAL DATA AND MAINFRAME COMPUTERS

Though the issues of data integrity, curation, and accessibility are increasingly familiar in current archaeology, they were not common topics over twenty years ago during the excavations at Dolores. A large project such as Dolores was unusual in having almost all of its artifacts—ceramic sherds, flaked stone, ground stone, soil samples, plant materials, bones—analyzed in-house. In addition, all of this information was entered into the DAP computer files producing a data set that was, in its size and integrity, unique to the Dolores Program.

While many archaeological projects enter their data into computer databases these days, the sheer size of the Dolores data set is still impressive even fifteen years after its completion. The file created to hold only the information about the ceramic sherds recovered by the DAP contains over 100,000 lines of data. The majority of these lines contain information about more than one sherd, such that more than half a million sherds are described there. The file containing the information about the flaked stone tools contains 47,445 lines, each describing a single tool. The fauna file, describing each animal bone recovered, holds data about more than 80,000 bones or bone fragments. Forty-seven thousand and thirty-seven lines of DAP photographic data are cataloged in the photo file. Over 8,000 archaeological features, like hearths, sipapus, and wall niches are described. Precise information is stored on almost 1,500 manos and over 800 metates.

In fact, if you add up all the information in these data files, counting each number used as a code, or each letter used to describe these artifacts, the DAP data set contains over 70 million pieces (i.e. bytes) of information. The computer programs we used to read and analyze these data contain another 6 million characters. When all this information was transferred to the Heritage Center, it was copied onto nine miles of computer tapes. In our current-day computing environment with CDs, DVDs, and the Internet, it difficult to remember how unusual and important the effort was to manage these data in the early 1980s.

While the sheer quantity of information held in these files remains impressive, there is another even more important concern, and that is quality. We have all seen too many examples of the garbage in, garbage out syndrome ... bad data carefully analyzed to produce bad results. It's fair to ask "just how good is the DAP data set?"

From the very beginning of the project, a strong commitment was made to ensure the quality of the data files. The computer files were not an afterthought, or simply a necessity for a project as big as the DAP. They were seen as an important archaeological contribution, and there was a huge commitment of resources, both human and computer, to this effort.

This commitment to the computer files from the beginning, is perhaps the most important step that was taken. By planning the computerization from the beginning, the DAP imposed a consistency on the recording of information, both in the field and in the lab, that would not have been there otherwise. This consistency was, and continues to be, essential to the successful use of these data for research.

A very important part of this early planning was the organization of the data files and the design of special forms that would be used in the field and lab to record the data. This task also involved critical decisions about what observations would be made and what the range of values for recording would be. These codes would have to be used consistently through the life of the project and across the full range of sites and artifacts analyzed over seven years. This was not easy, and involved many powwows, raging battles, bloody skirmishes, and much cajoling and persuading and compromise. But when the dust settled there were forms—such as FS forms and feature forms—and codes to be used for recording most of the information collected at the site and in the lab.

The next challenge was getting the archaeologists to actually use these forms. This, also, was not easy. It was a fairly radical concept for many of the field people, particularly the necessity of using a predetermined coding guide to record observations. But classes were held, arms were twisted, threats were made, and, indeed, the forms were filled out, from the very beginning. Not only did this help ensure a consistent data set, it enabled the computerization of the data to proceed as fast as the field and lab work could be done. In addition, the completion and acceptance of groups of 50 consecutively numbered FS forms by the laboratory allowed crew chiefs to guarantee that their artifacts would stay in line for lab analysis. For crew chiefs who wanted to have preliminary artifact analysis completed for their winter site report write-up, this was a powerful incentive. This step also involved a review of the use of the field codes by a lab manager with the authority to return forms for correction before they would be accepted for entry.

It’s worth recognizing here the importance of the coding decisions made early in the life of the project. They allowed a data set that did not change substantially in structure over the duration of the project. This was essential to both the data processing and research efforts at the time and to the continuing value of the data. This large a set of observations with a consistent internal structure is rare even today.

Many of the important decisions made about the data structure affected the DAP’s use of the data as well as its usefulness to others later. An extensive review of existing database management software revealed that there were none up to the task. At this time there were few to choose from and none could handle a data set of this size and link multiple files, as was needed to do for synthetic studies and statistical analyses. In addition, the huge amount of statistical analysis would require data in a "sequential" file format which worked on the mainframe computers used in the early 1980s. This meant that all the data would be stored in a “flat file” structure and that all data management design would be through custom programming. As a result of these decisions, today almost any personal or well-endowed laptop computer can access and use these same files.

Among the other decisions made about data file structure at this early stage, one in particular had a great bearing on data quality. This was the decision to keep all information about provenience (the description of the actual locations excavated) in a single file and to link this file to the various data files to retrieve provenience information about the artifacts. This meant that there was always only one set of provenience information to be maintained. There was no possibility of discrepancies in the provenience information between files.

Another step toward data quality was sending the forms to a professional data entry organization in Denver where the data were entered and verified, written to tape, and sent to the Bureau of Reclamation computer center in Denver for addition to the data files. Tracking this data entry process took a lot of organizational work at Dolores, but helped ensure high quality data.

Once the data were in the files, a great effort was made to catch any errors that might be there. Data processing personnel and analysts would periodically do data-checking runs on the files to catch any out-of-range values and report these to the appropriate task specialist for correction. There were also special linkage runs on the data files to catch any discrepancies between the provenience files and the artifact files, to track down "lost" artifacts that didn't link up with any location in the provenience file. A duplicate line checker was run to ensure that no lines were accidentally repeated in the files. Also, any edits that were made on the files were submitted on paper and records were kept on all of these changes.

Use of a mainframe computer twenty years ago had advantages and disadvantages. For example, all work done with the DAP files during the duration of the project was done by the data processing staff. No one else ever had actual access to the files. This had some distinct disadvantages, but it also contributed a great deal to the quality of the data files that resulted and to the replicability of the analyses done for the DAP reports. It took four to five people full time to keep up with the Dolores program's data processing needs.

The editorial work on the DAP reports also provided another quality control on the data. Up to three people were employed full time by the editorial staff as "data checkers." For each report there was a "data checking package" that was used to verify the data in the reports against the data in the files. This process took the DAP a long way towards keeping the story straight, and caught numerous small problems that could creep into the data. It also provided feedback to field and lab personnel regarding consistency of use of the coding system.

Finally, backups of all of the major data files were made on a weekly basis. By writing these tapes in a compressed backup format, the resulting 52 sets of tapes contained three years worth of data sets. This was extremely important to report production; if tables or analyses had to be redone for a report and the data had since been revised, this system made it possible to pull the data set from the week in which the original analysis had been done and redo the work.

These were some of the things done to ensure that the data in the system were good and that the error rate was minimized. It took a tremendous commitment of time and resources to do carry out these steps. As far as computer resources are concerned, the DAP was the largest user of the Bureau of Reclamation's western region computer in Denver. In the course of the DAP (1978-1985), over $1,000,000 worth of computer time were provided by the Bureau. While this amount would certainly be far less in today's computer market, the million-dollar mark is still a good indicator of the level of effort invested in this endeavor. It also provides at least one reason why there are not similar data sets from archaeological projects from the 1970s and early 1980s. It simply required a lot of time and money to do these things right.

What was learned from the design, maintenance, and use of the DAP data set over the course of the project? Certainly archaeologists did not have sufficient experience in the 1970s to estimate the amount of effort required to design and ensure consistent field and lab recording and to guarantee the construction and maintenance of quality data sets. So, in simple terms, it took tremendous effort just to get the data in—and this was of course only half the battle. The other half —getting the data back out—was equally difficult and resulted in the creation of a special managerial position to facilitate the production of what ultimately was called "standard output" at the DAP.

A second major lesson was that the data requirements of the DAP staff were varied and ever changing. Report writers needed descriptive information. Specialists needed statistical analyses of the data for ceramic items, flaked lithic materials, groundstone, botanical remains, animal bone, and other artifact classes. In addition, there were numerous special studies to address topics ranging from economic intensification to variation in projectile point morphology. These demands presented particular challenges in the early 1980s. It took a combination of SPSS (Statistical Package for the Social Sciences), custom BASIC, FORTRAN, and COBOL programs, and numerous special programs acquired from other sources to even begin to satisfy these requirements.

None of these solutions were without problems. To keep up with the DAP's contractual reporting requirements, and to attain consistency in the DAP report series, it was necessary to design a so-called "standard output" which could be produced for any site, providing the crew chief with both detail and summary data about the site. There was always what could be most charitably described as a "creative tension" between the way things needed to be done for the sake of standardizing and expediting the production of output and the way things had traditionally been done, either by archaeologists in general or by a particular individual. In addition, it quickly became clear that an undertaking like this requires more computer expertise than even the most computer-inclined archaeologist will have. The most important lesson was that the data processing tasks evolved over time and reflected the life cycle of the project, from an emphasis on data design and input at the start, to the report writing and research analysis, to the final report production effort.

While the DAP computing done through 1985 more than satisfied the needs of the Dolores contract, the rapidly changing field of computing—especially what was becoming known as personal computing—totally transformed what could be done with the DAP data set. This transformation gradually changed even how ex-DAP researchers looked at their own data.

USES OF THE DAP DATA BETWEEN 1985 AND 1998: PERSONAL COMPUTING AND CHANGES IN AMERICAN ARCHAEOLOGY

Personal computers were only becoming readily available as the McPhee Reservoir work of the DAP was concluding. For those who do not remember Commodore 64s, Apple IIes, or early IBM personal computers (even before clones!), it is difficult to understand how different computing is for the average user at the end of the century in comparison to the early 1980s. Whereas the DAP used a large CDC CYBER mainframe computer in Denver, by the mid-1980s personal computers were cheap enough (only $2000 for a machine with about $20 of modern-day memory!) and powerful enough (it only took four hours to do computations that now take 30 seconds) that some DAP researchers experimented with personal computing solutions to DAP problems. While relational databases were not commonly available outside of very large-scale research or business management, it was possible to use the separate files for particular artifact groups (e.g., the faunal analysis files) or the linked temporal-spatial files for these particular artifact classes to do some fairly impressive research with ASCII data from the Dolores Program.

Almost all of this research used the Statistical Package for the Social Sciences (SPSS) as the means of generating output. While DAP "standard output" for sites provided a descriptive summary of the artifacts and proveniences for particular sites, other than for the limited investigations of the *Final Synthetic Report* (Breternitz et al. 1986) and two *Supporting Studies* volumes (Blinman et al. 1988, Petersen and Orcutt 1987), there has not been much individual use of the computer data in post-DAP research. The completion of the DAP data set necessarily coincided with the completion of the project, and this left little time to truly explore these data.

Given that a common excavation strategy and proveniencing system was used by the whole project, it was possible for someone who had not worked at a particular site—but who did understand the provenience and temporal-spatial system—to use these site data with a fairly good understanding of their context. In addition, since the DAP data were not widely available (there were only three individual sets of the electronic data readily available in ASCII format), much of the post-1985 analysis was done by ex-DAP researchers who either had direct access to the data or who had all the volumes in the DAP series. By understanding the FS recording (i.e., provenience) system, it was possible to run large-scale comparisons between different site assemblages and across different temporal intervals. However, since practically no one outside of the Dolores Program was familiar with the project-specific provenience and temporal-spatial systems, this research was limited to ex-DAP archaeologists.

The field recording system was designed so that large-scale comparisons of different sites and similar provenience contexts would be possible at Dolores by people who had not necessarily worked at those sites. The provenience system was a mix of both objective and subjective information. Spatial location was recorded in terms of both grid system and in terms of general location relative to major architectural or extramural study units. So, a unit could be described as being in a particular level with a particular horizontal grid unit and could also be described as being in surface structure fill, but above roof fall. In addition, a modified version of Michael Schiffer's (1976) proposed categories of formation processes was used in recording fill-assemblage type (FAT). Finally, by evaluating each provenience designation (FS) within a system of social space (households, interhouseholds, etc.) and time (40-year-modeling periods, phases, etc.), it was possible to create comparable groups of provenience units that either represented similar uses of space through time or contemporary uses of different spaces. This total system allowed someone who was only generally aware of the recording methods and of the general work at Dolores to do large-scale synthetic comparisons in a way that had only been dreamed about in the 1970s.

All thirteen of the government-sponsored DAP volumes were published by 1988 (see Appendix IV). This literature offered thorough site descriptions, the limited synthetic studies noted above, and some summaries of the overall methodology of the field and laboratory work done by the project. However, the flood of dissertation research and published articles that followed suggested how much remained to be done with the research. Tim Kohler and various co-authors pioneered a variety of research issues ranging from ecological degradation (Kohler and Matthews 1988) to village formation (Kohler 1992a, 1992b) to archaeological methodology (Kohler and Blinman 1987). Schlanger and co-authors addressed similar issues but more focused on paleodemography, abandonment, and site persistence (Schlanger 1988, 1990, 1991, 1992; Schlanger and Wilshusen 1993). Blinman and Orcutt and co-authors (Blinman 1988a, 1989, 1994; Orcutt et al. 1990) increased our understanding of temporal changes and larger-scale social change. Wilshusen and various co-authors remained doggedly interested in understanding village formation and breakup (Adler and Wilshusen 1990; Wilshusen 1986a, 1989, 1991; Wilshusen and Blinman 1992; Wilshusen and Ortman 1999; Wilshusen and Wilson 1995). While many other researchers used the Dolores collections and data, only a few publications have resulted from researchers who were not involved in the original Dolores research.

The immense size of the Dolores collections, the presence of the Anasazi Heritage Center, and the fact that the original work had been largely published made ex-DAP researchers, the BLM (who runs the Heritage Center), and the University of Colorado (who was the primary archaeological mitigation contractor at Dolores) aware that the next step was to make the computer data publicly available. In the past archaeologists had gained "authority" in their field by taking control of a particular site or region and being the master of that data for their professional career. Increasingly as archaeology brushes more and more with science, data sets are shared among researchers and used by researchers who may have never worked at the site or in the region that yielded the data. In addition, immense data sets such as the DAP data can now be run on small personal computers so that the sharing of archaeological data is a trend that is likely to increase. All these factors contributed to a desire to make the Dolores data more available to the public.

Until 1998 the only means to use the DAP data were either on the mainframe database maintained on the BLM's ARGUS database or through the few DAP researchers who had the old files on diskettes. Much of the data was still in ASCII format and all of it was without lookup keys, easily accessible data dictionaries, or "readme" statements that might explain shortcuts or problems in using the data. So a key issue by 1998 was how to share the data with a larger audience of archaeologists. The BLM and the University of Colorado obtained a State Historical Fund grant from Colorado in 1998 and this DAP user's guide and CD-ROM, as well as a fully configured ARGUS database at the Anasazi Heritage Center, are the result.

In the final section we introduce the remainder of the DAP user's guide and offer reasons for the way in which we have organized it and the CD-ROM. It is unclear if the "Pepsi generation" of archaeologists is quite ready for such large data sets, but there is little doubt in our minds that the younger, more computer-oriented archaeologists will recognize the potential in these data.

THE USER'S GUIDE, LEGACY DATABASES, AND FUTURE USES OF THE DAP DATA

We realized that a considerable amount of background on the project and data sets would be needed if the data were to be offered to individuals unfamiliar with the particulars of the Dolores project. For one it was clear that many people needed a general overview of the project and the context of the data it generated. As a consequence, the first chapters provide a very general background on the DAP to familiarize the uninitiated. To understand how the artifacts were recovered, how they were analyzed, and how artifact and provenience data were coded into the computer, we have offered a general introduction for each major data class—provenience and feature data, temporal-spatial data, ceramic data, flaked lithic data, nonflaked lithic data, faunal and shell data, botanical data, ornaments and other similar data, sample information, photo information, map information, and data generated by special DAP studies.

All of the above-mentioned data are essential parts of the ARGUS system at the Heritage Center and the data base files (DBF) we have included on the CD-ROM. With these data files there are also lookup files that allow one to know the text equivalents for the numerical values of the DAP attributes. This will allow a current data researcher to quickly construct a relational database where all of the values of the attributes are known. While this is expected today, it is only in the last five years that a database such as this has been commonly available with personal computing.

In addition, we have included old archived data from the original DAP data set. We have included the original data set that consists of various files of no more than long strings of numbers in ASCII format. These are the data from 1985, which are in the format that DAP researchers used them. There are also the SPSS programs that went with each data file as a reference to the basic descriptive report, which explained the data analysis system. These are essentially the instructions for generating the basic DAP data files. In the case of the more complex "temporal-spatial" (TS) files, where an interpretive superstructure is imposed upon the artifact data, one must be familiar with the DAP literature to understand these data and use these files correctly. We have included only a sample of these TS files since they take up so much memory. We highly recommend that all users consult the pertinent, original DAP literature (see listings in Appendix IV) before doing serious computing with these data.

The inherent potential of the DAP data should be obvious to any archaeological researcher. The immense size of data files, consistency, and definitions make it an attractive group of data to anyone interested in examining village formation, Southwest prehistory, or formative societies. The kinds of problems that can be addressed with these data are noted in the first chapter and certainly as issues relating to “culture” and “cultural change” become more important in future research, the value of these data become more and more important. Also, as the power of personal computers continues to increase, there is an increasing ability to use these data on personal computers and in modeling exercises. We wrote tutorials for each data class, but only a sample of these are on the CD-ROM, because of memory limitations. These tutorials are very straightforward and we would urge researchers to advance the research in ways that are meaningful to their own interests.

There are several directions in which large data sets may be important to future research in archaeology. One of the most obvious examples in current archaeology is the kind of modeling of complex societies such as are presented in recent Santa Fe Institute volumes on Southwestern prehistoric change (e.g., Gumerman and Gell-Mann 1994). Certainly archaeology must increasingly address problems at the regional or landscape level spatially, and must address problems that span several hundred years. There are presently very few meaningful or substantial archaeological databases for problems of this kind. The DAP data set is clearly substantial and hopefully, with this volume, more meaningful. As a consequence, it is possible that data such as these, especially in combination with other Four Corners data sets, could be used in larger modeling or simulation efforts.

While there is great promise in these data, we must caution users with the need to understand the background pertaining to the data classes. Cautions are set out in Appendix I and in various “readme” files attached to particular data sets. Some of the potential problems and the very promise of the files both have to do with the age of the data.

Twenty years ago the DAP did not design the data to be a relational file, so there is some limited, but unanticipated, overlap of terms between certain data classes (e.g., Taxon represents different phenomena in the Macrobotanical and Faunal files). We have not changed these redundant variable (i.e., "attributes" in data-description terminology) names given that we want researchers to be able to go back to the original literature, but we have noted the overlap in the data class write-ups and in the "readme" files with some of these data classes. Also, because the original construction of the data was as stand-alone flat files, there is a certain built-in redundancy in the files, with the FS data at the first of each file serving as a "key". Again, we have preserved this for consistency, so that one can go back to the original DAP work. If a researcher wants to build a relational database using these data sets, then these redundant features are the obvious primary keys for relating different tables. We provide examples in some of the tutorials of how this would work.

We have constructed a data dictionary and lookups based on DAP documentation, but there has been only limited testing of the total package so far. Because of a generation's worth of time between the original analysis and the present summary, there are quite a number of new research issues (e.g., migration, ethnicity, and other cultural issues), archaeological methods (e.g., GIS, GPS, and other electronic data programs), and possible modes of research (such as simulations) that were unobtainable 20 years ago. Despite the antiquity of the files, some aspects—such as the temporal-spatial files—are still not for the archaeologically faint-of-heart, and these files will require considerable background reading for "safe" use. In these cases, not all temporal assignments have withstood the rigors of continued research in the area (e.g., Blinman's 1994 reassignment of the Grass Mesa subphase).

The remainder of the volume is organized into chapters on the data classes that were derived from artifact analysis and those classes derived from archaeological field documentation and special studies. Finally, there is a concluding chapter by Lipe and four appendices with particular information, germane to specific uses of the data. All users are urged to read the cautions and suggestions offered in Appendix I. These represent our best advice to the beginning user. The abridged data dictionary in Appendix II is also in electronic format on the CD, but for many users the dictionary format on paper may be more comfortable at this time. The third appendix shows the directory structure of the CD, and Appendix IV is a short listing of the table of contents and summary of each of the DAP published volumes. Appendix V is a summary of the temporal-spatial assignments and total number of provenience units for the DAP excavated sites. We recommend that the user glance through all of the guide and read the most pertinent chapters before beginning to use the data.

An awareness of the previously published DAP material will make any question much more informed. The brave new world of personal computing will likely show us as many new things about the DAP data set as we learned while working on the actual archaeology of Dolores. In this case however, the users will be excavating old data to do new research.

2

Provenience Data and Temporal-Spatial Interpretations

THE DAP PROVENIENCE DATA

Christine G. Ward

PROVENIENCE IN ARCHAEOLOGY

The provenience system is the basic tool underlying all archaeological analysis including field and data analyses. The provenience of any culturally or arbitrarily defined place or item on an archaeological site, as used by the DAP, precisely pinpoints its location, not only within the site but also with relation to locations of other features, artifacts, or excavation units. The provenience system has two primary components—the horizontal and the vertical. In other words, the provenience system allows archaeologists to describe precisely the location of an object or feature in three dimensions.

In perhaps its most basic form, the horizontal component of a provenience system may consist of a 1x1-meter grid being laid over the surface of the entire site and oriented to magnetic north. For example, one corner could have an arbitrary designation of 0 m North and 0 m East and every point within that grid would have a precise location as measured from that corner (e.g., 103.40 m N and 78.69 m E). In this way, every single place within the grid has its own, unique horizontal designation. Regarding a vertical location in its most basic form, the highest point on the site might be given an arbitrary designation of 100 m. Every location on that site would then be measured from that point, thus giving a specific point an elevation relative to that 100 m datum (e.g., 2.45 m below the datum would give that location a relative elevation of 97.55 m).

In the southwestern United States, there are certain predictable features, activity areas, and other locations on many habitation sites which have allowed this system of location to become interpretive rather than simply descriptive. As such, provenience is not always arbitrarily assigned as in the examples above. Instead, provenience might be culturally and arbitrarily divided. A provenience system on such a site might consist of assigning all structures on a site unique numbers and assigning all non-structural units another set of numbers (e.g., Structures 1-45 and Nonstructures 1-9). Other cultural units within the same site may get an additional set of sequential numbers. Again, this is simply another way to partition the site into a set of unique horizontal locations. Each of these structures may be further partitioned using arbitrary and cultural divisions.

Likewise, the system for assigning vertical provenience is based on predictable ways in which habitation sites collapse or decompose after being abandoned. In a structure, for example, whether it be surface or subsurface, there will often be wall- and/or roof-fall deposits atop the floor. Additionally, non-cultural deposits form another layer atop these deposits. The vertical provenience designations then can be adapted to include the particular origin of the deposits, thus allowing some determination of significance and/or disturbance. In this way, the system of provenience is assigned either entirely by stratigraphic units, whether they be natural or cultural, or by a combination of the arbitrary designation and the natural/cultural deposit.

THE DAP PROVENIENCE SYSTEM

If the DAP had merely wished to describe the location of artifacts, features, and excavation units within the site, an easier and more convenient provenience system could have been used. However, the DAP chose a system that allowed for a greater amount of interpretation of the data as they were recorded in the field. This system also makes using the data easier even 15 years later.

The provenience system used by the DAP is good for several reasons. First, describing features, artifact clusters and other observations in the field at the time of excavation requires the excavator to expend more time and consideration of the details of these observations. Second, there is a greater possibility for the recognition of similar instances. Third, an excavator has a greater chance of catching changes in strata or other variations in site stratigraphy if she has greater familiarity with the feature or structural unit at the time the excavation begins. And lastly, by recording greater detail in each of the features and units, there is also a greater chance that the excavator will consider the site as a whole rather than as a slew of unrelated microcosms.

In creating this interpretive and descriptive data file, the DAP has made the data accessible and useful to current researchers who wish to use this information to answer new questions. Additionally, the use of standardized terminology by all excavators associated with the DAP, created a cohesive, comparable, and useful set of data. For example, a researcher who is interested in the abandonment of structures in Pueblo I villages can easily access a large body of data regarding that topic by looking in the data file for key provenience categories such as “structure floors,” or “cultural refuse.” This type of search may provide a large body of data which would not otherwise be available to the researcher without the tedious task of reading all of the FS forms and trying to decipher terms or phrases which the excavator may or may not have used in the descriptions. More importantly, the body of data is available not just for a single site but for as many as the 95 sites fully or partly excavated as part of the DAP.

The FS system used by the DAP is limited in that it was only used for sites recorded and excavated by the DAP. There is also a certain amount of DAP jargon. However, other archaeologists throughout the Southwest use similar, if not identical, systems twenty years later. There are drawbacks to the system, but its utility seems to far outweigh its negative aspects.

USE OF THE F.S. PROVENIENCE SYSTEM BY THE DAP

The details of the provenience system are never overtly explained in any of the major published volumes produced by the DAP. However, there are manuscripts and technical reports that explain the system. For example, Kane (1980a) defines the Study Unit codes as used in the provenience system. Other texts that address the provenience system include Kane et al. (1981) in the field manual used in the investigations and Kane and Robinson (1984) in the final version of the excavation manual.

Much of the DAP data are presented in site reports and summarized under cultural unit headings (e.g., pithouses, surfaces, etc.), so the discussion of specific proveniences is rare in the DAP published volumes. However, tabulations of provenience-specific artifact data—for particular study units, grid coordinates, features, and surfaces—are present in nearly all reports. Perhaps the primary reason that one can look through the published volumes and not find reference to the provenience of features, artifacts, etc., is that enough of this information is visually available on published maps. In addition, most site-specific summaries or intra-site comparisons do not require the use of the full provenience information. For example, a simple comparison of pitstructure floor assemblages from across all sites would require some knowledge of the provenience system to access the body of data; but, in order to compare these data, one does not need to include details of all proveniences.

ORGANIZATION OF THE DAP FIELD PROVENIENCE DESCRIPTION FORM

ORGANIZATION OF THE DAP FIELD PROVENIENCE DESIGNATION FORM

General Provenience

The *field provenience description* form, also known as the *field specimen* form (Figure 2.1), is a single-page form which was filled out during the field investigations. This form is first organized by archaeological site. Oftentimes the site number—designated using the Smithsonian trinomial system of state and county (one attribute in the provenience system) and the sequential site number (another attribute) within that county and state—will be the first bit of data needed to work with the DAP files. The Field Specimen (FS) numbers are sequentially assigned for each site, so there may be FS# 106 for each site investigated. A unique FS number is assigned for every vertically and horizontally unique location within each site. The layout of the form resembles a funnel in that it starts with the most general location information and gets more specific as you move down the form. Appendix II includes a detailed description and definition of every attribute included in this data class.

Study Unit

The next primary division recorded on the FS form is the *study unit*. A study unit (SU) can be either culturally or arbitrarily defined. Culturally defined, it can be a structure, such as a surface structure with masonry walls or the main chamber of a pitstructure. Or it can be a specifically defined non-structural unit, such as a plaza, midden, or other use area. Arbitrarily defined areas within the site include an excavation unit, trench, or a back dirt pile from a pothunter's hole.

Study unit horizontal and *vertical* refer to the excavation area within the study unit as a whole. Study unit horizontal asks for a type of excavation unit, such as *segment*, *quadrant*, or excavation unit of a defined size on the site grid. Study unit vertical refers to the way in which the deposits are being excavated—as complete natural or cultural strata, or as arbitrary subdivisions of these strata. With reference to both of the above subdivisions, the horizontal and vertical types are then followed by numbers, which again are unique to that particular location. Specific study unit horizontal types, such as segments, are assigned numbers specific to the study unit type and number. Stratum or level numbers likewise refer to those within that specific study unit.

Surface type may not be applicable in all situations, whereas most of the above data should be applicable in nearly all cases. This designation denotes that some sort of change in the stratigraphy within the excavation unit has been encountered. The change could be either cultural or natural and it may be recently derived or prehistoric in age. Whenever a cultural feature was defined in the Dolores excavations, a surface was associated with this feature.

The next two categories of information are definite examples of how the provenience system goes beyond description into interpretation. *Fill/Assemblage Position* (FAP) refers somewhat to both the horizontal and vertical locations. It may be in- or outside a structure as well as within a specifically defined deposit, such as wall- or roof-fall, or from just above a floor surface. The *Fill/Assemblage Type* (FAT) is more interpretive in nature. First, the deposit must be defined as having cultural, post-abandonment, or mixed origins. Once its origin has been determined, it can be further defined as being *in situ*, deposited by wind/water, or a mix of post-abandonment and cultural elements, respectively. This leaves some room for interpretation.

<u>Feature</u>

The *feature* attribute is again not always applicable. There was a separate one-page form for features at Dolores. There is a long list of feature types, which includes pit features of all sizes and varieties, surface features, wall features, and artifact features, such as clusters of a particular artifact type. The feature number is a unique number--only one feature per number per site was used. Once identified, the feature's location both within the site and study unit, as well as within the excavation unit, needs to be pinpointed. The *feature horizontal* and *vertical* categories offer possibilities like those for the study unit above. Feature fill/assemblage type is a way to describe the fill found within the feature—cultural, post-abandonment, mixed, and any of several choices within each of these categories.

The *feature form* (Figure 2.2) applies to the entire feature, whereas the feature as detailed on the field provenience description form applies only to a single provenience. The feature may be spread out among two or more FS forms. The feature form is first organized by site. Next, the feature type and number are listed, then all the FS numbers associated with that feature. Study Unit type and number, grid, datum, area, subarea, and types and numbers of samples collected are all included in this first section, *provenience*. The form then asks for a detailed, written *description* of the feature and allows for information regarding the shape, and existing or inferred dimensions of the feature. The *construction* of the feature includes information on both the original and modified construction episodes. Other things included on this form are construction materials, fill type and written descriptions of observations in the field during excavation. The last two items on the form—consisting of both written description and coded boxes—are internal and external associations, relating to the context of the feature with regard to other features and artifacts.

Point Locations

Point Locations (PLs) are numbered artifacts or clusters of artifacts whose context and/or artifact type is considered significant. The specific location of the artifact(s) is recorded and the item(s) is given a unique PL number. These may be artifacts lying on an occupational surface; it may also be a broken pot in midden or other deposits of which most pieces are present.

CHANGES IN THE FORMS AND DATA CHECKS

These forms were developed early on in the project and were not significantly altered at any time. As a result of this consistency, the way the forms were used, and the types of information recorded on them, were very much the same in 1979 as they were in 1985. The Field Provenience Description form was filled out during excavations with FS numbers being assigned as each new horizontal or vertical provenience was begun. The crew chief checked these forms on a regular basis for consistency and errors. Once fifty forms (representing fifty different horizontal and/or vertical proveniences) were completed, they were turned in to the DAP Lab Director for accuracy checking. If inconsistencies or errors were noted at this point, the forms were returned to the crew chief whose job it was to correct the forms. All forms then, were checked and rechecked before finally being accepted.

POTENTIAL PITFALLS AND BEST STARTING POINTS WITH THE PROVENIENCE AND LINKED PROVENIENCE/ FEATURE DATA FILES

These data files are not as complicated as they might first appear. However, the provenience system used by the DAP is intricate, with each piece following from the previous one. The best way to use and understand these files is to have a copy of the field manual next to the desk. If this is not possible, as will often be the case, it is important to use the included look-up tables frequently. These tables give brief explanations of the different values for a particular attribute. It is also important to keep in mind at all times, that each attribute follows from the previous one and applies specifically to that one, particular provenience. Best of luck to all who pass this point and have fun! Now, let's attempt to apply the data file to address some interesting questions regarding village formation.

PROVENIENCE TUTORIAL: QUERYING THE DATA

The Provenience data file can help address questions on several different levels. We can query this file directly or use it to link to other data files for stronger results. This query will use the PROV10 data file to examine methods of interring the dead to address the issue of village formation.

Persistence in occupation of the DAP area relates to the village formation theme. Persistent places, according to Schlanger (1992:97), are "...places that were repeatedly used during long-term occupations of regions". Toll and Schlanger (1998) have suggested that, in the La Plata Valley of New Mexico to the south of the DAP, burial patterns can indicate a symbolic link to place. Specifically, burial location within a site may indicate different periods within the persistent occupation of an area--not just a site. Midden burials are more likely to have occurred during site occupation while burial within pitstructures after site abandonment may indicate a continued link, or perhaps a continued claim, to the structure after the site's occupants have moved elsewhere.

At Dolores, it seems that we might be able to explore this idea through the linked feature and provenience data file (FEATLNK), looking specifically at the locations of interments. I used the linked data instead of just the provenience file (PROV10) so that I would have full feature data available for the query. To examine the question of whether the occupation of the Dolores area persists through much of Pueblo I, I used hamlets from the Sagehen Flats area that date to the A.D. 760-800 period as well as the later villages in this same area that date to A.D. 840-880. This selection will allow us to learn new things about the continuity of possible cultural attachment to this area, as well as allow us to focus on our larger theme of village formation.

In order to increase our sample size and explore different areas of the project area, I selected several roomblocks at McPhee Village and three sites in the Sagehen Flats locality. At McPhee, there are four roomblocks with pitstructures which may have served specifically ceremonial functions (Wilshusen 1989). Though I would certainly like to look at the interments from these roomblocks, I'd also like to look at roomblocks which are not associated with pitstructures which are thought specifically to be ceremonial. I therefore expanded my sample from McPhee Village to include four additional roomblocks.

Once I selected the sites from which I would like the data to be obtained, the query for this is really quite simple. I first created a query whose results include just interments from the eight roomblocks at McPhee Village and the three sites at Sagehen Flats.

- SITE
  - McPhee Village sites include 4475 (McPhee Pueblo), 4477 (Masa Negra), 5106 (Weasel Pueblo), 5107 (Pueblo de las Golondrinas) [roomblocks at McPhee Village with the over-sized pitstructures]; and 4479 (Aldea Alfareros), 4480 (Rabbitbrush Pueblo), 4725 (Tres Chapulines), 5104 (Willow Flat Pueblo) [other roomblocks at McPhee Village].

- Sagehen Flats sites include 2193 (Dos Casas), 2194 (Casa Bodega), and 4644 (Windy Wheat)

- FETYPE- 70, human burial, not further specified; 72, human burial, primary inhumation; 74, human burial, multiple; 75, human burial, other.
- FENUM- This is the feature number and will allow us to track individual burial features, in the event that we need to go back to the site or specialist reports for feature-specific information.
- SUTYPE- 21, pitstructure, pithouse, main chamber; 42, non-structural unit, midden or refuse deposit.

There was a total of 66 individuals identified in burials at DAP sites. Of these 66, 19 burials representing a total of 23 individuals were recovered at the McPhee sites in the required contexts. None, however were found at the Sagehen Flats sites listed above.

One additional separation we might like to make is the fill from floor interments in the pitstructures. By also requesting the study unit fill/assemblage position (SUFAP) it is possible to distinguish burials from different contexts, such as burials placed in structural fill above roof fall (11) or interments just above the floor of the structure (18) or on the floor (30). The results of these queries and sorts indicated above are in Table 2.1.

Table 2.1 Location of Human Burials, Selected McPhee Village Sites.

SITE	QTY.	FETYPE	SUTYPE	SUFAP
4475	1	Burial, primary	Pitstructure, main chamber	Surface contact, Prehistoric
4475	1	Burial, primary	Pitstructure, main chamber	Structure fill, not further specified
4477	1	Burial, primary	Pitstructure, main chamber	Surface contact, Prehistoric
4725	1	Burial, primary	Pitstructure, main chamber	Structure fill, other
4725	2	Burial, other	Pitstructure, pithouse, main chamber	Surface contact, Prehistoric
5106	4	Burial, mass	Pitstructure, pithouse, main chamber	Surface contact, Prehistoric
5107	3	Burial, other (2) Burial, primary (1)	Pitstructure, pithouse, main chamber	Structure, above roof fall (2); structure, lower fill
4475	3	Burial, primary (2) Burial, not further specified	Non-structural unit, midden or refuse deposit	Outside, not further specified
5107	3	Burial, primary	Non-structural unit, midden or refuse deposit	Outside, not further specified

The query has given us the number of burial features, but this does not necessarily represent the number of total individuals. An inspection of the DAP physical anthropology summary (Stodder 1987: Table 20A.1) shows that in four cases, there are two individuals represented in one burial feature, resulting in a total of 23 individuals.

There are several obvious things that can be said about the results. First, the sample of burials at the sites we queried for and in the contexts we wanted is quite small. Second, those recovered in pitstructure deposits are far greater in quantity than those recovered from midden deposits. However, what do the results suggest with regards to our original question about persistence?

Toll and Schlanger's (1998) work in the La Plata Valley indicate that burial location can represent a symbolic link to place. Midden burials are more likely to have occurred during site occupation while burial within pitstructures after site abandonment may indicate a continued link, or perhaps a continued claim, to the structure after the site's occupants have moved elsewhere. The evidence from the DAP—at least for the sites that we queried for—is more ambiguous with regard to their suggestion. First, burials were recovered at only 5 of the 11 sites; as mentioned earlier, no burials were recovered at the Sagehen Flats sites. Of the five pueblos at McPhee Village from which burials were recovered, four are the ones with the over-sized pitstructures.

The burials recovered at these five pueblos include both pitstructure and midden burials. Pitstructures were preferred as a burial location. Of the 13 burials within pitstructures, eight were recovered from floor or surface contact contexts. One other was found within the lower fill of a pitstructure. Only two burials were found within the upper fill of the pitstructures—these are the only ones which could possibly be compared to Toll and Schlanger's (1998) bench burials. Outside of structures, only six burials were recovered in midden contexts. These were found at sites 4475 and 5107—pueblos which accounted for four of the pitstructure burials and both of the 'bench' burials.

Obviously, these results do not equate to Toll and Schlanger's (1998) findings in the La Plata Valley. A possible further way to test these results would be to expand the query to all of the DAP data; this is more than we shall do here, however it would probably be worthwhile to check these results.

DOLORES ARCHAEOLOGICAL PROJECT
University of Colorado
U.S. Bureau of Reclamation
FIELD PROVENIENCE DESCRIPTION

Site Name

Site Number

Locality 0

Prepared by

Date Assigned

Date Closed

GENERAL PROVENIENCE

F.S. Number

Area

Subarea

STUDY UNIT

IDENTITY

Type

Number

Subdivision Hierarchy

LOCATION

Horizontal (Grid) | Vertical Level

CONTEXT

Surface Type

Fill/Assemblage Position

Fill/Assemblage Type

FEATURE

IDENTITY

Type

Number

Subdivision Hierarchy

LOCATION

Horizontal (Grid) | Vertical Level

CONTEXT

Fill/Assemblage Type

EXCAVATION NOTES

Mode of Collection

Number of Point Locations

Special Specimens: Type Total No.

F.S. BAG TALLY
Date

	Ceramics	Flaked Lithics	Non-Flaked Lithics	Human Bone	Non-Human Bone	Vegetal	Other Inorganic	Other Organic	Other (Specify)
TOTAL									

DOLORES ARCHAEOLOGICAL PROJECT
U.S. Bureau of Reclamation

FEATURE FORM

State | County | Site Number

Prepared by

Date

Locality

General Description

Feature Type Number

Provenience:

F.S. Numbers

Samples Type | Number | Standard

Grid | Datum

Area

Subarea

Study Unit Type Number

Photos
C R X X X X

B/W
C R X X X X

Detailed Description

Shape
Plan
Profile

Dimensions

	Existing	Inferred
Length	.	.
Width	.	.
Depth	.	.

Construction

Original:

Materials

Fill Type

Modifications:

Excavation Observations:

Associations

External
Code | Type | Number
P, F or S

External Associations

Internal
Code | Type | Number
P, F or S

Internal Associations

THE TEMPORAL-SPATIAL SYSTEM

Jonathan Till

TEMPORAL AND SPATIAL CONTEXTS IN ARCHAEOLOGY

The archaeological record is composed of artifacts and features (e.g. houses, campfire hearths, etc.) left behind by people of the past. To make sense of the record, archaeologists try to understand the patterned relationships between artifacts and features. Forces of nature and/or human agency often obscure these relationships in the distant or recent past. In order to filter out these disturbances, archaeologists need to understand how artifacts and features relate to each other in space and in time. An understanding of these relationships is critical in the analysis of these materials and plays a fundamental role in their final interpretation.

THE TEMPORAL-SPATIAL SYSTEM IN THE DAP

An archaeological project as complex as the Dolores Archaeological Program (DAP) needed to respond as well as possible to the demands of temporal and spatial control. The DAP data set contains information about materials from over 100 excavated sites, a number of which had been used by different peoples at different times. Indeed, some of these occupations were hundreds, or even thousands, of years apart! Thus DAP archaeologists created a system of organizing the recovered artifactual materials according to their relationship to space, as well as time, on a site.

The spatial and temporal controls were greatly refined during the course of this 7½-year project. This review summarizes the components of the temporal-spatial system and provides a short bibliography of sources pertinent to this important aspect of the DAP's data files. Additionally, this section briefly reviews the DAP's site typology system.

Given their large study area, DAP archaeologists wanted to examine both intra- and intersite spatial relationships. The former were approached with a system devised by Flannery in *The Early Mesoamerican Village* (1976); archaeologists investigated the latter by distilling an appropriate scheme from regional data, especially based on environmental characteristics. The initial and final systems for both intra- and intercommunity units are illustrated in Figure 2.3. The system is hierarchical in that smaller units can be subsumed under larger ones. For example, an *activity area* may be composed of a hearth. This hearth may belong to an area identified as being a part of a larger *use area* that is shared, in turn, by a *household cluster*.

The same applies to intercommunity units: localities are contained within sectors which are nestled in the larger district or *drainage unit*. In the *Final Synthetic Report*, Kane (1986a:358) further defined the intercommunity units as "...administrative divisions based on topographic features; they do not reflect prehistoric use of the project area." However, Kane also stated the possibility that these units, at the lower levels, may reflect delineations of community land use or, at higher levels, may represent approximate boundaries of ethnic identities or socially tied communities.

With regard to time, the DAP's initial use of the Pecos Classification, a stop-gap measure to begin with, was quickly dumped in favor of a formal system (Kane 1983a: 24-26). DAP personnel crafted a system that consisted of "archaeological units rather than merely temporal units" (Kane 1983a: 24). This meant that particular assemblages of materials, including artifacts and architecture, constituted temporally identifiable groups; however, these groups could, and did, overlap in time. These groups were organized under the headings of *basic units, synthetic units*, and *integrative units*. The basic units (episode and element) were the "...building blocks upon which the remainder of the system rests, and they represent discrete intervals of site use" (Kane 1986a: 359). The synthetic units (subphase, phase, and tradition) were the hierarchical components of the temporal series that had seen little change during the project. The basis for these three units lay in cultural variability as it manifested itself in the archaeological record through space and time. Integrative units (component, local occupation sequence, sector occupation sequence), which also retained their original meanings, were clarified in the *Final Synthetic Report*. Kane (1986a: 360) defined them as "...combinations of basic units that can be used for spatial or temporal comparison."

The descriptions of the synthetic units formed the outline of the culture history overview for the prehistory of the DAP project area (Table 2.2). Several of these overviews have been generated by the project and are recommended for the reader that wishes a detailed summary of the project area's history (e.g., Kane 1984; Kane 1986a; Kane, Gross, and Hewitt 1986). What follows appeared in Kane's prehistoric overview for the *Final Synthetic Report* (1986a:360-402).

There were six recognized prehistoric "traditions" within the area: PaleoIndian, Archaic, Anasazi, Shoshonean, Athabaskan, and Protohistoric. The project area has yielded little or no hard evidence of human occupation during that time period described for the *PaleoIndian Tradition* (Kane 1986a:361). More data was available for the *Archaic Tradition*, particularly during the time interval commonly described by archaeologists in the area as the late Archaic. Indeed, enough material was recovered from eleven excavated and/or tested sites to postulate the *Great Cut Phase*.

The *Anasazi Tradition* was the most prevalent tradition represented in the DAP project area. Evidence for Basketmaker II (BM II) occupation of the area was scanty at best and was described by the *Cougar Springs Phase*. In fact, only one DAP site, a rock shelter (Cougar Springs Cave, Site 5MT4797), was clearly identifiable as a BM II occupation. No subphases were identified for the Cougar Springs Phase. In contrast, due to an increase in occupation and/or use of the Dolores River Valley, the subsequent Anasazi Tradition phases contained two or more subphases. The *Sagehen Phase*, which sees the development of dispersed agricultural settlements, contained three subphases: the *Tres Bobos Subphase*, the *Sagehill Subphase*, and the *Dos Casas Subphase*. The following *McPhee Phase*, which was characterized by the culmination of community aggregation and subsequent abandonment, included three subphases: the *Periman Subphase*, the *Grass Mesa Subphase*, and the *Cline Subphase*. Finally, the *Sundial Phase*, which may be described as a time of sparse or seasonal habitation for the Dolores drainage, consisted of two subphases: the *Marshview Subphase* and the *Escalante Subphase*.

As noted earlier, the phase/subphase system was composed of "archaeological units" that were not strictly temporal. Some of the DAP analyses were hindered by this framework, particularly those analyses (such as the ceramic analysis) that were very temporally sensitive. Consequently, a purely temporal system, composed of seven "modeling periods," was developed (Table 2.2) by 1983. These modeling periods should be considered an important addendum to the temporal/spatial matrix, particularly as they regard specific data classes such as ceramics.

It should be noted that confidence and integrity values, concerning the temporal and spatial assignments to proveniences, were included as a part of the data files (Robinson et al. 1986:22). Confidence values, on a scale of 0 to 4 with the latter representing the highest rating of confidence, rated the strength of the argument used to designate a temporal or spatial value. The integrity tag, with a similar scale of 0 to 4, considered the "purity" of an assignment.

Finally, one may ask what the value of the temporal-spatial system is to the data set. Simply put, it serves as the story within which words fall. Without the plot, the reader would be lost in a morass of words, if not jumbled letters and meaningless punctuation. The DAP's temporal-spatial systematics defines and develops the plot, and even delineates the chapters, of the historic narrative detailing this portion of the Dolores River valley.

THE DAP SITE TYPOLOGY SYSTEM

In conjunction with its temporal-spatial system, the DAP developed a means of site classification based upon site morphology and presumed function. The archaeological literature is replete with site type definitions that go unexplained. Even where these are defined, the terms offer more of an interpretive opinion of what constitutes a particular site than what the original inhabitants thought about these places. In this latter respect, the DAP typological system does not differ. However, its typological terms are clearly spelled out and perhaps more intuitive than other typological definitions.

Simply put, the DAP site typology is based on a simple model of the relationship between the settlement behavior of prehistoric groups and the formal attributes of sites reflective of that behavior (e.g. economic, social, or communications) (Kane 1986:354). Additionally, the typological system is organized around the frequency and duration of use. Accordingly, the three basic site types are defined as habitations, seasonal loci, and limited activity loci while the subcategories are defined according to behavior and function (Kane 1986:354-5).

WHERE TO FIND TEMPORAL-SPATIAL INFORMATION IN THE DAP REPORTS

Most of the information for this summary derives from Allen Kane's "Introduction to Field Investigations and Analysis" in *Dolores Archaeological Program: Field Investigations and Analysis - 1978* (1983a) and "Prehistory of the Dolores River Valley" in *Dolores Archaeological Program: Final Synthetic Report* (1986a).

As noted earlier, the temporal-spatial system essentially includes the typological system. The two are often paired, although the temporal-spatial system is definitely the dominant feature of this matrix. Information regarding the latter will be found with the former. Kane (1983a) is also a good reference that permits insight into the typological system s development.

One needs to be aware that many memoranda that trace the development of the temporal-spatial system are on file at the AHC. The following sections reference a few of these important documents.

DESIGN OF THE TEMPORAL-SPATIAL DATA CLASS

GENERAL ORGANIZATION

The DAP's temporal-spatial system, as the term implies, consists of two basic dimensions. Both are modeled after archaeological and ethnographic analogies (Kane 1983b:19). The spatial dimension differs from the provenience system in that it provides a qualitative description of archaeological space. In short, while provenience informs us about location, the spatial dimension informs us about the kind of location.

As mentioned earlier, the spatial system is defined in terms of intra- and intercommunity units, all of which are hierarchically organized. The components of this system are perhaps best summarized in a tabular format.

Intracommunity Units	Intercommunity Units
1) Activity Area	1) Locality
2) Use Area	2) Sector
3) Dwelling Unit	3) District and/or "Drainage Unit"
4) Household and Interhousehold Cluster	
5) Roomblock unit or roomblock cluster	
6) Habitation	
7) Community Cluster	

It is important to note that not all of these units find their way into the temporal-spatial files. Intracommunity units that are not included are the “dwelling unit” and “habitation.” None of the intercommunity units are coded for under the temporal-spatial system. For definitions of the other units, see Appendix II.

The organization of the temporal system has already been discussed in some detail. However, the application of both dimensions, in the field as well as in the lab, warrants further discussion.

DISCUSSION OF SELECT ATTRIBUTES

Before wading into the definitions of each temporal-spatial attribute (Appendix II, this volume), a brief review of the complex ideas behind certain of these attributes is appropriate. The temporal-spatial system is basically composed of sets of hierarchical units under temporal and spatial frameworks. This section also defines the confidence and integrity attributes and describes how archaeologists arrived at the certain values of these attributes. Please note that some of this language is derived from "Chapter 5: Prehistory of the Dolores River Valley" by Allen E. Kane in the *Final Synthetic Report* (1986a).

Temporal Framework

The DAP defines its temporal framework in 3 sets of units: *basic units*, *synthetic units*, and *integrative units*. The data set only keys for attributes for the first two unit types mentioned here, the basic (episode and element) and synthetic (subphase, phase, and tradition) units. As noted earlier, these units are "archaeological" in nature. In addition to these, the temporal framework also includes purely temporal measures: modeling periods and their subsumed subperiods. See Table 2.2 for a breakdown of the synthetic units and modeling periods.

Spatial Framework

The DAP spatial systematics have been previously described in terms of intracommunity and intercommunity units. It is important to note here that the data files only deal with the intracommunity units. From smallest to largest, these are as follows: activity area, use area, household cluster, interhousehold cluster, roomblock unit (or cluster), and community cluster.

USE OF THE TEMPORAL-SPATIAL SYSTEM

Temporal-spatial data were recorded with the help of a number of forms. These forms are briefly summarized by Farley (1981). The forms include the Activities Recording Form, Use Area Form (with attached Spatial Form), Household Cluster Form (with attached Spatial Form), and a Temporal Form. All of these forms are linked, in one way or another, to the Field Provenience Description Form. DAP archaeologists could describe the data demanded by these forms while in the field or in later work. However, the forms were not completed until the interpretation of the spatial or temporal units was complete (Farley 1981). The AHC houses guidelines for each of the forms.

DAP archaeologists built in certain measures that allowed them to sort out strong from weak examples of certain spatial or temporal units. These measures are described as *confidence* and *integrity*. *Confidence* refers to the degree of certainty for a particular temporal or spatial assignment to an object while *integrity* basically refers to the "purity" of context for an object. While these measures are prone to sometimes subjective judgements, the DAP staff utilized guidelines to help standardize these assignments. These guidelines follow a scale of 1 to 4 with 1 the weakest and 4 the strongest. The standards* are as follows:

Confidence

0 Not applicable.

1 Lowest confidence. There is no strong argument for the assignment, but this is the best apparent alternative

2 This assignment is best among the alternatives.

3 This assignment is supported by a strong argument, and there are no apparent alternatives.

4 Highest confidence. This assignment is supported by multiple independent lines of evidence.

Integrity

0 Not applicable.

1 Lowest integrity. The assignment is based on disturbed or surface deposits which are likely to contain considerable extraneous material, but from which at least half of the material is likely to represent the temporal/spatial unit. (Note: If even the lowest integrity level cannot be confidently designated to the material, it should be assigned to a larger temporal/spatial unit.)

2 Mixed, redeposited, or disturbed strata, fill, or surfaces from which 70-85% of the materials are likely to represent the temporal/spatial unit.

3 Cultural surfaces or strata which may have been slightly disturbed by abandonment or minimal post-abandonment activity, but from which 85-95% of the materials are likely to represent the temporal/spatial unit.

4 Highest integrity. The context is undisturbed, sealed, or catastrophically abandoned cultural surfaces or strata units.

*These standards are derived almost verbatim from the "Coding Guidelines for the DAP Activities Recording Form" (Kane and Robinson 1984:354, 373-74).

DATA CLASS FOR TEMPORAL-SPATIAL SYSTEM

The archaeologists of the DAP organized the temporal-spatial system according to the various data classes, essentially pairing up each "basic" data class with a fairly standardized set of temporal-spatial attributes. Additionally, the provenience information specific to each specimen is included. Each pairing constitutes a new data file which is quickly identified with the prefix "TS-" in front of the initial data class abbreviation (e.g. "Flaked Lithic Tools" is "FLT"; "Miscellaneous" is "MISC"). Some of these data files are redundant (and are marked as such); their attributes are already contained within a larger data class. A list of these temporal-spatial data files, under their "basic" data class headings, follows:

Flaked Lithic Tools

- TSFLT4 This data file consists of the temporal-spatial attributes paired with the provenience file and the data file for flaked lithic tools.
- TSFLP3 This data file includes some additional temporal analysis fields. It also includes some source materials data and toolkit study variables.
- TSHFT3 This data file consists of temporal-spatial attributes paired with objects determined to be hafted tools (already included in TSFLT4).
- TSPJP3 This data file consists of temporal-spatial attributes paired with projectile points (already included in TSFLT4).
- TSMWR This data file consists of temporal-spatial attributes paired with data obtained during lithic microwear analysis. Please note that this data file is potentially obsolete and should only be used after conferring with the Anasazi Heritage Center.

Nonflaked Lithics

- TSNFL4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for nonflaked lithic artifacts (e.g. ground stone).

Debitage

- TSDEB4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for lithic debitage.

Ceramics

- TSCER4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for ceramics.

Botanical Resources

- TSBOT4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for macrobotanical collections.

Bone and Shell

- TSFAU4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for non-human bones.
- TSWBS4 This data file consists of temporal-spatial attributes paired with data from the worked bone and shell data file (WBONE20) and the TSFAU4 data file.

Samples

- TSSAM4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for samples.
- TSDAT3 This data file consists of temporal-spatial attributes paired with the information for dates (already included in TSSAM4).

Miscellaneous

- TSMISC4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for miscellaneous objects.

Provenience

- TSPRV4 This data file consists of temporal-spatial attributes paired with provenience data only. There are no objects in this data file; nonetheless, the data contained herein are critical.

CHANGES TO THE TEMPORAL-SPATIAL SYSTEM

The number of small changes to the temporal-spatial system are considerable; however, the basic schemes for both dimensions remained largely the same throughout most of the project. The two most major changes have already been mentioned: the replacement of the Pecos Classification with a project specific phase/subphase system after the first excavation season and the addition of the modeling period/subperiod system.

POTENTIAL PITFALLS AND STARTING POINTS

There are several problems or misunderstandings that can occur when working with the temporal-spatial system. Indeed, users of this guide may find problems that its editors never encountered. Nonetheless, an experienced student of archaeology will find this aspect of the DAP database to be of considerable use and interest. What follows are several observations that may help database users avoid a few problems before wading into the temporal-spatial quagmire.

First, consult Appendix II and reference the various temporal-spatial attribute definitions located there. These are quick definitions; a full list of the attribute values is available in the look-up tables for the temporal-spatial files.

The user will note that a number of these attributes work with the integrity and confidence of an attribute type (e.g. community cluster assignment, phase assignment, etc.). These attributes can be helpful for filtering out potentially bad data. However, one should understand first the operations of confidence and integrity (explained above) and decide on the quality of data that one desires. Knowing these two things, one can determine what degree of filter is necessary. For example, if a researcher knows that she wants to pull all of the reconstructible ceramic vessels from Dos Casas subphase contexts and doesn't particularly care for the condition of the context, she may decide that she wants a high confidence for the subphase and that integrity is really not a question.

When working with modeling period attributes, one should select only for the attributes MPN, MPN1, and MPNEW. The attribute MPN2 only contributes to the calculation of MPN1. Also, since ceramic information was heavily used to support modeling period assignments, researchers should not use these period assignments to test models of ceramic change.

Oddly, for all the attention given to the development of a hierarchical spatial system, the DAP does a poor job of summarizing its final determinations in print. Researchers for the database guide could find no final comprehensive printed master list of assigned community clusters, interhousehold numbers, roomblock numbers, household cluster numbers, use area numbers, or activity area numbers. While one might not expect to find the assigned numbers of the smaller spatial attributes, the larger entities, such as community cluster and interhousehold numbers, ought to be readily on hand (Figure 2.4). Some of these values may be found embedded throughout the DAP site report volumes. Preliminary values for the community clusters and some of their associated household clusters may be found in Kane (1980b), Kane (1982), or Kane (1983a).

The temporal assignments are much better documented in print. Robinson et al. (1986:Table 1.13) offer a final list of temporal assignments of elements and episodes, with associated phases and subphases and modeling periods and subperiods, for each excavated DAP site. A summary version of this table is presented in Appendix V of this guide. It should be possible to generate a total master list of final DAP temporal-spatial assignments by querying the TSPRV4 file in the event that it is needed. Because of the large size of these files, only several of the larger and more frequently used temporal-spatial files are included on the CD. See Appendix III for a list of these files.

Table 2.2 DAP Phases and Subphases by Tradition

Tradition	Phase	Subphase	Dates	Subperiods (by subphase)*
PaleoIndian			Prior to 5000 B.C.?	
Archaic			5000 B.C. - A.D. 500	
	Great Cut		2000 B.C. - A.D. 500	
Anasazi			A.D. 1 – 1200	
	Cougar Springs		A.D. 1 – 600	
	Sagehen		A.D. 600 – 850	
		Tres Bobos	A.D. 600 – 700	Subperiod 1.1 Subperiod 1.2
		Sagehill	A.D. 700 – 780	Subperiod 1.3 Subperiod 2.1 Subperiod 2.2
		Dos Casas	A.D. 760 – 850	Subperiod 2.2 Subperiod 2.3 Subperiod 3.1 Subperiod 3.2 Subperiod 4.1
	McPhee		A.D. 850 – 975	
		Periman	A.D. 850 – 900	Subperiod 4.1 Subperiod 4.2 Subperiod 5.1
		Grass Mesa	A.D. 880-925	Subperiod 5.1 Subperiod 5.2 Subperiod 6.1
		Cline	A.D. 900 – 975	Subperiod 5.2 Subperiod 6.1 Subperiod 6.2
	Sundial		A.D. 1050 – 1200	
		Marshview	A.D. 1050 – 1200	Subperiod 7.2 Subperiod 7.3 Subperiod 7.4
		Escalante	A.D. 1125 – 1200	Subperiod 7.3 Subperiod 7.4
Shoshonean and Athabaskan			A.D. 1500 – 1800	
Protohistoric			A.D. 1775 – 1870	

***DAP PERIODS**

- Period 1 (A.D. 600-720)
  - Subperiod 1.1 (A.D. 600-660)
  - Subperiod 1.2 (A.D. 660-700)
  - Subperiod 1.3 (A.D. 700-720)
- Period 2 (A.D. 720-800)
  - Subperiod 2.1 (A.D. 720-760)
  - Subperiod 2.2 (A.D. 760-780)
  - Subperiod 2.3 (A.D. 780-800)
- Period 3 (A.D. 800-840)
  - Subperiod 3.1 (A.D. 800-820)
  - Subperiod 3.2 (A.D. 820-840)
- Period 4 (A.D. 840-880)
  - Subperiod 4.1 (A.D. 840-860)
  - Subperiod 4.2 (A.D. 860-880)
- Period 5 (A.D. 880-920)
  - Subperiod 5.1 (A.D. 880-900)
  - Subperiod 5.2 (A.D. 900-920)
- Period 6 (A.D. 920-980)
  - Subperiod 6.1 (A.D. 920-940)
  - Subperiod 6.2 (A.D. 940-980)
- Period 7 (A.D. 980-1250)
  - Subperiod 7.1 (A.D. 980-1025)
  - Subperiod 7.2 (A.D. 1025-1100)
  - Subperiod 7.3 (A.D. 1100-1175)
  - Subperiod 7.4 (A.D. 1175-1250)

2.3 DAP spatial systematics. Adapted from Kane 1986: Figs. 5.1 and 5.2.

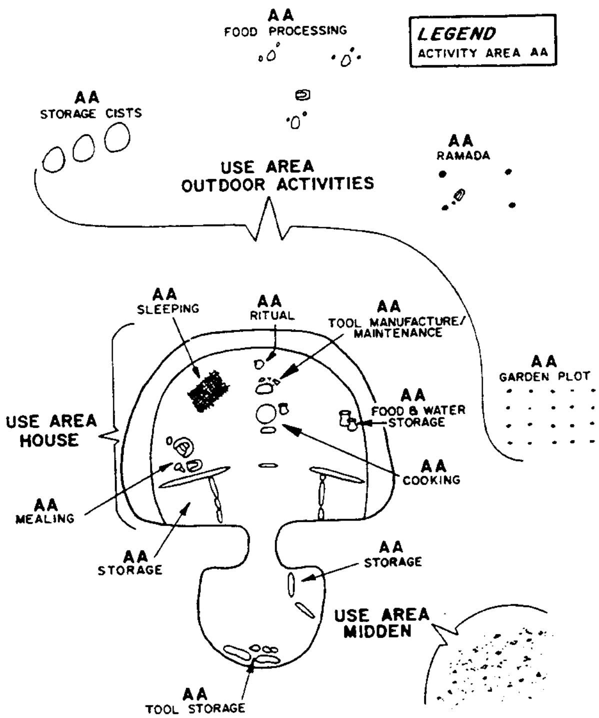


Figure 5.1 – Relationships of intracommunity spatial units at the household cluster level. Not to scale.

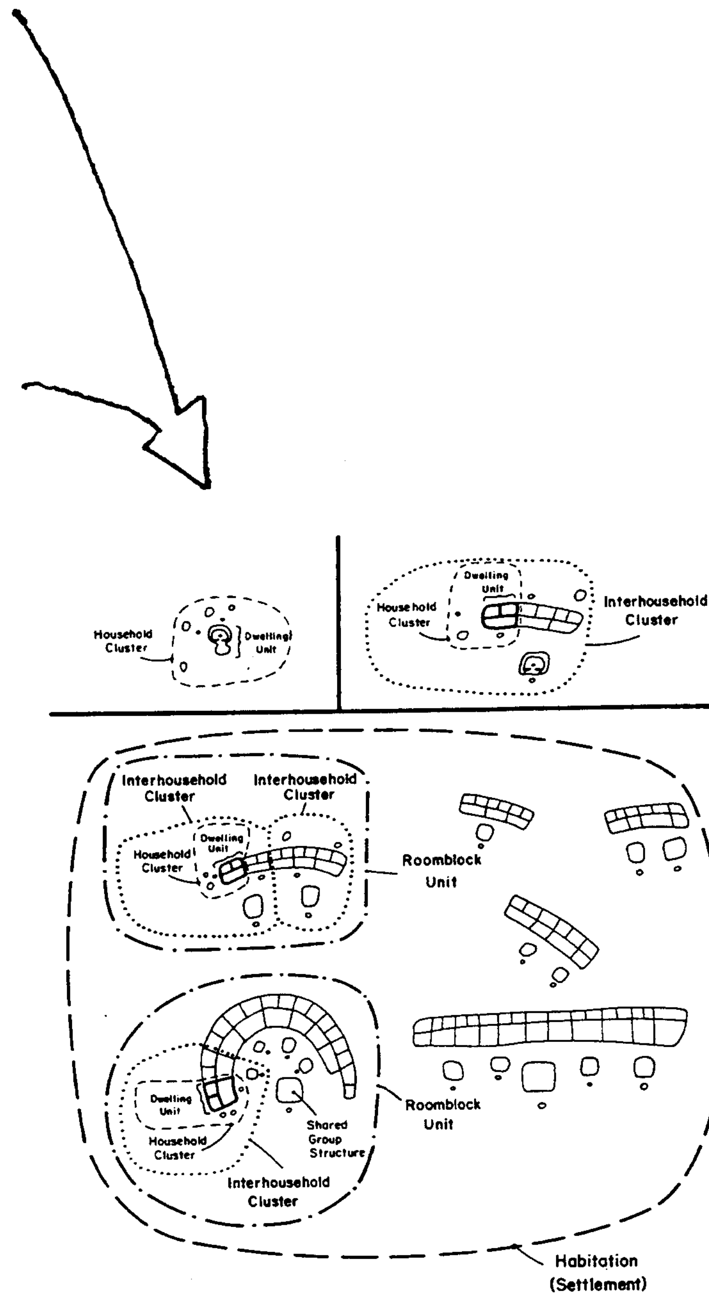


Figure 5.2 – Relationships of intracommunity spatial units above the household cluster level. Top left: Tres Bobos or Sagehill Subphase settlement containing 1 dwelling unit and 1 household cluster. Top right: Dos Casas Subphase settlement containing 1 roomblock unit and 1 interhousehold cluster with several dwelling units. Bottom: Periman Subphase settlement with multiple roomblock units containing numerous interhousehold clusters and dwelling units. Not to scale.

2.4 Plan of household clusters and interhousehold clusters, Element 2, McPhee Pueblo. From Brisbin et al. 1988: Fig. 2.92.

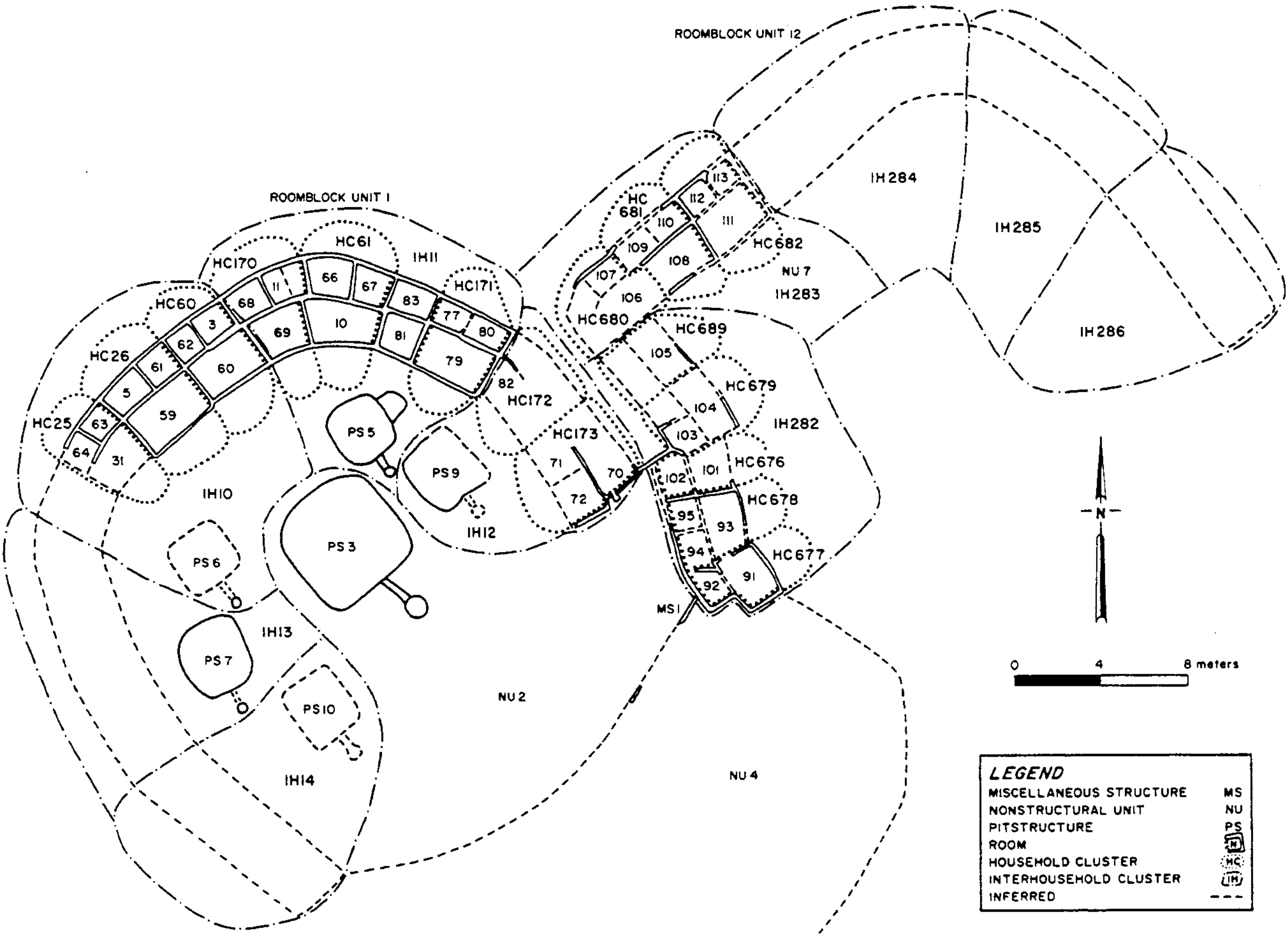


Figure 2.92 – Plan of household clusters and interhousehold clusters, Element 2, McPhee Pueblo.

3
The Artifact Data

THE DAP CERAMIC DATA

Karin Burd

CERAMICS IN ARCHAEOLOGY

Ceramics within the DAP, and the Southwest in general, are vital to addressing many of the questions frequently asked by archaeologists. Ceramics in the Southwest have traditionally been used to determine the age of a site through ceramic seriation. *Seriation* groups ceramics into types based on technology (temper, paste, paint type, etc.) and style (designs). Then, using a provenience with known dates, usually from tree-ring dates (Breternitz 1966), the groups of ceramics are dated. For discussions on ceramic types found in the DAP see *Prehistoric Ceramics of the Mesa Verde Region* (Breternitz et al. 1974). Once the ceramics are typed and dated they can be used to answer a variety of questions. Because of the materials used, archaeologists can determine where ceramics came from and how they were constructed. Design styles can indicate group preferences. Not surprisingly, ceramics were used by the DAP to address a variety of larger issues and questions. These issues include, but are not limited to: immigration, social organization, foreign interaction through exchange, local exchange, production and distribution, as well as investigations of ceramics as proxy measures of human population and site occupation duration. (For an excellent study of exchange see Errickson 1988.) Traditional ceramic studies carried out by the DAP included ceramic dating using typology, as well as regression and seriations to provide temporal control for the above mentioned studies of culture process.

HISTORY OF CERAMICS IN THE DAP

Ceramics are by far the most abundant single class of artifacts recovered by the Dolores Archaeological Program. *The Additive Technologies Group (ATG)* was responsible for all the administrative and analytical activities involving the ceramics of the DAP. The ATG defined "ceramics" as fired pottery, unfired clay, and ceramic raw materials (clay, temper, and pigment). The ATG analyzed and recorded attributes for these types of artifacts.

Typologies and Culture Areas—Typological affiliation has been assigned traditionally to place the sherd or vessel in time and space. For example, sherds may be assigned to the Northern San Juan region, and date to A.D. 1250 based on the way they were made and the designs found painted on them. There are four ceramic traditions usually represented in DAP ceramics: Northern San Juan, Cibola, Kayenta, and Chuska. These have been termed "culture categories" by the DAP and are descriptive of the larger geographic area from which the vessel originated.

Types—These culture categories also have specific named types associated with them, such as Mesa Verde Black-on-white, or Mancos Gray. Type names are assigned based on a two-part system. The first part (such as Mesa Verde) refers to the place in which the type was first found and is presumably (but not always) the most abundant. The second part of the name (black-on-white) refers to the paint color (black) on the background color (white). Ceramics throughout the Southwest are named based on this system.

Tracts—Within these culture categories the ATG have defined "tracts" to place the sherd or vessel more precisely within a culture area. These tracts designate smaller manufacturing areas within a culture category, for example the Dolores tract of the Northern San Juan tradition (Figure 3.1). Ceramics within the Dolores tract of the Northern San Juan would have been manufactured near Dolores, Colorado, which is in the Northern San Juan Culture area.

Grouped Types—Groups were also defined to accommodate sherds that did not have enough attributes present to assign them to formal types. These groups included categories such as Early Pueblo Gray.

Vessel form—These data are another useful category in descriptive reporting. Vessel forms include things like bowl body, bowl rim, jar body, jar rim, kiva jar, bowl dipper, or lug handle. These designations are assigned on the basis of sherd attributes. There is an expectation that vessel form and surface manipulation will correlate. A simple example follows; if a body sherd is painted on the interior of the vessel, then it is a bowl.

Post firing modifications—reflect activities such as wear associated with the intended use of the vessel (like from stirring or scraping), repairs, or reshaping of an item (or fragment of an item) for a different purpose.

Reconstructible vessels—are often found in excavations. Labeling a cluster of sherds as reconstructible if the vessel can indeed be fully or partially put back together can offer more information than a collection of sherds. For example, an analyst can make inferences on vessel size, shape, and function and storage capacity to address larger questions of social organization.

The ATG carried "out analyses in support of descriptive reporting, as well as in support of a subset of the problems stated in the program research design and of those devolving from the modeling effort" (Blinman 1986a: 57). In other words, the ATG was responsible for analyzing the ceramic data and using this information to address the five problem domains of the DAP (outlined below). The DAP not only analyzed the ceramics, but used the analysis in several studies designed to learn more about the communities from which the ceramics came.

Ceramics in the DAP are used in several different ways and at different levels of interpretation and analysis. At the most basic level, ceramic seriations were used by the DAP to date sites and assemblages, whether in the field or in the lab.

Once typologies are designated and morphological attributes are described, researchers use this information in a variety of ways. Besides the basic level of designating time and place through seriations, ceramics can be used in a variety of studies that explain social, technological and organizational behavior in the past.

WHERE TO FIND CERAMIC INFORMATION IN THE DAP

After the minimal descriptive information was recorded, the ATG used this information to address larger problems. Ceramics can be used to address all five of the problem domains outlined by the DAP research design. Below are some examples within each of the five problem domains. Problem domain:

> The Economy and Adaptation problem domain is concerned with what resources were available and how these were utilized through time in the Dolores area. Wilson and others (1988) address clay resources and resource use within the Dolores area.
>
> For Population Estimates the DAP used ceramic studies. The researchers determined population size in the DAP region during different time periods by estimating the amount of ceramic sherds and ceramic trash that is produced by a certain number of people (Kohler 1988). Blinman (1988b) later expanded these studies later by studying whole vessels and vessel assemblages.
>
> Social Organization can be divided into economic, political, ideological and "general" social organization. Blinman and Wilson (1988a) examine local social organization based on ceramics in the DAP area. And Blinman (1986b) examines economic and social organization through a study of cooking jar volumes.
>
> Extraregional relationships are easily and often studied using ceramic assemblages. For example, Wilson (1988) considers a migration model based on Mogollon Smudged ceramics from the DAP area. Additionally there are several chapters in the DAP volumes that consider issues of exchange, migration and other connections between peoples within and outside of the DAP area (i.e. Blinman 1986c; Errickson 1988; Waterworth 1988).
>
> Finally, Cultural Process is designed to address change over time within a culture or site. Ceramics with their ability to render temporal information offer an excellent source for examining cultural process. For example, Blinman and Wilson (1988b) look at the frequencies of trade wares over time.

OTHER STUDIES USING DAP MATERIALS

Additionally, ceramics are useful for asking questions that the DAP did not address, such as our theme of village formation. Ceramics are extremely useful in addressing these types of larger questions because they speak to many different aspects of life. For example, a study of whole pot capacities (Figure 3.2) and their association with large public structures can suggest feasting activities, which may be viewed as an integrative method for a village.

Most of the volumes dedicated to reporting a site or number of sites list the ceramic types recovered and sometimes the frequencies of these types. If you are looking for raw data, this is the place to go; however, the information is not synthesized. As visible in the above examples, the best source for synthetic ceramic studies and information can be found in *Supporting Studies: Additive and Reductive Technologies (*Blinman et al. 1988). Chapters 7-13 are dedicated to applying ceramic data to larger research questions. Chapter 15 describes the process involved in calibrating the ceramic change in the DAP assemblage, which became the basis of the ceramic dating procedures. Additionally, the *Final Synthetic Report* (Breternitz et al. 1986) devotes chapters 12 and 15 to synthetic ceramic studies. Chapter 12 uses ceramic studies to address measures of subsistence intensification and economic and social organization. And, chapter 15 looks at exchange and interaction using ceramics from the DAP. Finally, in the *Research Designs and Initial Survey Results* (Kane, Lipe et al. 1986), Blinman outlines the methodology and uses of the ceramic material from the Dolores Archaeological Program. This is an excellent source for understanding the roles that ceramics play in the interpretation of the project area.

CONCLUDING THOUGHTS

The ceramics data may seem overwhelming and unwieldy, however there is a wealth of information waiting to be uncovered. Ceramic studies can offer insight into many diverse research questions, as evidenced by the synthetic studies accomplished by the DAP. There are a number of resources available outside the DAP volumes for information on ceramics in this area. These include the following: Blinman 1988c, 1989; Hegmon 1995; Hegmon et al. 1997; Wilshusen and Blinman 1992; Wilshusen and Wilson 1995. Good luck and enjoy the wealth of information available in the ceramics data!

DESIGN OF THE CERAMICS DATA CLASS

ORGANIZATION OF THE DATA

The ceramics data class contains only one single data file: CERAM10.

William A. Lucius (Blinman et al. 1984) designed the preliminary analysis system for ceramics. Traditional typologies were included in analysis and recording, but the bulk of the system focuses on attributes as opposed to types. The system includes aspects of production technology, resource use, traditional typology and vessel form, and accommodates both fired and unfired ceramic materials (Blinman et al. 1984). This analysis system was designed to describe sherds rather than vessels. The presence of reconstructible vessels is noted as labels attached to data lines that describe the sherds that comprise the vessels (Blinman et al. 1984).

The attributes used in the ceramics analysis at the DAP were conditioned by a concern for adequate inventories, descriptive reporting and anticipated data requirements of the DAP research design. The data classes of the DAP reflect two types of analysis: preliminary and intensive. Preliminary analysis consists of comprehensive descriptions and inventories that are designed to give information on construction techniques, typologies, comprehensive description and inventory. The second type of analysis is an intensive one that provides focused descriptions about subsets of ceramic materials. These were designed to address specific research problems of the DAP. Intensive analyses were generally short term-projects. Methods and results of these projects are recorded elsewhere, and not in the ceramics data class file.

The attributes and their values were chosen by the DAP to provide adequate inventories of materials and descriptions of the materials. Certain attributes were chosen to represent traditional typologies as well. There are a total of 23 attributes analyzed in the DAP ceramics data file, which are described below. Of these 23, nine are designed for inventory purposes. These include: state county, site number, field specimen number, catalog number, point location number, lot count, and lot weight, as well as special handling status and special specimen type. The temper category relates to resource use, as well as production technology. Six attributes relate to production technology. These include paint type, temper, surface manipulation, surface compaction, surface cover, and paint color. Three attributes define aspects of traditional Southwest pottery typology. The bases for assignment of sherds to culture categories "include aspects of resource use (temper, clay, and paint), technology (forming and firing techniques), vessel form, and decorative style" (Blinman et al. 1984:66). These attributes of traditional Southwest pottery typology include culture category, ware, and type. Additionally, three attributes help identify reconstructible vessels: rim count, special specimen type, and special specimen number. Detailed descriptions of attributes and values, found in Appendix II, are based on a lab manual produced by Blinman and others (1984).

Changes in the Data Class

Certain inconsistencies may arise in the data file that could potentially affect interpretations of these data. These inconsistencies arise from modifications of the system made throughout its duration of use. Key modifications made by the DAP are also noted in Appendix II. Many substantial changes were made to the attributes and values in September of 1981 (Blinman et al. 1984). DAP analysts attempted to correct for many of these changes, however researchers should be aware that there is still a chance some of these data may be corrupt. There are no published accounts of these earlier data proving to be problematic so far.

Field Procedures

Details of the procedures for collection of the ceramic material in the DAP can be found in the DAP field manuals and will not be explained in detail here (Bohnenkamp et al. 1984; Kane and Robinson 1984). Ceramics were segregated by provenience in the field and identified by a unique FS number associated with each provenience within a site. In special circumstances (such as structure floors), FS's were subdivided by point location numbers. All of the sherds found within a provenience and labeled with FS and or PL numbers were bagged together. If there were ceramic items within a provenience that required special handling (such as sherds with fugitive red paint, reconstructible vessels or unfired clay), then this was noted. The bags were then transported from the field to the lab.

Lab Procedures and Data Checks

In the lab, ceramic artifacts were cleaned prior to preliminary analysis and the provenience data were verified. Unfired ceramics or ceramics with fugitive red pigment were not washed, but picked clean, dry brushed or left untreated to avoid loosing potential information (Blinman et al. 1984). Prior to 1982, sherds were soaked in diluted hydrochloric acid (less than 1 percent), however, this practice was discontinued in 1982, due to the effect residual acid had on the sherds and labels (Blinman et al. 1984).

Sherds that were not analyzable were discarded. These included sherds that were less than 1.5 x 1.5 cm or lacked one surface (Blinman et al. 1984). Sherds that were analyzable were divided into lots, which were broken into groups of sherds with the same unique attribute value string (e.g., all the plain gray sherds with sand temper and similar surface treatment from a particular provenience might comprise a single lot). These lots were assigned sequential catalog numbers within an FS.

A different analyst than the one who conducted the preliminary examination, copied data from the original analysis slips to data recording forms. This served as an additional data check and questions or problems could be resolved immediately. The forms were then sent to the Data Processing Group who entered the information into the computer and generated data lines. These files were then given back to the Additive Technologies Group for a final editing.

Data checks were an important part of the analysis conducted by the DAP. In fact, the DAP regularized the methods for data checks of the computerized information. Once the analyst finished completing the forms for several lots of items, an assistant task specialist checked these forms. This task specialist looked for completeness and internal consistency, as well as for possible illogical codes. If the form passed this check, it was photocopied and sent off to be entered into the computer. Once this was completed, the information was printed out and each line of information was checked against the photocopy. In addition to these checks, the computer section ran computerized searches for duplicate lines, out of range values and orphan values. These checks were necessary to ensure that the computerized files were clean, consistent, and useable.

<u>POTENTIAL PITFALLS AND STARTING POINTS</u>

Reconstructible vessels were handled differently and this handling should be consulted if you intend to use reconstructible whole or partial vessels in a study. They were given a sequential number within a site series and all the data lines for sherds that are part of the vessel were labeled with the number of the reconstructible vessel.

Additional care should be exhibited when dealing with sherds and vessels collected and analyzed prior to 1982. Researchers should be aware that reformatting of the data class occurred during this time. Whileinconsistencies in the earlier material were corrected, it is possible that some errors remain in these early analyses.

Because ceramics can offer such a wealth of information on many different levels of analysis and interpretation, they are widely used in Southwest studies. They have been used in the past primarily to address questions of chronology, cultural affiliation, and exchange/interaction. The following example query illustrates some of these traditional applications as well as others.

CERAMICS TUTORIAL: QUERYING THE CERAMICS DATA CLASS

Archaeologists develop typological systems to organize the material culture remains that they identify in archaeological sites. Ceramics provide an excellent example of how multiple typologies can be applied to one type of artifact and how, if used carefully, these can contribute to our knowledge of a prehistoric site's occupants.

For example, we can use the ceramics data class to discuss village formation by focusing on ceramic construction and style. Issues of style can play an important role in attempts to recognize ethnic groups as well as different ethnic groups living in close proximity. Recently, scholars (Sackett 1990; Stark 1995; Stark et al. 1995) have suggested that prehistoric potters make choices in the materials, methods and techniques they use when they construct pots. This is called isochrestic style. These choices will reflect cultural affiliations and preferences that may indicate ethnic ties.

Additionally, studies by Washburn (1989) have suggested that a detailed stylistic study of the ways in which geometric designs (symmetry) are constructed in textile and ceramic motifs, will provide insight into aesthetic choices made by groups of people. She further suggests that these choices indicate ethnic diversity. Combining these two strategies (isochrestic style and symmetry) into one study could possibly provide a researcher with a powerful tool for examining ethnic differences and possible ethnic blending in a village setting.

A close, diachronic ("through time") study of the ceramic production techniques in the southwestern portion of the project area may inform us of the degree of integration within the communities that made up this area. In order to conduct this stylistic analysis, the analyst will need ceramics from a distinct provenience and finite slices of time to account for changes in styles over time. To this end, it might be good to start analyzing ceramics from different sites occupied at approximately the same time. The following example suggests how a researcher might query the ceramics data to address the issue of ethnicity through style.

A researcher wants to conduct Neutron Activation Analysis (NAA) on sherds from two different sites to determine whether the prehistoric potters at these sites used different clay and temper sources in constructing their pots. The researcher believes that possible differences found in the sources suggest differential access to these resources along culture historical (ethnic) lines. The researcher therefore needs to ask the Anasazi Heritage Center to pull the relevant lots of sherds so that she can obtain a good sample for her NAA study. She will use the ceramic analysis data in the CERAM10 file for her initial search. The researcher determines two sites [SITE] that she feels best represent two distinct villages based on differences in site layout. Casa Bodega (5MT2194) and Dos Casas (5MT2193) were both occupied at approximately the same time in the late 700s. The researcher decides to isolate only white ware ceramics. Therefore, she would need to select only white painted sherds [WARE] that are generally local (produced within the Mesa Verde/San Juan region) so she would need to select items from the appropriate "cultural regions" [CULTCAT]. A careful archaeologist, she is curious (and dubious) about how this latter category might be determined and labeled. She decides to see if the temper of the vessels might have anything to do with this categorization [TEMPER]. To get the full name of the ceramic type, she queries the data file for the "traditional type" names as well [TRADTYPE]. Finally, she requests the artifacts' object identification numbers so she can request these from the Anasazi Heritage Center. With the information given below, the researcher is ready to run a small series of queries to isolate the artifacts she needs from which to pull her sample.

[SITE] Enter 2193 for Dos Casas
[CULTCAT] Enter 2 (Mesa Verde, Dolores), 10 (Mesa Verde, Blanding), 11 (Mesa Verde, Mesa Verde), 12 (Mesa Verde, San Juan), 16 (Mesa Verde, Cahone), 18 (Mesa Verde, Sandstone), and 19 (Mesa Verde, Animas)
[WARE] Enter 03 (White Ware)
[TRADTYPE]
[TEMPER]
[COBJECTID]

The same query should be run for 5MT2194 (Casa Bodega). In the end, our researcher would find about 150 sherds available for study from 5MT2193 while 30 sherds are available from 5MT2194. She also notes that the temper does seem to be a determining factor for the ceramics' "cultural" designation.

Using this information, and the object identification numbers, the researcher should get a list of white ware painted sherds from the two sites that she chose from the time period that interests her. She would give the list of object identification numbers to the Heritage Center to select and pull a sample for her analysis.

As suggested above, the cultural category, listed under CULTCAT, is determined by the temper. What is not as obvious perhaps is that these ceramic "types" [TYPE] are a part of a larger ceramic tradition, represented by design style. To examine this further, the researcher decides to perform a stylistic analysis of local White Ware vessels [WARE]. She decides that a study of reconstructible ceramic vessels is necessary to fully understand the intricacies of symmetry. To get a reasonable sample size (one that is not too large or too small), she decides to query the data file about one of the larger sites [SITE] excavated by the DAP: McPhee Pueblo (5MT4475). Using these attributes, and the special specimen type [SSTYPE] that calls for reconstructible vessels, she develops a query that will let her develop a list of objects [COBJECTID] that she can request from the Heritage Center. The query calls for the following:

[SITE] Enter 4475 for McPhee Pueblo
[WARE] Enter 03 (White Ware)
[TYPE] Enter >0 and <16 to get all the appropriate ceramic types
[CULTCAT] Enter 2 (Mesa Verde, Dolores), 10 (Mesa Verde, Blanding), 11 (Mesa Verde, Mesa Verde), 12 (Mesa Verde, San Juan), 16 (Mesa Verde, Cahone), 18 (Mesa Verde, Sandstone), and 19 (Mesa Verde, Animas)
[SSTYPE] Enter 81 (Reconstructible Vessels)
[COBJECTID]

The researcher discovers that 69 reconstructible vessels meet the above specifications. With this list in hand, she can send a request to the Anasazi Heritage Center to see these particular vessels and their associated documentation.

3.1 Approximate geographic locations of ceramic manufacturing tracts within the Mesa Verde region. From Blinman and Wilson 1988a: Fig. 9.2.

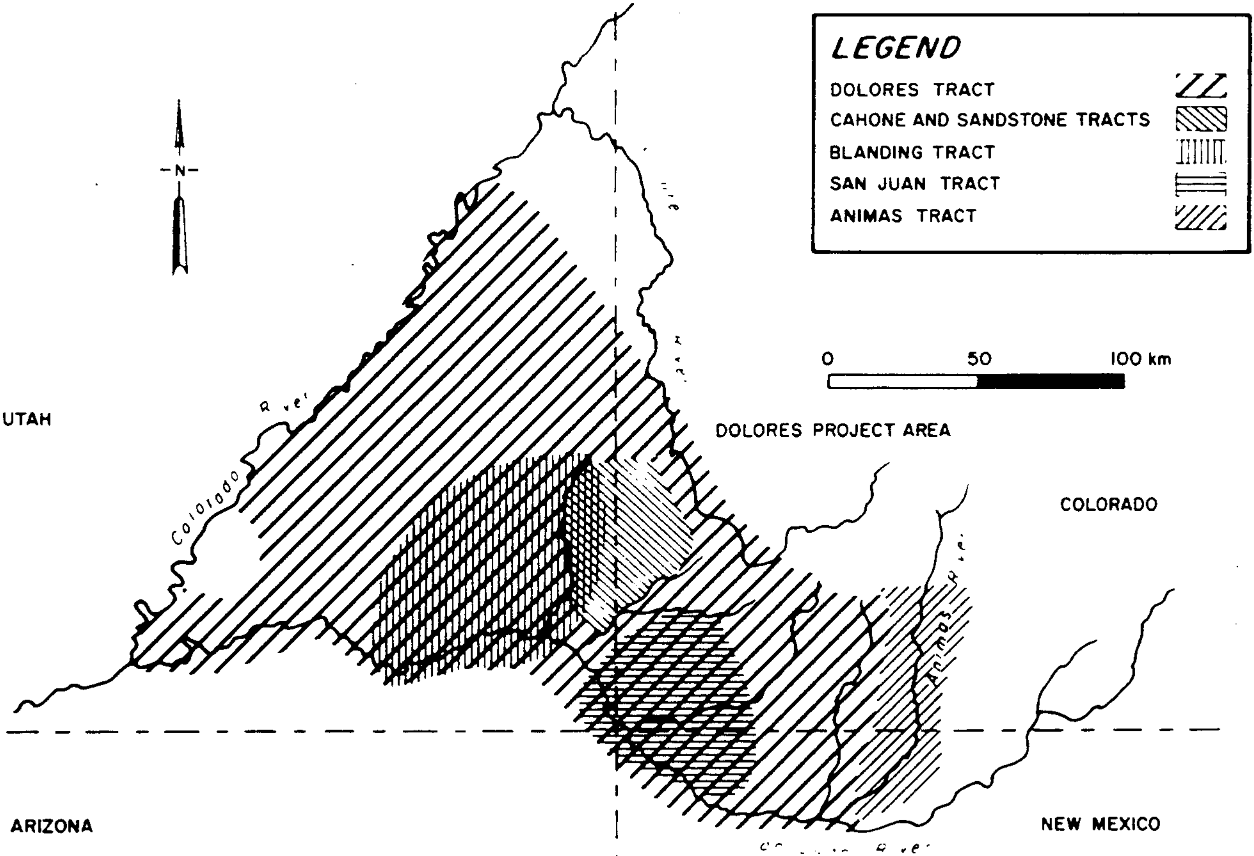


Figure 9.2 – Approximate geographic correlates of ceramic manufacturing within Mesa Verde region. Boundaries of tracts are inferred from limited data and should be interpreted as generalizations.

3.2 Moccasin Gray jar (vessel 15) recovered from Site 5MT2181.
From Etzkorn 1986: Fig. 6.26.

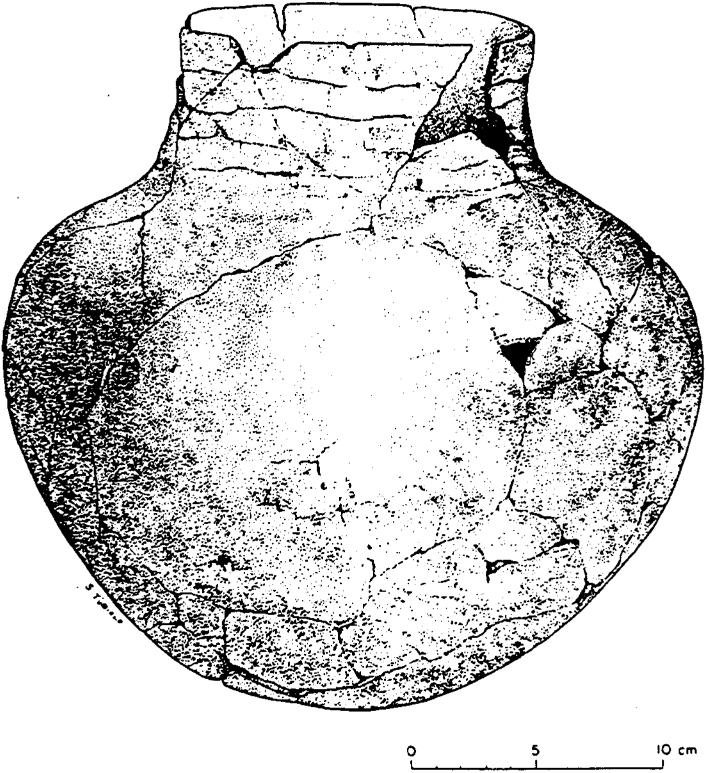


Figure 6.26 – Moccasin Gray jar (vessel 15) recovered from Room 2, Hamlet de la Olla.

FLAKED LITHIC ARTIFACTS

Sarah B. Barber

FLAKED LITHIC ARTIFACTS IN ARCHAEOLOGY

A lithic artifact is any object made of stone that has been used, modified, or created by human activity. Lithic artifacts may be beautifully worked projectile points (Figure 3.3), grinding stones or *metates,* or just bashed rocks used once as a hammer. Analysts in the Dolores Archaeological Program divided lithic artifacts into two discrete classes: flaked and nonflaked. In the following pages, a brief description of flaked lithic artifacts and their use within the DAP will be presented.

Archaeologists identify flaked lithic artifacts as a special subset of the wide range of stone objects that past peoples have used in their daily tasks. Flaking is the process whereby artifacts are created through the breaking or cracking of a piece of stone. Often, flaking is performed using percussion—a person uses a hammer stone to break off pieces of a larger stone called a core. The pieces of stone that break off from the core are called flakes or blades depending upon their shape. When done properly, flaking produces thin pieces of stone that have very sharp edges that may be used for tasks such as scraping an animal hide, cutting wood or bone, and digging. The production of flakes and blades also creates numerous small, useless pieces of stone that archaeologists term debitage. Any piece of stone found at an archaeological site that was created through some method of flaking—no matter how small—is a flaked lithic artifact.

Chipped stone can be used to address a variety of research questions in archaeology. In the Southwest, these questions include ones regarding subsistence, raw material exploitation, and chronology, among others. By studying chipped stone tools and the cores and debitage, or waste by-products, from their manufacture, we can address parts of all of these questions.

The raw materials from which chipped stone tools are generally made include a variety of types of materials. The type of material used and the availability of that material can provide information regarding use of local versus nonlocal resources. By analyzing the debitage, cores, and finished tools, we can get ideas regarding the materials used.

The types and amounts of particular tools can help us with issues such as subsistence. Some tools, such as projectile points, can, and often have been, designated particular types based on morphology of the tool. These types, in turn, have been correlated to particular time periods, thereby providing clues to particular time periods with which they are associated.

ANALYSIS OF FLAKED LITHIC ARTIFACTS IN THE DAP

Flaked lithic artifacts from the DAP were studied by the Reductive Technologies Group (RTG). A reductive technology is one "in which raw material is reduced to a desired form" (Phagan and Hruby 1984:1). Because stone tool production requires the manufacturer to remove part of the raw material (the core) to create the desired object, the manufacturer is reducing the amount of original raw material. The RTG thus analyzed all artifacts that were produced in this manner, including flaked lithic material.

An explanation of the specific research agenda as it relates to flaked lithic material may be found in the *Research Designs and Initial Survey Results* volume of the DAP (Phagan 1986a). Phagan's chapter describes the application of the entire project's research goals to the analysis of lithic artifacts and provides a description of ways in which this class of artifacts can inform archaeological questions. DAP lithic analysts divided artifact analysis into preliminary and intensive studies:

Preliminary analysis

- Flaked lithic tools
- Flaked lithic debitage

Intensive analysis

- Projectile points
- Microwear
- Flaked lithic tool production/technology

A broad description of each area is presented in the *Final Synthetic Report* (Phagan 1986b, 1986c).

WHERE TO FIND FLAKED LITHIC INFORMATION IN THE DAP REPORTS

The preliminary analysis of flaked lithic artifacts from the DAP focused upon identifying "variability in the technology of tool production" (Phagan and Hruby 1984). Two aspects of tool production variation were recognized in artifact analysis: raw material selection and tool production. These categories formed the foundation of the preliminary analysis of all flaked lithic artifacts. Within tool production, which is of course a very broad category, analysts relied upon morphology—or shape—and assessed the use of each artifact. Through the identification of tool morphology, analysts created categories, such as "drills" or "flaked axes," that organized the artifacts into broad groups based upon certain similarities. Analysts could then return to artifacts from specific categories for intensive analysis of particular artifact characteristics.

Flaked lithic tools, because of their importance in all aspects of human life before the advent of metal tools, are extremely useful for understanding several facets of prehistoric human behavior. Phagan states that flaked lithic artifacts are particularly amenable to the study of economy and adaptation, social organization, and extraregional relationships (Phagan 1986a). An entire volume of the DAP reports is devoted to the application of artifact data (including flaked lithic material) to these problems (Kane, Lipe et al. 1986). In particular, the results of the RTG's intensive analysis program were brought to bear on methodological questions. In a two-part report on projectile point analysis, Phagan tested the usefulness of classification systems, or typologies, for organizing artifacts (1988a and b). Neusius studied the use of prehistoric tools through a microwear analysis (1988). Microwear studies allow archaeologists to look at the edges of tools through a microscope to identify the damage caused to those tools by use.

Changes in flaked lithic artifact production and use through time and across space reveal a great deal about human behavior. Using provenience data, analysts placed flaked lithic artifacts into specific time periods and made general estimates of their age. Each time period—also known as a phase or subphase in the DAP literature—represents a group of characteristics that reflect the behavior of the ancient people who lived during that time. By tracking changes in flaked lithic tools, the analysts of the DAP attempted to trace changes in subsistence, economy, and social organization over time. Hruby (1988) used provenience data to study groups of artifacts and their production, to define household "toolkits," and to study changes in the economy over time (Figure 3.4). To address questions regarding larger social processes, however, analysts like Hruby needed to incorporate data on several aspects of flaked lithic artifacts.

A study of flaked lithic tool production requires knowledge of debitage and raw materials. Because debitage represents the by-products of tool manufacture, it can be studied in order to determine how past peoples actually went about making the tools they used. Ancient peoples choose the raw materials used to create a flaked lithic artifact for a variety of reasons. Phagan (1986b, 1986c) presents a view of how a study of changes in these aspects of lithic artifacts may provide information on how and why subsistence changed through time in the DAP region. Raw material source has a second use—it allows archaeologists to trace an artifact back to the quarry where the material originated. By tracing an artifact back to the material source, it is possible to determine whether people were trading over long distances and perhaps with whom (Blinman 1986c). Finally, while the analyses described above were aimed at investigating behavior through time or among several sites, information on flaked lithic artifacts also appears in individual site reports. This information is generally raw data that do not serve to explain the larger questions posed in the project's research design.

DESIGN OF THE FLAKED LITHIC DATA CLASS

INTRODUCTION

The RTG had several goals and theoretical perspectives in mind when designing the policies and procedures of analysis. First, the major analytical emphasis was placed on the “comprehension of production technology and on the identification and interpretation of temporal-spatial patterning in tool manufacture” (Phagan and Hruby 1984:4). Modeling their technique on several developed in the past 30 or so years (Bordes 1967; Crabtree 1972; Swanson 1975), the RTG designed a framework that allowed them to interpret specific tool attributes and their associated values in culturally relevant terms (Phagan and Hruby 1984). Additionally, the RTG was interested in being able to identify functional and stylistic variability in the data. Second, the RTG wanted to be able to separate out items for analysis on the basis of the technique used in the manufacture of these items. This has resulted in the separation of flaked lithic from nonflaked lithic material. Third, the RTG felt it was necessary to provide information related to the basic "attribute-focused" technological analysis and on a traditional "item-level" classification of artifacts. The classification system allowed the RTG to compare (at least on a limited basis) materials from the DAP and ones previously published in the southwestern literature. For example, the term "morpho-use category" reflects a combination of morphological and functional factors which reflects the traditional classificatory system of analysis (Phagan and Hruby 1984). Fourth, the RTG recognized that the amount of material recovered would be very large, and therefore they wanted to create a system with analytical efficiency. Along with these four underlying principles, the RTG worked with an underlying assumption that "tool-producing and tool-using behaviors are basic and relatively stable cultural subsystems" (Phagan and Hruby 1984:6); therefore, the lithic material was not expected to reliably reflect or monitor small-scale temporal variability in the archaeological record. Any temporal significance in this material will be on a very gross level (Phagan and Hruby 1984).

Organization of the Data

The analysts of the Reductive Technologies Group (RTG) organized the flaked lithic data into two main categories:

- Flaked Lithic Debitage (DEBTG10)
- Flaked Lithic Tools (FLT10).

Studies of microwear (MICWR10) and intensive research on projectile points (PJPALL) and flakes (INTFLK) resulted in additional DAP data files. The RTG also conducted specialized studies of the lithic materials which were available for lithic tool production. Some of these studies are available in the DAP volumes and are outlined earlier in this section.

Each of the data files mentioned above contains it's own set of unique *attributes*. These attributes are described through a series of *values*. Within each data file, most attribute information is nominal; however, counts, weights, and measurements were recorded as interval/ratio data. A description of the attributes is available in Appendix II of this volume. The accompanying values can be found in the lookup files (stored as .DBF files in the LKP directories) on the CD-ROM.

Debitage

Flaked lithic debitage is the "residual lithic material resulting from the manufacture of lithic tools by flaking" (Phagan and Hruby 1984:64). A thorough item-by-item analysis of the debitage was considered too time intensive and costly. Therefore, debitage analysis was abbreviated and an intensive flake analysis was conducted and reported elsewhere. The interpretation of the debitage data "needs to be focused on the mean characteristic expressions for variously defined archaeological units" (Phagan and Hruby 1984:65). The debitage data file is DEBTG10.

The debitage data file contains information on groups of artifacts from particular archaeological units (determined by the excavators). Analysts differentiated between *angular debris* and *flakes/flake fragments*. The former are pieces of rock that are not securely identifiable as the byproducts of flaking while the latter are definitively the result of flaking and may provide information relating the process by which they were produced. The debitage analysis, while recognizing the existence of angular debris, was aimed at collecting data on flakes and flake fragments. Angular debris was thus separated out in each group of artifacts, counted and weighed. No further analysis was conducted on these items. In addition, the number of complete flakes was recorded beginning in 1980. Before that time, the number of striking platforms present for each grain size group was recorded. These latter data are not available in the current data set, nor was this attribute recorded after the 1978-1979 season.

Flakes and flake fragments were divided an analyzed by the size of the grains within the stone. The definitions used from the middle of 1980 on are as follows:

Medium-grained: grains measure between .25mm and .5mm in diameter

Fine-grained: grains measure between .125mm and .25 mm in diameter

Very fine-grained: raw material cannot be distinguished from nongranular raw material without 10X magnification

Microscopic: microcrystalline raw material, such as obsidian, that has a silica matrix of greater than 50 percent

Flaked Lithic Tools

Flaked lithic tool analysis was concerned with describing important characteristics of edges and the two surfaces that meet to create those edges. Edge strength was of particular importance to the RTG.

At some point, in one of the final versions of the data, the flaked tool file was split into two files: FLT10a and FLT10b. These are simply the original file, FLT10, split into two. A researcher needs to combine the “a” and “b” files to have access to all the site data for flaked lithic tools, if they are not already working with the FLT10 file. We have included all three versions of the flaked lithic tool data on the CD.

There is a basic structure underlying both the flaked lithic tool and flaked lithic debitage categories. The first five columns in the analytical system address issues of provenience. These provenience attributes provide structure for linking the data found in the flaked lithic data class with data in other artifact classes. Attributes 6-8 describe several raw material characteristics. Attribute 10 describes morpho-use (item typology). The remaining attributes focus on identifying technological variability. For a detailed explanation of each attribute see Phagan and Hruby (1984). This system was designed to be able to combine and re-combine attributes and/or values in response to varying research designs and questions.

Projectile Points, Microwear, and Other files

There are several files that are not discussed in any detail in this overview. There was an extensive projectile point study and resulting computer file (PJPALL). Phagan (1988a and b) provides a good summary of the study’s findings. An intensive flake study resulted in a substantial file (INTFLAK), but information on this study is mentioned only tangentially in the published DAP literature (e.g., Phagan 1986a:83). A search of the Anasazi Heritage Center did not uncover the background literature on the intensive flake study.

Microwear analysis of artifacts began in 1982, well after the commencement of the DAP. This allowed researchers to study artifacts that already had been placed into a temporal-spatial matrix (see Chapter 2, this guide). The unit of analysis was the household or interhousehold cluster; and assemblages containing 100 or more artifacts (tools and debitage) with a 3 or 4 integrity rating were chosen for study. This excluded a large number of assemblages from the analysis. Furthermore, only assemblages dating to the Basketmaker III/Pueblo I transition were studied. All debitage was studied, unless the assemblage contained more than 10 pieces. In such assemblages, only debitage weighing greater than 1 gram was analyzed. For further details, see Neusius (1988). The microwear data are stored in the MICWR10 file. This file should be used with caution. It is possible that the file is obsolete and we have not been able to confirm that it is exactly the same file used by Neusius in his work at the DAP.

FIELD AND LAB PROCEDURES

Field crews first separated the material into flaked and nonflaked lithic material types. Each FS could have one or more bags of each type in addition to point location items from the FS, which were bagged separately. Once in the lab, materials were washed and processed according to standard procedures (Farley 1984) then wrapped in plastic bags to prevent damage. A single analyst examined all the flaked lithic material from a given site, however in some cases it was necessary for several analysts to work together on one site.

A flow chart of the lab processing of the flaked lithic material, is found as Figure 1 in Phagan and Hruby (1984:19). Point location material was analyzed first. The material was segregated into seven groups based on type of material and grain size. The groups were: one of tools, one of angular debris, four of debitage (based on grain size) and one of separately bagged, point-located items. Angular debris was then weighed, counted, and bagged. Then each grain size group of flakes and fragments were analyzed. Each tool was analyzed individually getting a unique catalog item number starting with 100.

Hearth, room-fill, and other special context materials were selectively water-screened if high concentrations of very small flaking debris were suspected. For a detailed discussion of the handling of this material, see Phagan and Hruby (1984:28-29).

CHANGES IN THE DATA CLASS

The original preliminary analysis system was developed in 1978, but due to inefficiencies and gaps in the design of the system, the RTG redesigned the system in 1980 (Phagan and Hruby 1984). In this redesign, all attributes were considered for their interpretive significance and the RTG deleted and added attributes as needed without sacrificing data comparability. For a justification of the changes that were made, see a memorandum generated by Phagan and included as Appendix A in the *Reductive Technologies Manual: Preliminary Analysis Systems* *and Procedures* (Phagan and Hruby 1984). The major changes were of several kinds. First, the RTG deleted attributes that appeared to be "minimally interpretable, unnecessary, redundant, or inconsistently applied" (Phagan and Hruby 1984:10). Second, unused or rarely used attributes and/or values were either combined into larger values or eliminated. Most of these were either lithic raw material categories or tool morpho-use categories. The third major change exacted was to add attributes and values to the system that were necessary. This was rarely done due to the inconsistency that would have been introduced into the data files or because of the reanalysis that would have had to be done to avoid these inconsistencies. And finally, "several analytical procedures and application conventions were devised or altered to improve efficiency (Phagan and Hruby 1984:10). Appendix B in *Reductive Technologies Manual: Preliminary Analysis Systems and Procedures* (Phagan and Hruby 1984) outlines these changes

DATA CHECKS

To alleviate analytical inconsistencies, an assistant task specialist arranged periodic consistency tests for all analysts. This test is described in the manual (Phagan and Hruby 1984:17). Overall, the DAP had certain built-in checks that were carried out throughout the analysis process in the laboratory and in the field. Coded forms were completed and turned in to a task specialist who checked the forms for completeness, consistency, and possible illogical codes. Once the forms were accepted, they were photocopied then sent off for entry into the computer. Once the forms were entered into the computer, a line by line comparison was made between the computer printout and the photocopied analysis record. Corrections were made. In addition to these checks, the computer section ran computerized searches for duplicate lines and out-of-range values. These checks were completed to ensure that the data were as clean as possible. It is unclear whether the Intensive Flake or Microwear files were data-checked, and consequently they should be used with caution.

POTENTIAL PITFALLS AND POSSIBLE STARTING POINTS

Because the RTG has included nearly 30 individuals throughout the course of the DAP, inconsistencies and a certain amount of subjectivity was unavoidable. In order to avoid some of this inconsistency, training programs were enacted and constant attention was given to checks and consistency in data analysis and interpretation. Despite this effort, a few inconsistencies are still present. For example the number of complete flakes was not recorded until the 1980 analytical revisions. Additionally, the 1978-79 analysis system recorded the number of striking platforms present in each grain size group for debitage, but this was discontinued in the 1980 revision. Finally, prior to the 1980 revisions, obsidian was the only consistently recorded nonlocal raw material. Values for nonlocal materials were expanded and better defined in the 1980 revision.

Despite some residual inconsistencies, this is a strong data set that can shed light on many new and interesting questions, such as the query that follows.

FLAKED LITHIC TUTORIAL: QUERYING THE LITHIC DATA SET

This query will focus on possible ties to nonlocal areas by prehistoric inhabitants by examining the use of specific lithic raw materials for flaked lithic tools. I would like to test two simple hypotheses: (1) that lithic cores, the pieces of stone from which a flintknapper produces flaked lithic tools, will most clearly reflect the usage of nonlocal lithic raw material resources, or in contrast, (2) that high-input tools will better reflect connections with nonlocal lithic raw material sources than cores do. Variation in the frequency of lithic materials between roomblocks within a village or between village assemblages may provide evidence of the diverse populations which comprise these different villages.

Flakeable stone is available throughout the Southwest, and is immediately accessible in the DAP area. However, the way in which people obtain their raw material may vary based upon a variety of factors. Phagan (1986c) notes that, in the Dolores region, decent raw materials are (and were) readily available. Thus a great deal of tool production occurred using raw materials obtained casually. Nonlocal raw materials such as obsidian, on the other hand, may have particular flaking characteristics that made them more appealing to ancient flintknappers. To obtain such materials, a flintknapper had to either obtain the material in person or participate in exchange networks. A flintknapper's intra-village and extra-village relationships might have strongly influenced the manner in which a flintknapper obtained the raw materials used to produce flaked lithic tools.

If villages in the Dolores region were comprised of diverse populations that aggregated for socioeconomic reasons (Wilshusen and Potter 1999), then village flintknappers might have retained different patterns of raw material procurement. This procurement pattern could be a function of a flintknapper's social ties, familiarity with particular nonlocal material sources, or any of several other factors.

Two possible ways to look at raw material use are to focus on flaked lithic cores or to look at finished tools such as projectile points. Cores are excellent artifacts for a study of raw material procurement and use because they are the byproducts of stone tool production. Projectile points represent another morphological category that can be compared for core raw materials. Given that projectile points are high-input tools, they may be excellent items for a study of persistence in raw material usage. Important tools such as projectile points, as well as tools made from good sources of raw material, are more likely to be curated (Binford 1977). If a particularly good raw material has been found and used and is nonlocal in origin, projectile points may be discarded only after they cannot be reworked any further.

At McPhee Village, there was a boom in population noted sometime after A.D. 850 (Kane and Robinson 1988). Prior to this, only 30-35% of the McPhee Community Cluster population was living in the village itself. After A.D. 850, and lasting until around A.D. 880-900, roughly 65-75% of the community population is thought to have been living in McPhee Village. Using different parts of McPhee Village then, I would like to test the idea that aggregation at the site may represent diverse populations whose flintknappers' social ties or familiarity with raw material resources may have been different for different roomblocks at McPhee Village.

I will then compare these data from McPhee Village to data collected in the same way from other sites in the DAP area. This will give us a standard by which to measure these data from McPhee. The roomblocks that we will use from McPhee are 5MT4475, 4477, 4479, 4480, 5106, 5107, and 5108, which are the some of the largest roomblocks at the site. In the FLT10 data file, the query will be of the SITE and MORPHO attributes, as follows:

- SITE- McPhee roomblocks 4475, 4477, 4479, 4480, 5106, 5107, and 5108.
- MORPHO- values 03 (unused core) and 04 (used core).

Now, we have a data file with just the cores from the requested roomblocks at McPhee. Prior to 1983, the lithic analysts of the DAP did not have a comparative collection of lithic raw materials. Since much of McPhee was excavated prior to 1983, there was not a collection by which to compare the cores for a determination of local or nonlocal. However, this did not entirely prevent the analysts from identifying raw material as local or non-local, especially if there was a readily identifiable local source nearby. We can look at the sources of material from these roomblocks by looking at the values for SPEFID.

The indeterminate (00) values are relatively few, meaning that the DAP analysts were able to get around the lack of a comparative collection. Though the roomblocks we are examining have primary village occupations that range between A.D. 825 and 900, several of the sites also have smaller Pueblo II reoccupations (4475, 4477, 5106, and 5107). Consequently we may also want to plot results based on those roomblocks whose occupation extended only to Pueblo I (n=3) and those that had smaller reoccupations in Pueblo II (n=4). Either way, Table 3.1 displays the results of the above query.

Table 3.1 Distribution of Local and Nonlocal Lithic Materials in Cores from Selected McPhee Village Sites.

SITE/ RMBLCK	INDETERM.	NONLOCAL	LOCAL	% LOCAL
5108	0	0	9	100.00
4479	4	0	121	96.80
4480	0	1	162	99.39
5106	0	0	53	100.00
5107	1	1	186	98.94
4475	95	4	522	84.06
4477	2	1	91	96.81

In the table above, the sites with only pre-A.D. 900 occupations are listed as the first three; those with later reoccupations are the bottom four. As we can see from the table, with the exception of site 5MT4475, the percentages of nonlocal versus local materials as reflected in the cores are a small part of the total. At 5MT4475, 95 (15.30%) of the cores' material types were undetermined. This is a fairly high percentage; these cores, then, may be worthy of reanalysis. The first step in a reanalysis would be to file a research proposal with the Anasazi Heritage Center.

To continue this inquiry, I would like to compare the use of local versus nonlocal materials as represented by cores at McPhee to other sites, again using the FLT10 file. Three other, large sites along the reservoir will be analyzed in the same way as above for comparison:

- SITE- 2320 (House Creek)
- MORPHO- values 03 (unused core) and 04 (used core).

- SITE- 23 (Grass Mesa)
- MORPHO- values 03 (unused core) and 04 (used core).

- SITE- 2182 (Rio Vista)
- MORPHO- values 03 (unused core) and 04 (used core).

For each of these, we want to calculate the SPEFID values showing the percent of indeterminate (00), nonlocal (1-19), and local (>20) determinations. Table 3.2 below shows the amounts of each of the raw material determinations for each of the above queries, by site. If we factor out cores of indeterminate origin, then the percentages of nonlocal materials are small for all sites. However, both McPhee and Grass Mesa villages have relatively high percentages of indeterminate materials in flaked lithic cores, so it is possible that this hypothesis can not be fully tested without reexamining the cores of indeterminate material.

Table 3.2 Distribution of Local and Nonlocal Lithic Materials in Cores from Selected DAP Villages.

SITE	INDETERM.	NONLOCAL	LOCAL	% LOCAL
McPhee	95	7	1157	99.30
House Creek	1	0	79	98.75
Rio Vista	17	2	481	99.60
Grass Mesa	1349	138	4952	97.30

To address the second hypothesis, I would like to do the exact same queries as above for McPhee, House Creek, Grass Mesa, and Rio Vista for the identification of raw materials used for projectile points. These queries would be as follows:

- SITE- 4475, 4477, 4479, 4480, 5106, 5107, and 5108 (McPhee Village)
- MORPHO- values 60, 63, 66, 70, 71, 72, 80, 81, and 82 (projectile points).

- SITE- 2320 (House Creek)
- MORPHO- values 60, 63, 66, 70, 71, 72, 80, 81, and 82 (projectile points).

- SITE- 23 (Grass Mesa)
- MORPHO- values 60, 63, 66, 70, 71, 72, 80, 81, and 82 (projectile points).

- SITE- 2182 (Rio Vista)
- MORPHO- values 60, 63, 66, 70, 71, 72, 80, 81, and 82 (projectile points).

Again, I will use a table below to show the results (Table 3.3).

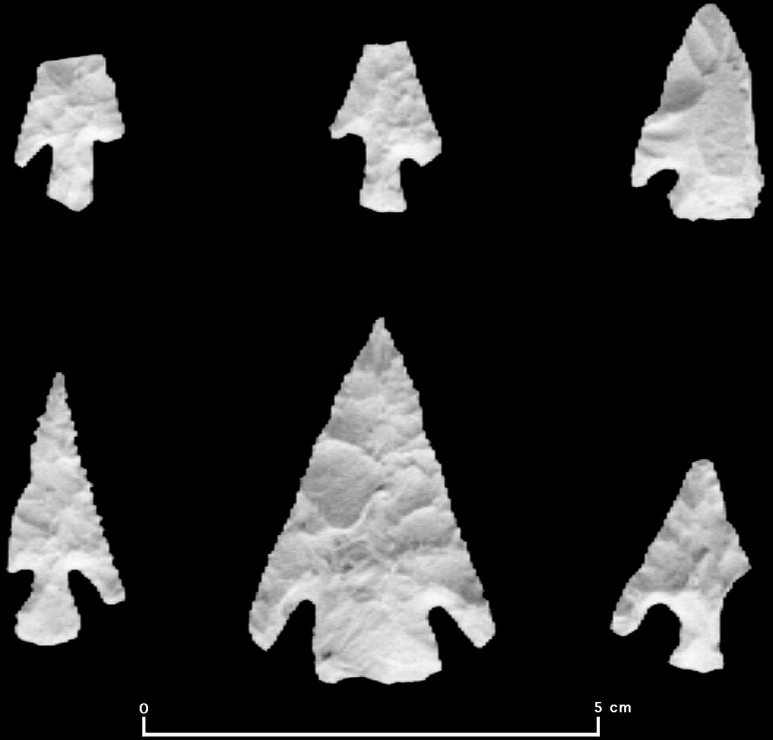
Table 3.3 Distribution of Local and Nonlocal Lithic Materials in Projectile Points from Selected DAP Villages.

SITE	INDETERM.	NONLOCAL	LOCAL	% LOCAL
McPhee	1	80	328	80.19
2320	0	1	15	93.75
2182	0	18	105	85.37
23	3	92	242	71.80

Something quite unexpected has occurred as we look at all the data above. The original hypothesis—that cores would most reflect the usage of nonlocal lithic raw material resources—turned out to be either a non-relationship or in serious need of reanalysis. Instead, it appears that projectile points better reflect a village's use of nonlocal resources. Are projectile points being curated from periods before the aggregation of population into these Dolores villages? Or, does this mean that these projectile points are being made away from the Dolores villages while on hunting forays? There are other possibilities, of course. We should note that there is a very pronounced difference in the total number of cores represented and the total number of projectile points and that his may be affecting the differences noted.

One approach to furthering this inquiry might be to select samples of debitage from each of the four sites used above. Lithic debitage was not analyzed by the DAP for raw material type, and the samples would have to be requested from the Anasazi Heritage Center before analysis could begin. Analysis of debitage might go some way toward suggesting whether the projectile points were being manufactured on site. Cores may not fully reflect the on-site manufacture of material if the material in question is considered precious and every bit of it being used. All that might remain, after being used to its fullest, is debitage. Though there are many questions that remain about nonlocal stone use, the above queries suggest that tools such as projectile points may provide the best avenue for addressing outside ties with the flaked lithic data class.

Editor's endnote: Because of the size and complexity of this query we were not able to include it on the CD. However, the instructions given above should allow readers to replicate it.


0
5 cm

3.4 Comparison of Tres Bobos and Sagehen household cluster toolkit correlations with Dos Casas and Periman subphase household cluster toolkit correlations. From Hruby 1988: Figs. 6.45 and 6.46.

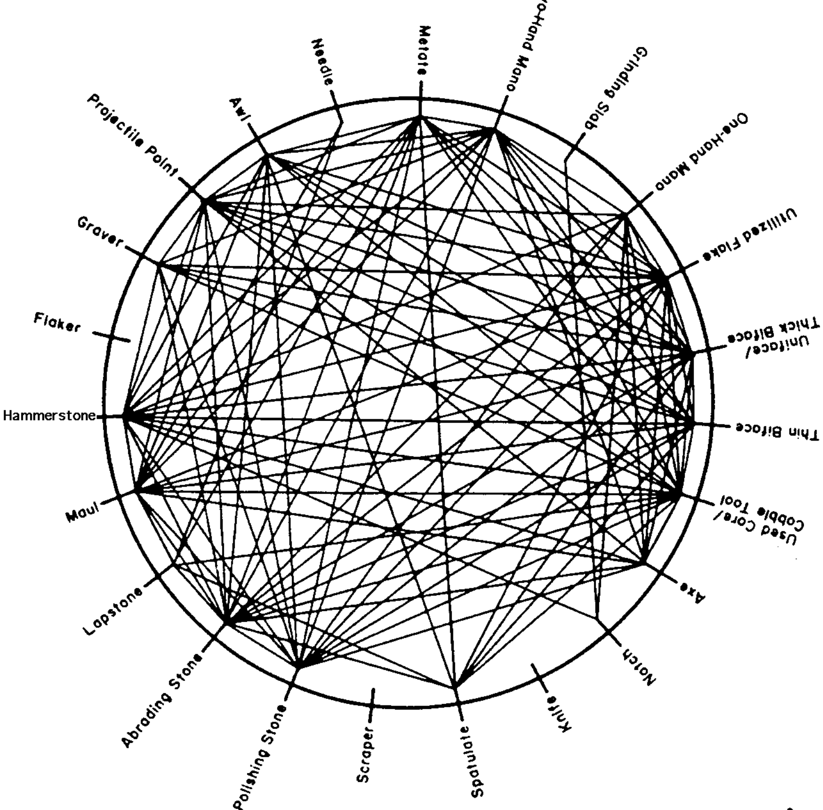


Figure 6.45 – Tres Bobos and Sagehill Subphase household cluster toolkit correlations.

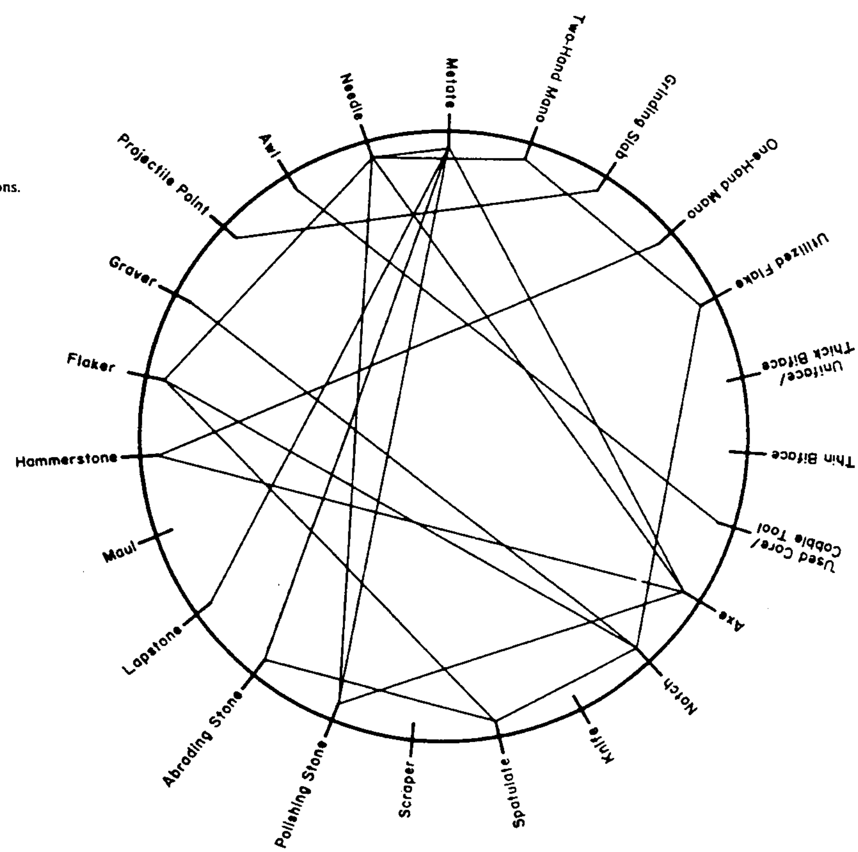


Figure 6.46 – Dos Casas and Periman Subphase household cluster toolkit correlations.

NONFLAKED LITHIC TOOLS

Cara C. Gulley

NONFLAKED LITHIC TOOLS IN ARCHAEOLOGY

Nonflaked lithic tools, or ground stone tools, are distinguished from flaked lithic tools based on production technology. In the nonflaked lithic reduction process, stone is either crushed or abraded by applying force from one stone to another (Phagan and Hruby 1984:70). Among these artifacts are grinding and milling instruments such as mortars and pestles, manos and metates; chopping tools such as mauls and axes; as well as other tools such as hammerstones, polishing and abrading stones, anvil stones, and ornaments.

Recent research on nonflaked lithic materials, including replication studies, has greatly expanded our knowledge of production techniques, use-life, modification, and implementation (Adams 1989, 1993, 1996). For example, it was commonly assumed that manos and metates were used exclusively for corn grinding. Manos and metates are great indicators of agricultural intensification and dependence (Hard 1990; Mauldin 1993), yet recent research has shown that these tools were also used for smoothing hides, grinding other plants, crushing bone, as well as processing pigment, clay, and possibly temper for ceramic manufacture (Adams 1988, 1996; Schneider 1996). Some archaeologists have also mistakenly accepted certain gender-specific, behavioral, and environmental assumptions that have affected our interpretations of nonflaked lithic assemblages (Schneider 1993).

ANALYSIS OF NONFLAKED LITHIC TOOLS IN THE DAP

The DAP nonflaked lithic tool analysis was fairly narrowly defined based on the reduction technology that produced the artifacts. At the time of the DAP analysis, consideration of nonflaked lithic components was based primarily on classification by general item morphology and on analogy with presumed or ethnographically established tool function. Phagan and Hruby (1984:71) found this useful at general levels of interpretation, but the lack of explicitly stated theoretical or practical models of tool production and use limited their attempt to arrive at more specific technological or functional conclusions.

Phagan and Hruby (1984) viewed the DAP nonflaked lithic assemblage as an opportunity to test a new model, the primary objective being the consistent distinction between tool production and tool use. It was thought that this could greatly expand the organization and interpretation of human behavior associated with nonflaked lithic tools. The technological or functional questions that were the focus of this research were based on the assumptions that these tools were produced and used in an efficient manner and that ground stone implements could be regarded as either "edges" or "surfaces" (Phagan and Hruby 1984:72-73).

Most of the DAP nonflaked lithic tool analyses have focused on the food processing components:

manos (1-hand and 2-hand), metates (basin, trough and slab), mortars and pestles. Raffensperger (1983) explored temporal variability in the DAP food processing toolkit, postulating that the rapid increase of population in the Dolores River Valley between A.D. 650 and A.D. 900 is indicative of successful corn production, and that this increased production would be archaeologically visible. By looking at changes through time within the food processing toolkit, she thought it would be possible to determine the extent of a reliance on a single food source. Phagan (1988c) reanalyzed this data, concentrating on the distribution and characteristics of manos and metates. These are the nonflaked lithic tools that are most securely associated with corn processing (Figure 3.5). Phagan was interested in data variability among both subphases and site types, especially as interpreted with respect to two alternative theoretical models of culture change (Lipe 1984). The "least cost" model of culture change predicts change in economic efficiency or specialization in the acquisition and processing of plant foods during bad agricultural times, and the "growth" model predicts the same change during good times (Phagan 1988c:184).

Phagan's (1988c) results indicated that the general development of more efficient and specialized food producing and processing implements was a response to economic stress brought on by negative environmental factors, particularly later in the DAP occupation sequence during the McPhee Phase (A.D. 850-975) and its subphases. This tentatively supports the least cost model. However, this variability is considerably more complex than a continuous change through time, and several characteristics tend to demonstrate major change fairly early in the DAP sequence. Additionally, the relationship between manos and metates was not one-to-one; there were more manos per metate, especially at seasonal sites (agricultural fieldhouses). Phagan found that considering variation in the nonflaked lithic assemblage within the site type data structure might be more successful in reconstructing behavior than the largely temporal subphase structure (1988c:201).

Sarah Schlanger (1991) later considered the effects of site-formation processes on the ground stone assemblages from the DAP. She looked at the frequencies of one-hand manos, two-hand manos, and trough metates relative to length of occupation and mode of abandonment. Schlanger found that at shorter occupation sites, more grinding tools were found on the floors (at or close to their original use or storage context) than there were at longer occupation sites (Schlanger 1991:468). It is possible that, at the longer occupied sites, tools were discarded elsewhere, removed as people moved away, or were scavenged after abandonment. Schlanger also found that sites abandoned slowly (i.e. not burned) tended to have fewer whole tools left on their floors than when pitstructures were burned and the roof collapsed. This makes sense, as a collapsed roof will make any tools left on the floor surface fairly inaccessible to scavenging.

WHERE TO FIND NONFLAKED LITHIC TOOL INFORMATION IN THE DAP REPORTS

Specific details and descriptions of the artifact classes, attributes, and modes of technical analysis can be found in several DAP reports, including the *Reductive Technologies Manual: Preliminary Analysis Systems and Procedures* (Phagan and Hruby 1984:76-108) and in Chapter 3 (Reductive

Technologies) of the *Final Synthetic Report* (Phagan 1986b). Carl Phagan also evaluates agricultural intensification across subphase and among site types in Chapter 4 (Nonflaked Lithic Tool Use: Food Preparation) of the 1988 *Supporting Studies: Additive and Reductive Technologies* manual.

ADDRESSING NEW QUESTIONS USING DAP MATERIALS

The nonflaked lithic assemblage as recorded in the DAP data set can be applied to today's archaeological questions in ways the original investigators could not have imagined. For example, pollen washes were taken of many objects found in situ, and yet Phagan (1988c) does not consider these data in his discussion of increased dependence on corn-agriculture. These pollen samples could be analyzed for a range of plant types; it is possible that the inhabitants of the Dolores River valley were exploiting more and different plants than we think. Perhaps not all manos and metates were exclusively used for corn. This and other available data can be applied to multiple, refined inquiries concerning activity areas, tool use-life, resource use, settlement type and duration, population differences and ethnicity, community integration, trade and exchange, agricultural intensification, and village formation. It is important to realize that the research potential for the nonflaked lithic component of the DAP has not been exhausted.

THE DESIGN OF THE NONFLAKED LITHIC DATA CLASS

ORGANIZATION OF THE DATA

The archaeologists of the DAP organized nonflaked lithic tools into the following four *data classes*:

- Nonflaked lithic tools
- Hafted tools
- Manos
- Metates

The nonflaked lithic tool analysis was the most general, and the least intensive investigation, of the four listed above. There are over 15,000 items in the nonflaked lithic data file (NFLT10), and items range from small pieces of stone with some evidence of grinding to well-shaped metates and polished ornaments. After the preliminary nonflaked tool analysis, certain items such as *hafted tools*, *manos*, and *metates* were subject to complementary, more intensive analyses. Hafted tools—such as axes, mauls, and hoes—are primarily ground stone, but there are also flaked axes in the category. The main distinguishing feature on these tools was typically a pair of notches or grooves into which a wooden handle could have been hafted. The hafted tool information is in the file "HAFT10." The other specialized studies focused on manos (MANO10) and metates (METAT10). These tools are among the most common nonflaked tools and were the primary implements for grinding collected seeds, corn, and other foodstuffs, as well as for processing materials such as ceramic clay, temper, and other domestic supplies.

ATTRIBUTES EXAMINED IN THE NONFLAKED LITHIC PRELIMINARY AND INTENSIVE ANALYSES

Each data file contains unique descriptive *attributes*. Within the DAP system the attributes were defined as *variables*, each of which had their own associated *values*. These attributes and values for the nonflaked lithic studies were used to distinguish between, and measure the relative intensity of, tool production and tool use (Phagan and Hruby 1984:70). The data files and a general overview of their attributes are discussed below. This information is derived in large measure from Phagan and Hruby (1984), Phagan (1988c), and Orth (1981). For more detailed descriptions of the attributes for each data class, one should consult Appendix II of this volume. For specific values, one should consult the lookup files (see the NFLT_LKP directory under DBF_DIR) for each attribute of these files.

Nonflaked lithic tools

As with all files the key provenience attributes of state and county, site, FS number, and point location number were at the beginning of the file to serve as a key for tying this file's information (NFLT10) to other files.

The attributes contained in the nonflaked lithic data class describe the morphological and production characteristics of all nonflaked lithic tools (N=15,200) recovered as part of the DAP investigations. Analysis results were used to classify tools within a general "techno-functional tool typology" and to evaluate the various costs necessary to produce a tool (Phagan 1988c:184). General item morphology and ethnographic analogy were used to suggest tool function based on this preliminary analysis. More detailed information and arguments about possible uses were generated by more intensive analyses.

All nonflaked (NFL) tools were generally described in terms of their *lithic material*, their *weight*, and general *morpho-use* category. In addition, general production and condition values such as the type of *blank* the tool was produced from, the tool's present *condition*, a general evaluation of the tool's *production stage*, and any *adhesions* on the tool that might suggest how it had been used were all considered in the preliminary NFL analysis. Though measurements such as weight were interval measurements to the nearest gram (at least up to 2000 g, whereafter it was to the nearest 50 g), the majority of the observations were ordinal or nominal. The forces that were used to produce and use nonflaked tools were evaluated on an ordinal scale for both vertical or horizontal inputs, with vertical forces representing a range from "tapping and pecking" to "hammering," and with horizontal forces representing actions such as "polishing" or "abrading."

Recodes are noted as they appear; recodes allow for a more specific definition of the attribute and were added throughout the course of the project to meet varying analytical needs. The recodes gather together the variety in the earlier analytical categories and allow the analyst to see broad patterns that might not otherwise be obvious. The recodes are oftentimes the main measures that are used in the summary chapters of the DAP reports. There were seven basic recodes with one being a simplified evaluation of material grain size, two recodes relating to morpho-use (one described general artifact classes and the other represented tool-kit diversity), two simplifications of material class to group various sandstone, igneous, and metamorphic materials, and finally a single recode that simplified blank types.

Hafted tools

The attributes for hafted tools offered a more detailed analysis of the morphology and production and use characteristics of the hafted tools (N= 794) discovered by the preliminary NFL analysis. These items consist of *mauls* that are notched or grooved; *axes* that are notched, fully grooved, ¾ grooved or tri-notched; and notched or grooved haftable items that were so broken that that they could not be specifically classified. The hafted analysis (HAFT10) amplified on the preliminary analysis by obtaining more detailed measurements of the hafting element, more detailed observations on the production of this element, and information on the production and use-wear on the bit and butt of the tool (Figure 3.6).

Manos

The attributes contained in this data file describe the morphological characteristics of all manos and mano fragments (N= 1,450) recovered by the DAP investigations. A *mano* is a grinding or pounding stone that can be held in one or two hands and which is typically moved back and forth across a larger grinding stone called a *metate*. Some of the attributes in the intensive mano analysis, such as length, texture, curvature, striations, and grips have up to three measurements/descriptions. These occur as separate entries and are denoted for length, for example, as LENGHT1, LENGTH2, and LENGTH3. This is due to occasional multiple ground facets (or "use surfaces") on the same artifact. Both Orth's original technical report on ground stone (1981) as well as Phagan's (1988c) chapter on food preparation should be consulted in the case of an in-depth analysis using the MANO10 file.

Metates

The attributes contained in this data file describe the morphological characteristics of all metates and metate fragments (N= 830) recovered by the DAP. Metates are typically used in combination with a smaller hand stone called a mano. As with manos, some of the attributes detailed in Appendix II (e.g. LENGTH1-2, TEXTURE1-2. etc.) give up to two measurements/descriptions. This is due to the occasional presence of more than one ground facet (or "use surface") on the same artifact. Again, both Orth's (1981) report and Phagan's chapter on food preparation (1988c) should be consulted when doing in-depth analysis using the METAT10 data.

CHANGES IN THE DATA CLASSES

The analytical system for nonflaked lithic tools was revised in 1980, and consequently there are some potential discrepancies between analyses for the 1978-1979 field seasons and the field seasons for the next four years. The most notable change is the addition of the attribute for "blank type" that was added after the 1980 analysis was completed. Since no complete reanalysis of the NFL materials for 1978 and 1979 occurred, this attribute is blank for some items for sites excavated in these years. Key nonflaked tools such as manos and metates from 1978-1979 excavations were reanalyzed under the new system and do have values for “blank type”. In addition, all items originally classified in the “polishing stone” or “indeterminate” tool categories were reanalyzed. In a number of cases these items were either removed from the analytical data set if they were unmodified or, if they were unmodified but were a PL (point location), placed into a “not culturally modified category.” Finally, some NFL tools which had originally been placed in a “nonflaked lithic undifferentiated” category were also reexamined and were either placed into a more descriptively appropriate tool category or were placed into non-cultural materials which were not reported in the site write-ups, with the exception of point locations.

FIELD PROCEDURES

Nonflaked lithic items were in most cases handled in a standard manner in the field, with artifacts from different proveniences bagged separately and with these proveniences identified by a unique, sequentially assigned number for each site. For particular proveniences, such as the occupation surfaces of structures, individual artifacts might be point-located, or identified as individual items with point-specific locations.

There were some unusual situations in which nonflaked lithic handling and analysis deviated somewhat. In some cases it was difficult in the field to assess whether a rock with possible evidence of grinding had been shaped by natural or cultural forces. In these cases it was usual to send the item into the lab for washing and preliminary analysis. If lithic analysts determined that the item was culturally unmodified, then it was removed from the lithic analysis track at that point. It is still possible that the stone may have been carried to the site and used in some other manner, such as being incorporated into a building that later collapsed, and so how items were handled after this point in the process varied case by case. In some rare cases different pieces of nonflaked stone from different FS or PL assignments fit together to form a single tool. In these cases, the primary analysis information was assigned to one line of data (usually the lower FS or PL number) with the other line of data given minimal information and not assigned a catalog number. After analysis each item was returned to its original bag for future tracking purposes. Finally, a very small number of very large nonflaked lithic tools were too heavy to be safely or easily removed from the field. In these cases the items were analyzed by lithic analysts in the field with all data, except weight, typically being recorded. These items were assigned special catalog numbers beginning with 801 to distinguish the fact that they were not turned in for curation.

LAB PROCEDURES

Nonflaked lithics were handled in the lab in essentially the same manner as flaked lithic items. Groups of 50 consecutive FS numbers were received from the processing lab and these FS bags were analyzed sequentially. Each individual item was analyzed separately and each tool in an FS was assigned an individual catalog number beginning with 100. Once items were identified, measured, and weighed, they were analyzed for material type, morpho-use, and technological variability. After the general nonflaked lithic analyis, the large hafted tools were held in the lab for a separate intensive analysis. In the case of manos and metates, these items also received special analysis, but at a later date.

DATA CHECKS

After analysis was completed for a lot of items, the completed coding forms were checked by the assistant task specialist for completeness of analysis and spot-checked for internal consistency and for possible illogical codings for particular items. The analysis records were then photocopied and sent off for computer data entry. After entry into the computer, a line-by-line comparison was made between a computer printout and the photocopied analysis record. Necessary corrections would be made at that time. In addition, the computer section at DAP ran computerized searches for duplicate lines and for out-of-range values, so that the data were as analytically consistent and "clean" as possible.

POTENTIAL PITFALLS AND POSSIBLE STARTING POINTS FOR USING THE DATA

The nonflaked lithic tool data is very descriptive and heavily dependent on a simple classification of tools. There is a great deal of descriptive data on the tool morphology and production, but the understanding of the use of these tools is still very basic. Consequently if one is interested in testing a particular hypothesis about ground stone at Dolores, it will be necessary to construct linking arguments that will allow one to use the DAP measurements to demonstrate certain behavioral changes. Details such as style and microwear may be difficult to obtain using these data. However, the sheer size of the collection, the control over spatial and temporal associations, and the large amount of descriptive data make this an attractive data set for future work.

It is very important to understand the kinds of problems that the DAP was trying to address with the NFL preliminary analysis and the more intensive analyses of the hafted tools, manos, and metates. In most cases the values for nonflaked lithics used in the summary volumes (e.g. Blinman et al. 1988; Breternitz et al. 1986) are "recodes" and combine a variety of values for a simplified classification. It is necessary to go back to the SPSS instructions on the CD for the particular data sets to understand just what particular values are encompassed in these recodes (also available in tabular form in Phagan and Hruby 1984:91). So, whereas morphology for the NFLT10 data set may have 60 possible values, the MORPHOA recode value only consists of 12 values.

As mentioned earlier, there were changes in the nonflaked lithic analysis in 1980, and so there are some potential discrepancies between the analysis results for ground stone recovered in the 1978-1979 field seasons and items recovered in the succeeding seasons. As noted in the section on changes in the data, this mainly results in some attributes being blank for the earlier seasons.

NONFLAKED LITHIC TUTORIAL: QUERYING THE DATA SET

The DAP data set is a dynamic tool that can help archaeologists answer specific research questions about prehistoric lifeways in the Dolores region. Two examples listed below will display how the nonflaked lithic data class can be utilized to aid in answering some of these questions. The examples here focus on possible cultural changes that may accompany the shift from hamlets to living in much larger villages. These questions utilize the nonflaked lithic (NFLT10) and provenience (PROV10) files.

Manos (a grinding stone held in the hand) and metates (a flat stone slab or basin in which corn or other plant foods are ground) are consistently used as indicators of agricultural dependence. By the time people aggregated into villages in the Southwest, such as at Dolores, it is clear that corn agriculture and the use of ruderal plants played a major role in allowing such large groups of people to live in sedentary settlements (Matthews 1986a). While there is a wide range of nonflaked lithic tools (e.g., Adams 1988), there are two important tool types—trough metates and 2-hand manos—that are found in most households and that appear to be central to household food grinding. A simple, yet intriguing, question that can be posed with the nonflaked lithic data is: Does the ratio of manos to trough metates change when people move into villages?

There are several levels at which we can address this question. For our purposes here, we will avoid the subtleties of the temporal-spatial files and simply address the query by comparing summary nonflaked lithic data from Sagehill (A.D. 700-780) and Dos Casas (A.D. 760-850) subphase hamlets with data from village sites with primarily Periman subphase (A.D. 850-900) occupations. How many complete 2-hand manos and trough metates can be assigned to these sites, and does the ratio of manos to metates change through time? It is quite reasonable to assume that the organization and context for grinding corn may have changed with the shift from hamlets to villages. As the organization of sites potentially shifted from one to three households to typically 20 to 100 households, it is quite possible that routine and organization of food grinding activities also may have changed.

This search will result in a ratio of complete 2-hand manos to trough metates within specific sites. Data from sites in the Sagehen Flats, Milhoan, and McPhee Village areas are used in the preliminary test. For the Sagehill-Dos Casas subphase, sites 5MT2193, 2194, 2854, 2858, 4614, and 4644 are used. For Periman subphase, sites 5MT4475, 4477, 4479, 5106, 5107, and 5108 from McPhee Village are used.

This query should ultimately be run for specific subphases and/or phases, using the temporal-spatial files, but our purpose here is to simply demonstrate the uses of the nonflaked lithic data. To construct the two initial queries, I imported the NFLT10.dbf file along with the appropriate lookup tables into an Access database. Using a Cross-tab query I made *sites* the row headings and the counts for the *2-handed manos* and *trough metates* the column headings. To focus as much as possible on the loci of grinding activities, I restricted the examination to manos and metates which were evaluated as “complete” in the analysis. The attributes that were needed in the query follow:

SITE - The Sagehill-Dos Casas sites comprised the “where” criteria in one query and the McPhee sites were made the criteria in a second matching query.

CONDTN - A value of (03) will filter all complete manos and metates at these sites.

MORPHO - this attribute allows one to gather all trough metates (values 52-57) and all 2-hand manos (values 40-47) with a simple criteria expression. The results are given below (Table 3.4).

Table 3.4 Complete 2-hand Manos and Trough Metates at Selected Sagehill-Dos Casas and Periman Subphase Sites.

Subphase	**2-hand mano**	**Trough metate**	**Ratio (mano:metate)**
Sagehill-Dos Casas	99	22	4.5:1
Periman (McPhee)	468	120	3.9:1

This slight difference in the ratios does not signal a major difference in the technological organization of grinding. However a second set of queries that looks at the context of grinding activities does suggest a real change. By substituting the attribute *study unit type* (SUTYPE) for SITE in the row heading and yet maintaining the criteria asking for the different Sagehill-Dos Casas and Periman subphase sites, it is possible to examine where manos and metates were primarily found (Tables 3.5 and 3.6).

Table 3.5 Provenience of 2-hand Manos and Trough Metates, Selected Sagehill-Dos Casas Subphase Sites.

Study Unit	**2-hand manos**	**Trough metates**	**Ratio (mano:metate)**
Surface structures	12 (12.1%)	1 (4.5%)	12:1
Pitstructures	58 (58.6%)	18 (81.8%)	3.2:1
Antechambers	2 (2.0%)	3 (13.6%)	0.6:1
Courtyard/outdoors use area	1 (1.0%)	0	-----
Other (i.e., units, General site)	26 (26.3%)	0	-----
TOTAL	99 (100%)	22 (100%)	4.5:1

Table 3.6 Provenience of 2-hand Manos and Trough Metates at Selected Periman Subphase Sites.

Study Unit	**2-hand manos**	**Trough metates**	**Ratio (mano:metate)**
Surface structures	228 (48.7%)	47 (39.2%)	4.6:1
Pitstructures	128 (27.4%)	59 (49.2%)	2.2:1
Kivas (later PII component)	24 (5.1%)	1 (0.8%)	24:1
Courtyard/outdoor use area	50 (10.7%)	5 (4.2%)	10:1
Other (i.e., units, trash, general site)	38 (8.1%)	8 (6.7%)	4.8:1
TOTAL	468 (100%)	120 (100%)	3.9:1

Though the association of complete artifacts with particular proveniences does not mean that they were necessarily used in those contexts, ground stone tools such as manos, and especially metates, are so heavy and awkward to carry, that it is much more likely that they are close to the locations where they were used or stored prehistorically. The very patterned relationships that we see in the tables suggests that there is a probable link between where these items were found by archaeologists and where they were used in the past.

There are at least three important patterned changes from the A.D. 700s to the late A.D. 800s in where grinding tools are found. The first is a dramatic shift in grinding tools being found in surface structures. Almost half of the manos and more than one-third of the metates are found in surface rooms in the village sites. This marked a difference between the almost total lack of these tools in these contexts 100 years before. A second pattern exhibits a disproportionate number of manos in village site surface rooms, while almost half of the metates are still in pitstructures. This suggests that grinding tools such as metates may be shared at an interhousehold level, while personal tools such as manos may be stored in individual households. Finally, there are many more manos and metates found outside of structures in plaza or courtyard contexts in the later village sites. All of these changes suggest that there may have been a marked change in where grinding of foodstuffs took place and possibly even in how grinding activities were organized. These possible changes are made all the more important when we consider the fact that grinding rooms emerge as very distinct cultural phenomena by Pueblo III and IV times (e.g., Ortman 1998).

The above test is only a beginning with what is clearly a big and complicated data set. To confirm the above proposals and to deal with additional details it would be necessary to open the linked temporal-spatial files for the nonflaked lithic file (TSNFL4 – see Temporal Spatial System Chapter by Jonathan Till). For the problems above, it would be good to add in criteria for phase (PN), subphase (SPN), and the confidence (SPC) and integrity (SPI) of assignments.

If for some reason you need to look at any ground stone at the Heritage Center, you should add one additional bit of information: COBJECTID (the catalog number for the object). With this number, the curators at the Anasazi Heritage Center could figure out where the item is in their storage facility. Remember that you are beginning with 15,200 nonflaked lithic tools, so get the details. There is clearly much still to be discovered using the nonflaked lithic tools from Dolores.

Editor's endnote: Because of the complexity of this query we were not able to include it on the CD. However, the instructions given above should allow readers to replicate it with the data on the CD.

3.5 Plan map of Pitstructure 1, Site 5MT2193 (Dos Casas). Note in particular the two in situ metates (Mealing features 21 and 112) with possible collecting basin (Feature 76). From Brisbin et al. 1986: Fig. 8.11.

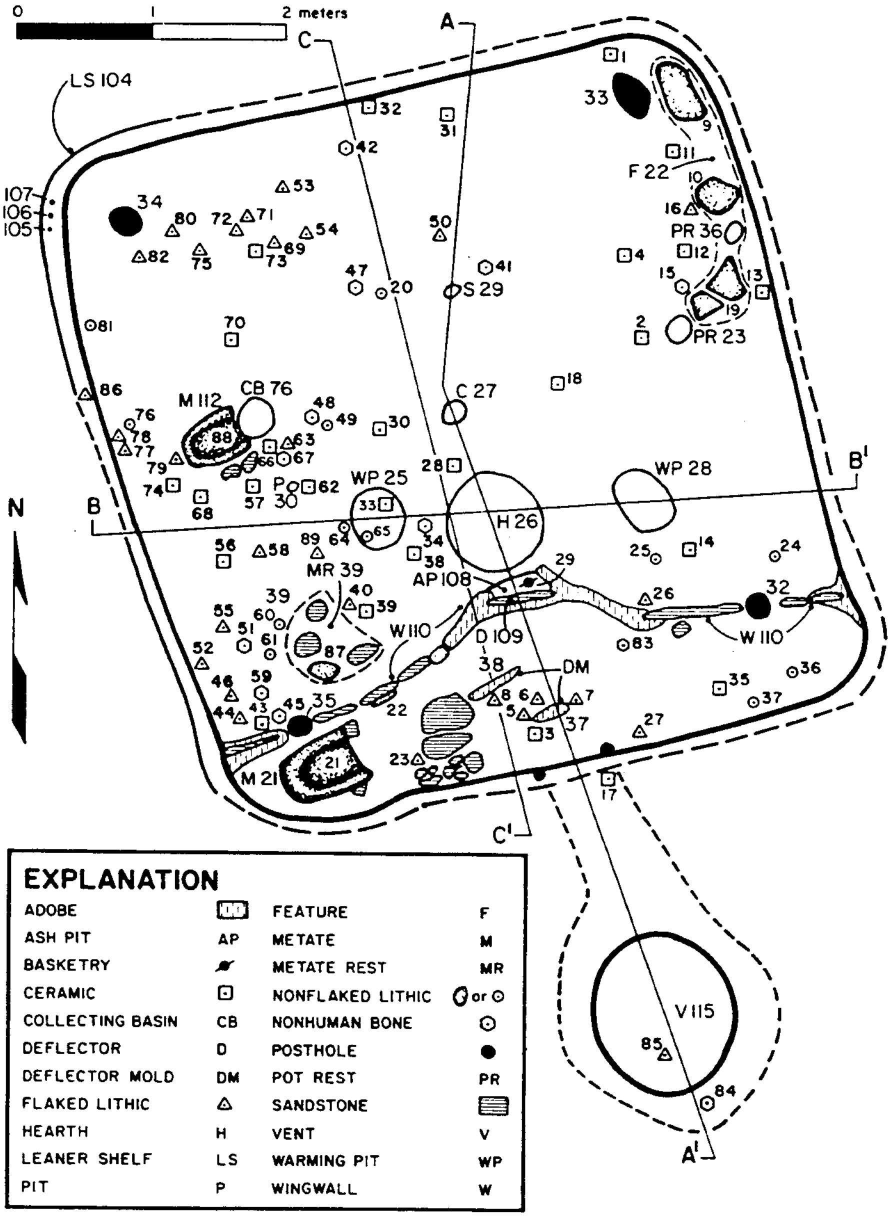
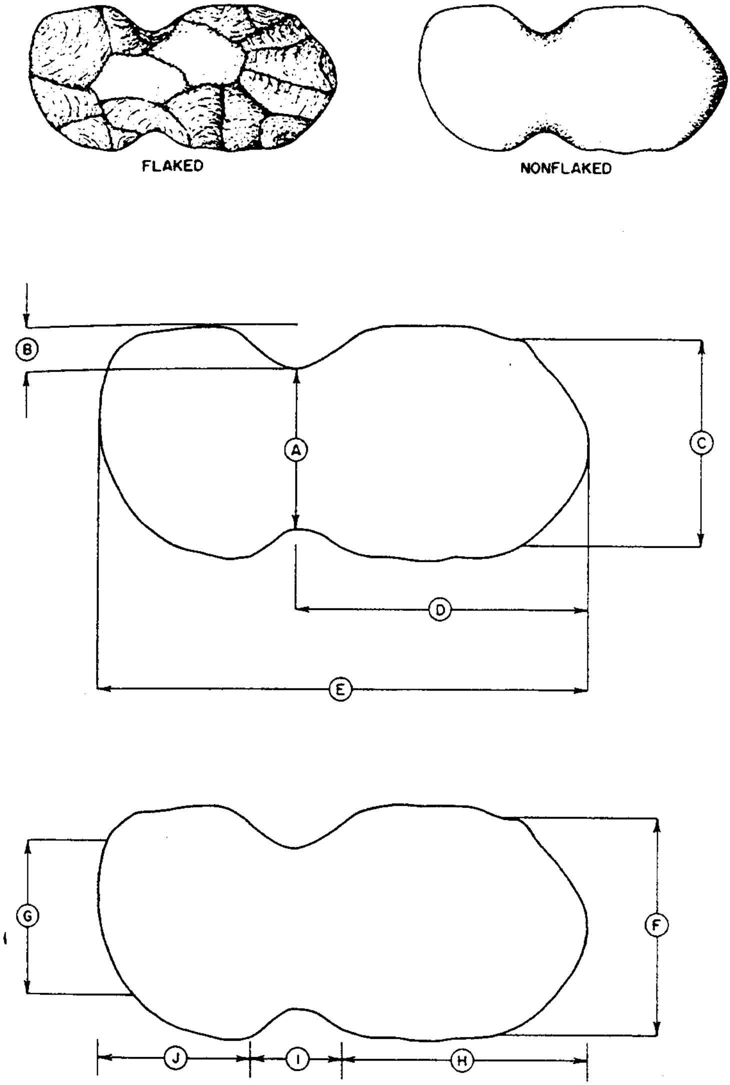


Figure 8.11 Plan map of Pithouse 1, Dos Casas Hamlet. AA' corresponds to AA' in figure 8.12; BB' corresponds to BB' in figure 8.13; CC' corresponds to CC' in figure 8.14. See table 8.4 for numbered artifact descriptions.

3.6 Measurements taken on large hafted tools. From Phagan 1986b: Fig. 3.33.



A	DISTANCE BETWEEN NOTCHES
B	NOTCH DEPTH
C	BIT LENGTH
D	HAFT-TO-BIT DISTANCE
E	TOTAL TOOL LENGTH
F	BIT
G	BUTT
H	BLADE ELEMENT
I	HAFT ELEMENT
J	POLL ELEMENT

Figure 3.33 – Large hafted tool measurements.

THE DAP FAUNAL DATA

Daniel T. Falt

INTRODUCTION

Animal bones are among the most common kinds of artifacts recovered from any archaeological project. These bones can provide valuable insight into the diet, domestication practices, and lives of the ancient inhabitants of the Dolores area. The Dolores Archaeological Program collected a staggering variety and number of animal remains. Included in this faunal data is all the recovered non-human bone, as well as the more rare shell fragments found during the DAP. Many hundreds of different animal species are represented by this assemblage. Food items, rare birds, predators, and exotic species are represented, as well as several intentional domesticated dog interments (Clark et al. 1987). In sum, 81,947 individual bone specimens were recovered and are now curated at the Anasazi Heritage Center (Neusius 1986:205).

Mammals are, by far, the most represented class of animals from the DAP. However, birds, reptiles, amphibians, and fish were also recovered in smaller proportions. Complete lists of the taxonomic composition of the faunal assemblage can be found in the Dolores Archaeological Program volumes: *Studies in Environmental Archaeology* (Petersen et al. 1985) and *Final Synthetic Report* (Breternitz et al. 1986). To understand the methods used for analysis of faunal remains, readers should also consult Neusius and Canaday (1985). This document contains a detailed description of the faunal typology, an overview of the DAP's use of the data, and a discussion of how to use the data to answer current questions.

FAUNAL STUDIES OF THE DAP

The faunal studies initiated by the DAP primarily focused on understanding what kinds of animals were available and used by the prehistoric inhabitants of the Dolores area. To explore an animal's availability in the prehistoric Dolores area, a model of the environment needed to be created. Further, the variety of environments that could affect species distribution and abundance also needed clarification (Neusius 1985a, 1986). In this sense, faunal studies of the DAP were only one part of the Environmental Archaeology Group. The task for their analysis was clear:

- Find out what species were present in the area.
- Understand how these species were distributed geographically.
- Understand the role that the changing seasons played.
- Find out how many of these animals were available to the inhabitants.
- Find out how changes in animal availability through time affected these people?

The analysis of bones from any animal can provide a wealth of information. The time of year an animal died, the age, the sex, and even the physical condition of the animal can be determined by looking at its skeletal remains. Types of species found at an archaeological site can also help illustrate what habitats prehistoric people were using. From the DAP data, researchers found species that lived in forests of pinyon and juniper, scrub oak, ponderosa pine, aspen, Douglas fir. The variety of habitats used describes the wide range of resources available to the inhabitants. These analyses allowed researchers to develop a model of preferred faunal species utilized by the prehistoric inhabitants of the Dolores area. Regardless of season, it appears that mule deer (and other *Artiodactyls*) and cottontail and jackrabbit (Neusius 1986:302) were common and preferred species. Twenty percent of all the identifiable bone specimens found at Dolores were of cottontail rabbits (Flint and Neusius 1987). Some animals may have been particularly favored for their meat, and others may have provided skins for pelt clothing or decoration.

Recent research using the DAP material explored notions of community ritual at McPhee Pueblo (Potter 1997). This new research suggests that differential distribution of rich food resources (such as large mammals) may indicate feasting behaviors or even social differentiation.

Many of the bones recovered from the DAP were the detritus of the most basic of human needs: to eat. These bones thus often bear the effects of human use, such as crushing, cut marks from butchering, burning, and disarticulation. All the bones also bare the scars of natural processes that affect artifacts in the post-depositional environment. To understand these taphonomic processes, the DAP examined a vast body of ethnographic literature to develop a model of how humans generally affect faunal remains (Neusius 1985b: 101).

During the lengthy process of analysis, a large comparative collection of animal bones was assembled by the DAP. This collection is now curated at the Anasazi Heritage Center. Comparative collections consist of the bones of modern animals obtained in a controlled manner, in order to know what a complete and unaltered skeleton would look like. These are especially necessary for archaeologists, who often only recover a tiny portion of an animal skeleton. The comparative collection is a valuable resource housed at the Anasazi Heritage Center.

Over 62% of the total recovered faunal artifacts were from screened excavation units. This is not surprising due to the nature of collecting artifacts from screened and unscreened contexts. The screen often catches pieces that would otherwise be overlooked. The largest portion of these artifacts (37,197 artifacts!) was recovered from pitstructures (Neusius 1986:203).

Marine Shell

The DAP also recovered the remains of marine shell-life, although in much smaller numbers. Shell species recovered include olivella (*Olivella giplicata* and *dama*), glycymeris (*Glycymeris* sp.), and abalone (*Haliotis* sp.) (Blinman 1986c: 687). These artifacts are generally ornaments, which have been transported over long distances and probably changed hands many times. Thus, shell items are useful in understanding long-distance trade and interaction in the Southwest. Marine shell was distributed over much of the Southwest and used to form beads, pendants, or even bracelets. As ornaments, shells were often recovered from burial contexts.

For reasons both economic and technological, shell objects are discussed in conjunction with the DAP's reductive and additive technologies (Blinman 1986c). Shell is included in this discussion because the BLM ARGUS database incorporates both marine shell and animal bone into a single object class. Shell is also presented in this text's "Ornaments" data class.

DESIGN OF FAUNAL DATA CLASS

Organization of Data

The primary goal of the faunal analysis was taxonomic and element identification with the objective of getting MNI (minimum number of individual) counts. The policy of the Faunal Studies Section (FSS) was to be as "conservative as possible when assigning taxonomic classifications" (Neusius and Canaday 1985). Additionally, they tried to avoid making assumptions when identifying a bone. In order to identify a bone to the species level the presence of a diagnostic feature (such as an articular end) was necessary (Neusius and Canaday 1985). If an analyst could not make a positive identification to species (even with the presence of diagnostic features), then one of two courses of action were taken. Either the identification was pushed back to the genus, family, or order level, or a designation of *compares favorably* (cf.) was given to the species level.

The data class includes the following data and data files:
- Faunal analysis (FAUNA10)
- Worked bone (WBONE20)
- Several special studies of animal bone (only BUNNY10 is included in this discussion)
- Marine shell (included in both this discussion and in the chapter on Ornaments by Newland)

The above data files contain descriptive *attributes* that are unique to each data file. These attributes, or what some researchers call *variables*, each had a set of associated *values*. This system was designed to help determine the MNI, as mentioned above. A general overview of the organization of the main faunal analysis file (FAUNA10) follows and was derived from Neusius and Canaday (1985). For a more detailed description of the attributes of FAUNA10 see Appendix II, this volume; value lists can be found in the appropriate files of the FAUN_LKP directory under the FAUNA directory (DBF_dir) on the accompanying CD-ROM.

The data coding form for the faunal analysis was designed to describe each bone in as clear a way as possible. The form includes 22 attributes, which are broken into eight sections. A working knowledge of osteology is desirable in order to understand and visualize the encoded attributes. The eight sections are:
- Provenience
- Modification
- Taxon
- Element

- Number of items
- Portion
- Miscellaneous observations
- Special specimen

Remember the primary objective of the analysis was to identify each bone as to its species and element side/type so that the FSS could calculate the MNIs. The data in Sections 1-6 (listed above) fulfill these requirements. Section seven (Miscellaneous observations) was intended to signal possible follow up analysis or studies, and section eight is a standard DAP section. These attributes are most often recorded as nominal data; however, counts and weights are interval/ratio in nature.

Provenience

Most of this information is dictated by the DAP FS form; however, catalog numbers were assigned in the lab by the faunal analyst. Each piece of worked or culturally modified bone was individually assigned a catalog number. After these numbers were assigned, taxonomic groupings were assigned numbers. For a complete description of how catalog numbers were assigned see Neusius and Canaday (1985).

Modification

Worked bone was coded separately from the unworked bone. The analysis of worked bone was designed to specify whether the modification was cultural or not (Figure 3.7). Once identified and coded as worked bone, the specimen(s) was sent to the Reductive Technology Lab for analysis. A separate file was maintained on the detailed analysis of worked bone (WBONE20). Though not discussed in detail in this chapter, the worked bone data file with many of the associated lookup (.LKP) tables is included on the CD.

Taxon

This section includes two attributes, taxon and certainty. *Taxon* refers to the type of animal identified. Each taxon was given a separate number. There is a long list of taxa in Appendix C of *The Dolores Archaeological Program Faunal Studies Section Laboratory Manual* (Neusius and Canaday 1985). This list was created using the Colorado "latilongs" and represents the animals that are expected in the Dolores project area today (Neusius and Canaday 1985). Within the general category of mammalia, numbers were to different size groups: small, medium, and large.

Certainty refers to the level of confidence that the analyst has with the identification to species of the bone. If the analyst was not "positive" of an identification, it would not be made. If the analyst was "fairly sure" of an identification, but not positive due to missing diagnostic features, a designation of cf. (compares favorably) was assigned. If the analyst was not fairly sure, the identification was pushed back to the level of genus, family, or order.

Element

Element side and *element type* are the two attributes associated with this section. Element side refers to the side of the body from which the bone originally came. For bones that do not have bilateral symmetry, a code of zero, or not applicable was assigned. Guesses were unacceptable, because to guess meant a 50% chance of being wrong. Left and right designations were very important for the determination of MNI.

Element type refers to the type of bone (e.g., femur, tooth, etc). The FSS chose to list skull elements and tooth combinations individually because the study required complex tooth and skull codes due to the many different combinations which might occur. Element identifications were necessary for the MNI study.

Number of Items

This attribute pertains to the number of items that share the same characteristics and are in the same line of data.

Portion

Portion refers to what part and how much of the bone is present. Most bones are not complete. The bone was held in correct anatomical position when recording this "portion" and should be visualized the same way when considering this code. Five attributes are used to record the position of the bone. These are:

1. Completeness
2. Proximity
3. Axiality
4. Laterality
5. Structure

These attributes were designed to assist in the computerized calculations of MNI's. Completeness refers to the amount of the element present while the other four refer to the part of the element present. These attributes are complicated and need to be visualized correctly. For a description and illustration of each of these attributes see *The Dolores Archaeological Program Faunal Studies Section Laboratory Manual* (Neusius and Canaday 1985).

Miscellaneous observations

In addition to data pertinent to taxonomic and element identifications, the FSS recorded several other observations. These were meant to flag the presence of this information for future research. The following attributes refer to the condition of the skeletal element:

- Breakage
- Cut marks
- Burning
- Age
- Additional comments
- Hold

- Special Specimen.

Most of these attributes merely note the presence and absence of some quality (e.g., cut marks or no cut marks). However, some of these observations were used to infer cultural practices. For example, in Room 3 at Windy Wheat Hamlet (5MT4644), a group of worked bone and stone tools from the same locus were inferred to be a possible bone-tool-production toolkit (Figure 3.8). The advanced researcher should certainly consult the *Dolores Archaeological Program Faunal Studies Section Laboratory Manual* (Neusius and Canaday 1985) for much more detailed information.

In addition to the coded data that were entered into the computer, space was left on the side of the coding form for handwritten notes that were not included in the computerized version of the data class. For information about the paper copies of these forms, it will be necessary to visit or contact the Anasazi Heritage Center.

Finally, there were a number of special faunal studies that produced data files. Only the data for BUNNY10, and the already mentioned WBONE20, are included in this user's guide. The cottontail study that produced the BUNNY10 file is discussed by Flint and Neusius (1987) and may offer support for a garden-hunting model of local small game procurement. There are other data files, such as those related to MNI calculations, that are not included in this guide.

CHANGES IN THE DATA CLASS

An important revision to the faunal data class was made in 1982. During this revision the DAP Faunal Studies Section made several changes to the coding form as well as to the codes themselves. Changes were made to the coding form for three reasons. First, there was a six-month backlog of material still waiting for preliminary analysis; therefore, the process needed to be streamlined. Second, parts of the original coding form were determined to be confusing and possibly misleading and needed clarification. Finally, to reduce the storage costs of the data file, the number of columns in the file needed to be minimized. Due to these extensive changes, many of the codes in the original format and the already coded bones needed to be recoded. Because of this approach the early paper records do not correspond to the computerized records. Changes were made to the provenience codes and the taxonomic codes. These recodes can be found in Appendix D of *The Dolores Archaeological Program: Faunal Studies Section Laboratory Manual* (Neusius and Canaday 1985). Additionally, a few subspecific designations were changed to species level because it was believed that subspecies were beyond the capabilities of the analysts to identify.

In addition to the recodes, two types of deletions were made. First, element types that represented only portions of bones were deleted. Second, codes that were determined to be too general to be useful to future MNI calculation studies were eliminated. Deleted and converted element codes can be found in Table 6 of *The Dolores Archaeological Program: Faunal Studies Section Laboratory Manual* (Neusius and Canaday 1985).

A number of codes were also added during this 1982 revision. Values were added to the list of element types, most of which referred to dentition (as well as epiphyses). Several additional codes were added to describe cranial fragments. Breakage attribute codes were also completely revamped. Information on breakage type and location on cranial fragments was put into paper site records with the intention that a special study of breakage would be undertaken as an intensive analysis. The presence or absence of cut marks was noted in regular analyses, but cut marks were also deemed appropriate for special intensive studies in the future. The final change involved a coded comment section that was added to document rarely recorded information including pathology, season of death, articulation and sex. No major changes were made after 1982.

FIELD AND LABORATORY PROCEDURES AND DATA CHECKS

As a rule, the DAP Faunal Studies Section tried to be as conservative as possible in their taxonomic classification assignments. Assumptions were avoided when identifying bone. In order for a specimen to be identified to the species level, the bone needed to exhibit the presence of diagnostic features such as an articular end.

In the field, bones were collected in the same manner as ceramics, flaked lithic and nonflaked lithic material. Any articulated skeleton found was assigned a point location number in the field.

In the laboratory, a judgement was made as to taxon and all the pertinent information was recorded on acid-free paper, which was stored with the individual bone or bones. After all the bones from a single FS had been identified, the information was encoded into the computer. Bones were stored by catalog number and by FS.

Data checks were conducted on a regular and routine basis as for the whole project. For a good discussion on these checks, see the nonflaked lithic section in this volume.

POTENTIAL PITFALLS AND STARTING POINTS

Due to the changes made during recodes, there are a few inconsistencies that need to be taken into account. First, because the analysts needed to recode some of the earlier bone analyses, the early paper records do not match the computerized files. This is important to take into account when trying to replicate earlier studies. Due to early coding problems, matched pairs needed to be pulled and recounted before the end of the analysis. Unfortunately, due to time constraints, this reexamination was not completed; and for this reason, in a few instances, an incorrect count of items for matched pairs may exist in the computer files.

The DAP Faunal Studies Section recommends that anyone attempting to use the faunal data file should have a working knowledge of osteology in order to be able to correctly read the computer encoded attributes and visualize the bones. The Faunal Studies Section did include diagrams that outline positions and locations on the bones in *The Dolores Archaeological Program: Faunal Studies Section Laboratory Manual* (Neusius and Canaday 1985). In order to understand the coding of the bones, I recommend reading through the laboratory manual.

The faunal data class offers a wealth of information into the past lifeways of ancient Pueblo peoples. While the files are large, the information is detailed and rich. An example as to how to use these data files follows.

EXAMPLES OF QUERYING THE FAUNAL DATA CLASS

Using the faunal data class, researchers can examine more than just ecological conditions and ancient subsistence. Indeed, some researchers have sought to examine the role of cultural traditions during the process of village formation.

Potter (1997) suggested that McPhee Pueblo (5MT4475) and Pueblo de las Golondrinas (5MT5107), both roomblocks within McPhee Village, used different kinds of animal resources. Despite being similar in size, close in proximity, and occupied during the same time period, inhabitants of McPhee Pueblo seemed to use more rabbits and less big game than the inhabitants of Pueblo de las Golondrinas (Figure 3.9). Potter believes that this difference may have been due to different amounts of ceremonial feasting at these sites. The difference may also be caused by different clan activities, different seasons of occupation, different ethnic groups living side by side, or even different archaeological techniques.

Because Potter (1997) did not have access to the computer data, but instead used data obtained from the microfiche in the back of the DAP volumes, I'd like to rerun Potter's queries on the faunal data class to see if we can replicate his results. First, we will query for the sites that Potter includes in his analysis. Next, the period of time which Potter was interested in was A.D. 850-900, or the Periman subphase of the McPhee phase. In this investigation, we will import the TSFAU10.dbf data file into MS Access, and we will construct four faunal queries for this subphase from the six roomblocks at McPhee Village. Potter summarized differences between the roomblocks through an inspection of the totals for four general taxonomic groups for each site: *Artiodactyls*, *Lagomorphs*, *Aves*, and *Carnivores*. Potter (1997:360) excluded all the unidentified or undetermined fauna with regard to species and also domesticated animals, rodents, fish, amphibians, reptiles, galliformes and doves. The queries all have the same basic form, varying only in the general taxonomic group.

SITE- 4475 (McPhee Pueblo), 5107 (Pueblo de las Golondrinas), 4477 (Masa Negra), 5106 (Weasel Pueblo), 4479 (Aldea Alfareros), and 4480 (Rabbitbrush Pueblo)

SPN- Periman subphase of McPhee phase (32)

TAXON1- There are three different sorts of taxa (Taxon, Taxon1, and Taxon1R) in the temporal-spatial file for fauna. I used Taxon1. This is the attribute that changes for each query, depending on which general taxonomic group is being queried.

For Artiodactyls we gathered together the counts for artiodactyls, cervids, elk, mule deer, mountain sheep, wild goats, and antelope at each site. In Taxon1, the criteria expression "(>=3009 And <3015) Or 3016 Or 3020 Or 3021 Or 3023 Or 3031 Or 3051" summarizes the classes that are included.

For Lagomorphs the data gather all specimens of cottontails and jackrabbits. The criteria expression is ">=4040 And <4049".

For Aves, or birds, there is an immense number of categories. The criteria expression is "(>=6001 And <6131) Or (>=6274 And <6548)". Only fowl-like birds such as turkey and grouse and doves are excluded.

Finally, for Carnivores, a variety of meat-eating animals ranging from coyotes to bears to mountain lions are included. The only exclusion was for domestic dogs and indeterminate categories that might include dog. The criteria can be written as "2006 Or (>=2009 And <2019) Or (>=3001 And <3009)".

The results we obtained from these queries are presented in Table 3.7

Table 3.7 Number of Identifiable Specimens for Roomblocks in McPhee Village.

SITE	ARTIODACTYL	LAGOMORPH	AVES	CARNIVORE	TOTAL
4475	215	688	27	13	943
	(22.8%)	(73.0%)	(2.9%)	(1.4%)	(100.1%)
5107	285	190	6	5	486
	(58.6)	(39.1)	(1.2)	(1.0)	(99.9)
4477	199	249	9	7	464
	(42.9)	(53.7)	(1.9)	(1.5)	(100.0)
5106	43	54	2	0	99
	(43.4)	(54.5)	(2.0)	(0)	(99.9)
4479	58	119	3	1	181
	(32.0)	(65.7)	(1.7)	(0.6)	(100.0)
4480	79	85	4	0	168
	(47.0)	(50.6)	(2.4)	(0)	(100.0)
TOTAL	879	1385	51	26	2341

It is probably not surprising, given the number of assumptions in this test, that we did not exactly reproduce Potter's results (1997:Table 2). However, with a few minor exceptions, the broad trends in relative proportions of artiodactyls and lagomorphs are generally reproduced. The proportion of the differences between artiodactyls and lagomorphs for the two large sites that were the focus of one of Potter's arguments—5MT4475 (McPhee) and 5MT5107 (Pueblo de las Golondrinas)—are almost the same in our recomputation. The DAP temporal-spatial system allows increasingly stringent spatial, temporal, and contextual controls in any temporal-spatial inquiry. The results reported above only invoke the association of the Periman subphase and do not call in any of the temporal and spatial confidence and integrity measures that could have made the criteria for selection more demanding.

There are, of course, the discrepancies expected in any reanalysis of a problem. The above results produce 60% less bird bone than Potter reports in his article, and there must be some discrepancy either in how I interpreted Potter's article or in his temporal-spatial faunal associations. There were at least three to four other ways that we could reproduce the assumptions described by Potter in data tests—given that we do not know the exact attributes he used—and each way produces slightly different numbers. However, the general trends that Potter used for many of his arguments are sustained by the above reanalysis.

The key lesson learned here is that with curated data sets it is possible to test the same hypothesis a previous researcher might have investigated. It also will become increasingly important to specify the details of one's distillation of a large data set so that replication will be easily possible.

3.9 Proportional taxonomic composition of faunal assemblages from McPhee Village roomblocks. From Potter 1997: Fig. 6.

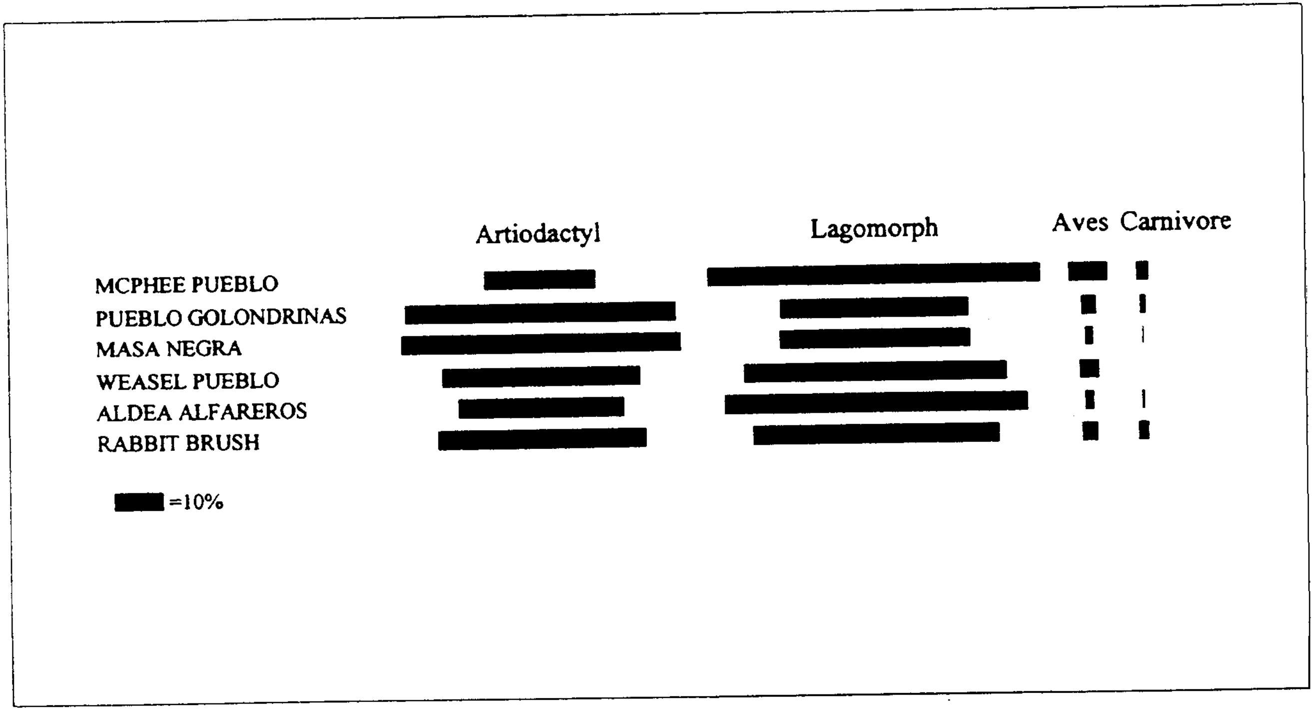


Figure 6. Proportional taxonomic composition of faunal assemblages from McPhee Village room blocks.

BOTANICAL RESOURCES

Joel Tyberg

BOTANICAL RESOURCES IN ARCHAEOLOGY

Information pertaining to *botanical* resources is an important component in any comprehensive archaeological investigation. In the American Southwest, the data derived from the collection and analysis of botanical remains adds to the reconstruction of ancient environmental settings. These data also contribute to the understanding of the relationship that existed between ancient peoples and their environments. The Dolores Archaeological Program (DAP) was one of the first southwestern archaeological projects to do extensive and consistent botanical sampling. DAP researchers implemented strict collection procedures to acquire only those plant resources that were unambiguously associated with cultural deposits. In this way they were able to frame questions, assumptions, and inferences about both macro- and microbotanical data found within the archaeological record of the Dolores Valley.

ANALYSIS OF BOTANICAL RESOURCES IN THE DAP

By assembling a macrobotanical data file from the materials recovered at excavated sites in the DAP, researchers were able to look at the ancient botanical resource base in terms of what resources were potentially available, which taxa were used, and how the resource mix changed through time (Petersen, Matthews, and Neusius 1986). Examining changes in resource supply and demand, and testing for changes in the resource mix available to the ancient inhabitants of the DAP area, provided researchers with a backdrop for understanding the economic and adaptive relationships that existed between ancient peoples and their environment.

One example of how DAP archaeologists attempted to accomplish this was to evaluate the impact that agricultural intensification had on botanical resource procurement and subsistence strategies. The productivity of an ecosystem has been shown to increase when humans take an active role in deciding the importance of certain resources over others. Modifications to plant resources (i.e. through agriculture and domestication) appear evident in the archaeological remains associated with subsistence routines from various occupation periods in the DAP area (Benz 1984:199). Questions asked by DAP archaeologists were meant to address what natural plant resources were available to the ancient occupants of the Dolores River valley and which of these resources were exploited.

DAP archaeologists did not only consider the domesticated crop resources that are generally believed to have been cultivated by ancient peoples (i.e. corn, beans, and squash). They also investigated the changing role of pioneer plant resources and collected wild species in the available resource mix (Petersen 1986a:469). Pioneer species can maintain thick stands in an agricultural field either actively being farmed or in the early stages of fallow. Studies show that by encouraging and harvesting pioneer plant populations the ancient Dolores inhabitants were able to increase the productivity of their fields, the predictability of their crop yields, and were also able to enhance the nutritional output of their subsistence base (Petersen 1986a:469).

In addition to collecting macrobotanical data, microbotanical investigations, such as the collection of pollen for analysis, were also able to provide information on economic resources that were utilized by the ancient inhabitants of the Dolores River valley. These data also provided details on the existent environment in which the Dolores Anasazi lived. Climatic reconstruction was attempted by using comparative pollen data from the neighboring La Plata Mountain area. By combining pollen data along with tree-ring records from the La Plata Mountains, researchers were able to chronicle both long-term and short-term changes in seasonal precipitation and length of growing season for southwestern Colorado (Petersen, Matthews, and Neusius 1986:150-151). Studies of this kind are very important for interpreting settlement location choices (Figure 3.10) as well as for recognizing the impetus for migration into and out of the Dolores area during ancient times (Petersen, Matthews, and Neusius 1986:151).

STUDIES USING DAP MATERIALS

Several interesting studies have since relied on the botanical data compiled during the Dolores Archaeological Program. Orcutt, Blinman, and Kohler's (1990) "Explanations of Population Aggregation in the Mesa Verde Region Prior to A.D. 900" noted that village formation in the Dolores area is more likely to take place when precipitation levels are above average. Additionally, Kohler, looking at Van West's (1994) 1470 km^2 study area in southwest Colorado, notes that aggregation is in the best interests of households when agricultural production is relatively high and is coupled with a high degree of spatial and temporal variability (1992a). Conversely, Kohler proposes that households will disaggregate when low agricultural production is coupled with a high degree of spatial and temporal variability. Schlanger and Wilshusen (1993) were able to link the movement of dry farmers in the Dolores region to variations in climatic conditions. Other studies using the botanical data from the DAP include Kohler and Matthews (1988), and Floyd and Kohler (1990) who show that the depletion of wild resources may be related to the processes of village formation.

DESIGN OF THE BOTANICAL RESOURCE DATA CLASS

ORGANIZATION OF THE DATA

The archaeologists of the DAP organized botanical resources into two main data files:

- Macrobotanical (MACRO10)
- Microbotanical (POLLN10)

In addition, there were several specialized studies of particular subclasses of material. In the case of the User's Manual we have included the special data for corn (CORN10), which is a study of the morphology of the corn cob and kernel remains found at Dolores. The files that represent these data were archived as MACRO10, POLLN10, and CORN10. In addition to these data, there are also files pertaining to botanical resources contained in the temporal-spatial category of data.

Each data file contains unique descriptive *attributes* with associated *values* that represent discrete or continuous aspects of any given attribute. For example, an important attribute in both the macrobotanical and pollen data is *Taxon*, which designates the plant family, genus, and species that a particular specimen represents. The values in the various botanical files include *nominal* (discrete categories), *ordinal* (relative range), and *interval* (continuous) levels of measurement, but many of the most important measures are simple nominal categories. A listing and brief summary definition of the attributes within each botanical data file is given in Appendix II. The corresponding values for each attributes are given in the lookup table files (see the MACR_LKP directory under MACRO on the DBF directory) on the CD.

The macrobotanical data contain basic information such as the site and FS number for a unit with macrobotanical remains, as well as detailed morphological information for each taxonomic item (or plant part within a taxon) within an FS. The recovery process—such as flotation, screening, or rehydration—was recorded, since this may differ for a particular sample from the collection process for the whole FS (i.e., provenience) unit. For example, a unit may have been screened through ¼ inch hardware mesh, but the macrobotanical remains for this unit may have been recovered from floatation analysis of a bulk soil sample. The majority of the macrobotanical information is primarily descriptive, nominal level data. The file includes information such as a taxonomic assessment of the remains, quantification of the items, and various measures of the condition of the remains—such as whether the items are charred or not charred, damaged or whole, or whether they are contaminated or modified in some way. There are 172 values that define the particular taxonomic group to which a particular record belongs (i.e. Amaranthus, Boraginaceae, Cactaceae, etc.) and these are named in a manner consistent with Weber and Johnston's *Natural History Inventory of Colorado* (1979).

The pollen data are even more simple and straightforward than the macrobotanical file. It contains rudimentary provenience information for the pollen sample and a listing of the taxa identified within a sample and the pollen grain count per taxon. For more detailed provenience information on the sample—as is the case with most files—it is necessary to link the pollen file with the provenience file.

The corn data file represents one of several intensive botanical studies that were done as subsidiary studies after the macrobotanical analysis was largely complete. The corn study was designed to obtain detailed information and measurement of corn cobs and plant fragments which might allow the DAP to identify different varieties of corn in the archaeological materials. The part of the corn plant recovered and the completeness and condition of the item were all recorded. Thereafter, the information recorded consisted of the actual and estimated numbers of rows of kernels on an ear, the shape and size of the corn ear, and various details about glumes, cupules, and kernels.

FIELD PROCEDURES

Given the strong ecological focus of the project, sampling for archaeobotanical remains was an important part of the DAP research design. A detailed sampling design and methodology was part of the original field manual (Kane and Robinson 1984 [though note that key parts of the sampling design were being systematically implemented by 1979]). There was only limited botanical sampling in the 1978 field season, but thereafter there was considerable attention was paid to the recovery of botanical remains in the field. In 1979 members of the Environmental Archaeology Group did most of the botanical sampling, but by 1980 the sampling procedures had become familiar enough to have specialists on each crew take care of bulk soil and pollen samples (Figure 3.11).

The actual procedures for bulk soil sampling and retrieving pollen samples are detailed in the field manual, but several basic themes should be noted here. First, there were often situations where sampling a particular cultural feature, such as a hearth, consisted of taking horizontal and vertical "control" samples in addition to the sample from the cultural fill of the hearth. For example, in the case of a hearth, bulk soil samples might be taken from the rooffall layer above the hearth and from the earth several centimeters below the hearth. Analysis of these vertical "control" samples and comparison with the results from the "target" sample might allow an analyst to strengthen their arguments about the association of particular botanical taxa with a particular behavioral loci and to rule out the possibility of outside contamination of a cultural provenience. A second theme was sampling intensity, which was determined by an evaluation of the potential for the preservation of micro- or macrobotanical remains. At the DAP, there were four basic site abandonment modes identified—ranging from leisurely to catastrophic—and these abandonment modes were argued to be reflective of different levels of preservation. Botanical sampling intensity typically was tied to this assessment of site abandonment mode, with catastrophic abandonments thought to offer the best potential preservation and thereby subject to the most intensive sampling regimes. Examples of some early results of intensive sampling are detailed in the *Synthetic Report 1978-81* (Matthews 1984). Leisurely abandonments, or cases in which sites were abandoned without any burning or deliberate destruction, were subject to the least intensive sampling.

LAB PROCEDURES

Bulk soil samples were processed and analyzed at the DAP laboratory and pollen samples were processed and analyzed by a consultant, Dr. Linda Scott. Processing procedures are specifically described in unpublished reports (Matthews and Benz 1981; Scott 1982) and generally discussed in the *Research Designs and Initial Survey Results* volume (Petersen, Clay et al. 1986). Bulk soil samples were typically "floated", the materials dried, separated, and analyzed. Taxonomic identifications were done using a binocular microscope with a reference botanical collection and literature. The heavier fraction of material was treated in a similar fashion. Each distinctive plant part or taxonomic item within an FS was given a separate catalog item number. The laboratory procedures for the pollen analysis are detailed in the pollen reports attached to many site reports and should be consulted. A particularly informative example of analysis procedures is the intensive pollen sampling done at Windy Wheat Hamlet (Scott 1986).

CHANGES IN THE DATA AND DATA CHECKS

We have not been able to discover what specific changes may have occurred in the data analysis or what specific data-checking procedures were in place in the environmental archaeology group. Environmental data was rechecked after being key punched, and it appears that the computer section at DAP ran computerized searches for duplicate lines and for out-of-range values.

POTENTIAL PITFALLS AND POSSIBLE STARTING POINTS

The botanical sampling program introduced a number of innovative procedures, but not all of the promise of the program was fulfilled. The collection of vertical and horizontal control samples was a significant methodological commitment early in the program, but its efficacy was never truly assessed. As a consequence, these "control" samples became a low priority for processing and in most cases were not included in the published project analyses, simply because it was unclear how they might bias the overall data presentation (see Matthews 1986a:153 for more details). Similarly, for some taxa only uncharred plant remains were recovered, which could mean that they consistently represented relatively modern contaminants to the sites. Though these remains are represented in the computer data, they were not tabulated in the *Final Synthetic Report*, except in the case of cultigens and one resource study, where it was deemed appropriate to include them.

The sheer size and standardization of this data class make it a very attractive avenue for analysis. The macrobotanical research examined vegetal remains from 2375 proveniences at 54 sites and seeds and other items recovered in floatation from 1908 samples from 52 sites. Standardized recovery of botanical remains is rare at this scale in archaeological projects any more. This allows analysts the opportunity to use a large data set to address regional questions through different time periods, like in the following example.

EXAMPLES OF QUERYING THE BOTANICAL RESOURCE DATA CLASS

Our interest in this query focuses on the Sagehen Flats/McPhee Village area in the southern reaches of the project area. We are interested in identifying economic similarities and/or differences between populations that occupied this place at slightly different times. In this case, the measures will be the macrobotanical remains of two plant food groups: ruderal plants, or "pioneer" species, that grow well in areas disturbed by agricultural areas (these plants are frequently used, and encouraged to grow, as foods); and wild plant foods.

This query approximates a few questions already addressed by DAP archaeologists. Meredith Matthews (1986a:165) examined changes in food plant use through time for the whole project area and defines several expectations to test her results. These expectations include:

- An increase in the amount of cultivated foods through time.
- An increase in the amount and diversity in ruderal species through time. These should increase in number as the intensity of agricultural production increases through time.
- A decrease in the amount and diversity of wild plant food species from the Dos Casas subphase to the Periman subphase (this last point is a gross paraphrase of a fairly complicated statement by Matthews).

This query will examine how two different plant groups—ruderal and wild plants—vary according to sites that belonged to the Milhoan and Sagehen Neighborhoods (the early population) and McPhee Village (the later population). The "neighborhoods" are combined to provide for a larger sample size.

The sites examined from the neighborhoods include: 5MT2193, 5MT2194, 5MT2854, 5MT2858, 5MT4614, and 5MT4644.

McPhee Village includes the following sites: 5MT4475, 5MT4477, 5MT4479, 5MT4684, 5MT5106, 5MT5107, and 5MT5108.

The attribute [TAXON 1] will allow us to select the appropriate plants for our analysis and include ruderal plants and wild plants. We will need to create separate queries for each plant group according to site group (i.e. the neighborhoods vs. McPhee Village). The plant groups are as follows:

Ruderal plants: *Amaranthus* (17), *Chenopodium* (64), Cheno-am (61), *Cleome serrulata* (53), Compositae (73), Cruciferae (99), *Descurainia* (100), Gramineae (156), *Helianthus* (79), Malvaceae (225), *Mentzelia albicaulis* (218), *Nicotiana attenuata* (328), *Physalis* (329), *Polygonum*/Polygonaceae (256), *Portulaca* (266), Solonaceae (325), *Solanum* (330), and *Sphaeralcea* (227).

Wild plants: *Allium* sp. (11), *Amelanchier* sp. (282), *Cordylanthus* sp. (317), Cyperaceae (125), *Iva* sp. (81), *Juniperus* sp. (118), *J. osteosperma* (119), *J. scopulorum* (120), Leguminosae (194), *Opuntia* sp. (47), *Penstemon* sp. (318), *Pinus edulis* (243), *Querqus gambelii* (149), *Rhus aromatica* (23), Rosaceae (281), *Rubus* sp. (292), *Rumex* sp. (259), *Scirpus* sp. (126), *Scutellaria* sp. (189), *Yucca* sp. (209), and *Y. baccata* (210).

Other attributes that these queries need to include are [PARTS] and [CHARRED]. Ruderal plant parts that are selected for analysis here include the reproductive portions of the plants including the infructescences (11), seeds (14), fruits (12), pericarps (13), cotyledons (17), cupules (19), and inflorescences (21). Wild plant species also include the cones (15), stamens (29), and the peduncles (29). Reproductive parts are selected for analysis essentially because these are the parts that are typically eaten. "Charredness" is an important attribute to consider as this helps us determine with greater security whether or not the plant was present in the structure prehistorically. The values we need to select for here are for partial charring (2) and complete charring (3).

As noted earlier, we basically need to run a total of four queries so we can look at the number and diversity of plant food species types present in the two groups of sites. By comparing the relative ubiquity of the plant food types in the floatation samples taken in the earlier Dos Casas hamlets and later McPhee Village sites, it is possible to see if there are patterned differences between the two site groups. The Crosstabs queries were constructed in MS Access using the MACRO10 data file along with the appropriate lookup tables.

Finally the presence or absence of the taxa in different proveniences (i.e. samples with different FS numbers) was used to count how "common" or "rare" a particular plant was. By looking at the relative "ubiquity" of particular seeds and fruits, we are somewhat able to compensate for variable sampling size at different sites and to not be influenced by particularly "rich" features. Seeds and fruits were gathered into three ubiquity groups, with divisions at 5 percent and 15 percent to separate plants which were rare (0-5%) from those that were somewhat common (5-15%) from very typical (>15%) plants found in features (Tables 3.8 and 3.9).

Table 3.8 Ubiquity of Ruderal Seeds and Fruits in McPhee Community Sites.

	Present in ≤ 5% of the samples	Present in >5%, but ≤15% of the samples	Present in >15% of the samples
Dos Casas subphase hamlets (N=587)	Compositae (73) *Helianthus* (79) Cruciferae (99) *Descurainia* (100) *Mentzelia albicaulis* (218) Malvaceae (225) *Sphaeralcea* (227) *Polygonum*/ Polygonaceae (256) Solonaceae (325) *Physalis* (329) *Solanum* (330)	*Amaranthus* (17) Cheno-am (61) *Chenopodium* (64) Gramineae (156)	*Portulaca* (266) *Nicotiana attenuata* (328)
McPhee Village sites (N=560)	*Cleome serrulata*(53) Compositae (73) *Helianthus* (79) *Mentzelia albicaulis* (218) Malvaceae (225) *Sphaeralcea* (227) *Polygonum*/ Polygonaceae (256) Solonaceae (325) *Nicotiana attenuata* (328) *Solanum* (330)	*Amaranthus* (17) Cheno-am (61) Cruciferae (99) *Descurainia* (100) Gramineae (156)	*Chenopodium* (64) *Portulaca* (266) *Physalis* (329)

Table 3.9 Ubiquity of Wild Seeds and Fruits in McPhee Community Sites.

	Present in ≤ 5% of the samples	Present in >5%, but ≤15% of the samples	Present in >15% of the samples
Dos Casas subphase hamlets (N=34)	*Opuntia* sp. (47) *Scirpus* sp. (126) Rosaceae (281)	*Juniperus* sp. (118) *J. osteosperma* (119) *Yucca* sp. (209)	Cyperaceae (125) Leguminosae (194) *Pinus edulis* (243)
McPhee Village sites (N=93)	*Rhus aromatica* (23) *Iva* sp. (81) *Juniperus* sp. (118) *Querqus gambelii* (149) Leguminosae (194) *Yucca* sp. (209) *Y. baccata* (210)	*Opuntia* sp. (47) Cyperaceae (125) *Scutellaria* sp. (189) *Pinus edulis* (243) Rosaceae (281)	*J. osteosperma* (119)

The results in the two tables do in general support the proposals put forward by Matthews (1986a), but the differences between the two groups are not so marked as to suggest a major shift in subsistence or a level of economic intensification that would restructure how people were generally exploiting ruderal and wild plants. Certainly, the ruderal plant foods are far more common in both the Dos Casas subphase hamlets and Periman subphase (McPhee Village) sites. The ruderal plant remains were found in over 500 samples from each subphase, whereas the wild plant remains were found in much fewer samples. This strongly supports the proposal that there was significant disturbance to the local landscape by cultivation of cultigens such as corn, beans, and squash and encouragement of these ruderal species in and around the fields.

There are unexpected results as well. For example, there is more variety and number in the wild food species in the McPhee Village samples than might be expected. The macrobotanical data class clearly can be used for many more investigations in the future.

3.10 Bird's eye view of the reconstructed potential dry farming belt, AD 800-1000, southwestern Colorado and climatograph for dry-farm corn, AD 800-1000. From Peterson 1987d: Fig. 15.5

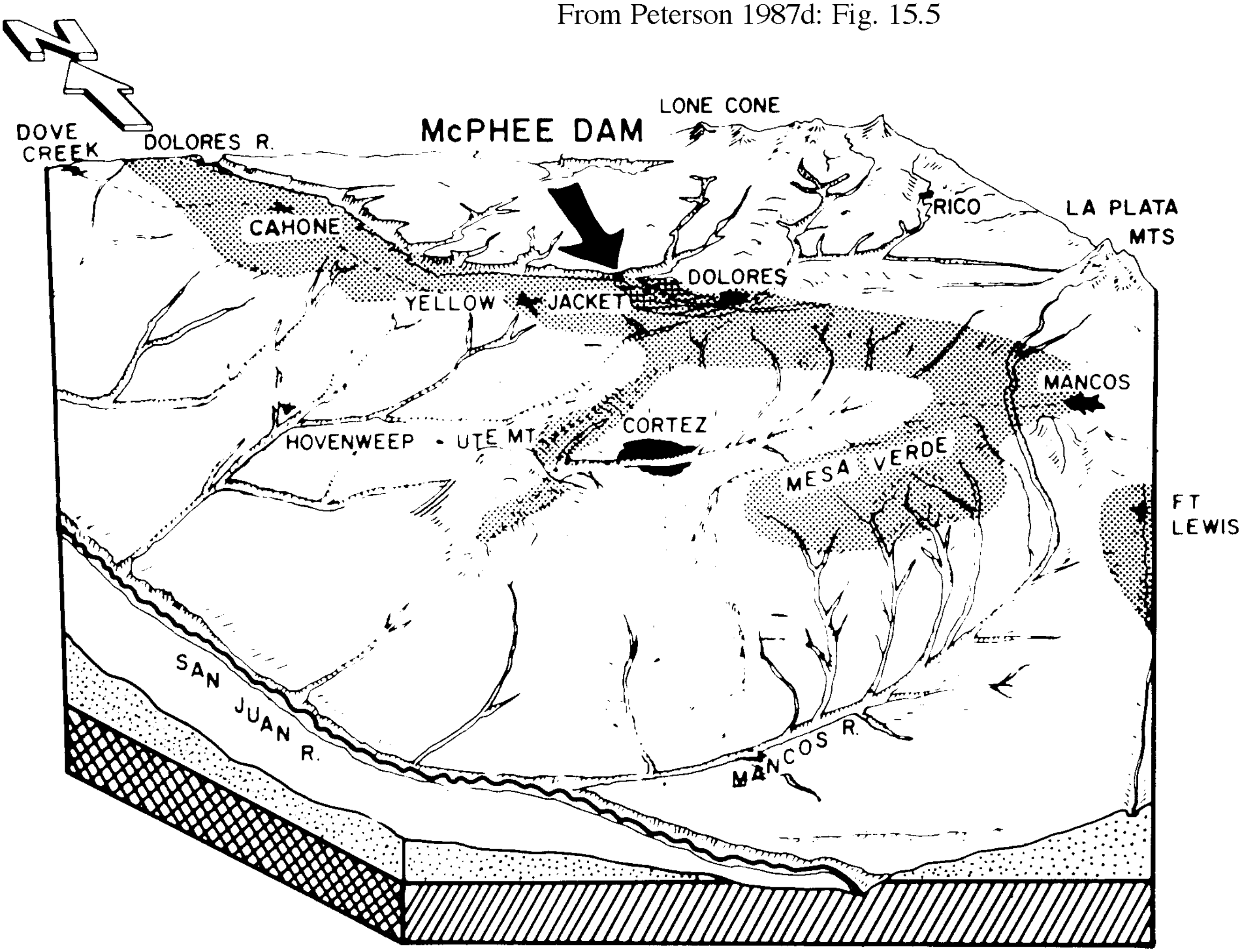


Figure 15.5 – Birds-eye view of the reconstructed potential dry-farming belt, A.D. 800-1000, southwestern Colorado.

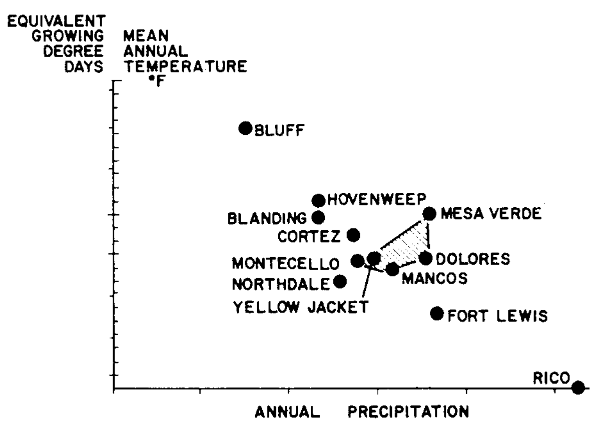
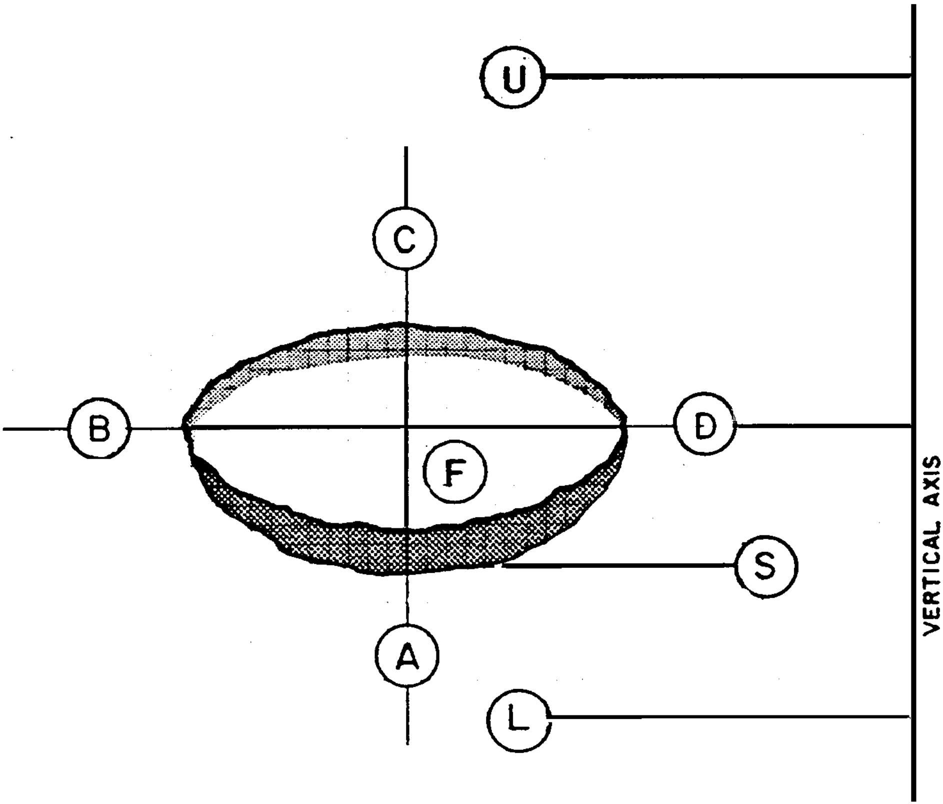


Figure 15.6 – Climatograph for dry-farm corn, A.D. 800-1000. Hatching indicates portion of the graph that was ideal for corn. Scale markings are present only to show relative units.

3.11 Standard DAP sampling scheme for hearths and related features. From Kane and Robinson 1984: Fig. 25.



ORNAMENTS, RARE ROCKS, AND MISCELLANEOUS

Judy Newland

Ornaments, *rare rocks*, and *miscellaneous* are small files with little documentation in the DAP volumes. They are not organized into separate, cohesive sections, but instead, grouped into a catchall category. The only relation these artifacts have to each other is that they are unusual, interesting, and do not fit the other categories.

ORNAMENTS IN ARCHAEOLOGY

Ornaments include beads and pendants made of turquoise, jet, bone and shell. The prehistoric peoples of the Southwest adorned themselves with jewelry made of materials considered precious and/or rare. Ornaments were valuable to the prehistoric Dolores residents. This fact is evidenced by the distance these objects were traded, their use as items to display wealth or status, and their inclusion in burial contexts in some instances. Items of stone and shell had special meaning to these people, and were probably valued for their intrinsic beauty and possibly their durability. But, for archaeologists, ornaments offer some valuable lines of evidence for questions regarding status, trade and display. Archaeologists assume that these items held high value because of the great distances they traveled. Ornaments can serve as indicators of regular, long-distance exchange networks as well as possible small group migrations. We also know that ancient people wore jewelry to display status and wealth. Because jewelry was valued so, ornaments are often analyzed to measure wealth or status. Ornaments have three basic characteristics; they are valuable, often inherited, and have a long life in a cultural system. Those buried with large amounts of jewelry were considered high status. They may have held power in the community or controlled trade and exchange.

TREATMENT OF ORNAMENTS IN THE DAP

The goal of the preliminary analysis of DAP ornaments was to inventory the ornaments collected in excavation and survey from 1978 - 1981 (Raffensperger 1982) and compare them within the context of the DAP temporal and spatial systematics. Analysis focused on material, finished shape and size. There were 243 occurrences of ornaments at the DAP. A cache of beads, or other items found together was sometimes considered one occurrence. It is likely that there are many more individual items than the 243 occurrences noted above, but individual counts are not recorded in the ornament data. Sixty-four percent of recognized ornaments were made of nonlocal materials, such as jet, shell, and turquoise, which certainly has implications for trade and exchange.

Shell ornaments were not given positive identification, but divided into four general taxa—two kinds of olivella (*Olivella giplicata* and *Olivella dama*), abalone (*Haliotis* sp.), and glycymeris

(*Glycymeris* sp.). The shell analysis suggests almost all of the shell was derived from the Pacific Coast, but given the relative lack of comparative collections and the common modification to the shell, these identifications are preliminary. The shell is assumed to have come into the Dolores Valley through trade with the Hohokam area.

WHERE TO FIND ORNAMENTS IN THE DAP REPORTS

Searching the DAP volumes for written material and information about ornaments is slow, tedious, and often without reward. Individual finds of ornaments may be included in the material culture listings in the tables of various DAP site tables. This method will yield a few entries, but they are widely scattered throughout the volumes.

One of these rare examples is at Site 4475 (McPhee Village), Pitstructure 3, a structure that contained a large number of beads. A brief discussion of these ornaments is found on pages 204 through 208 of the site report (Brisbin et al. 1988). This accompanying discussion is unusual in site reports. This group of beads included the following items (Brisbin et al. 1988:219-221):

Pl. No. 22	pendant
Pl. No. 54	turquoise bead
Pl. No. 76	2 geometric shaped turquoise objects
Pl. No. 182	turquoise bead
Pl. No. 188	2 shell beads
Pl. No. 197	bead
Pl. No. 198	bead

Examples of illustrated ornaments include a beautiful example of a jet effigy from Grass Mesa (Figure 3.12) and several jet bird effigies illustrated in Fig. 4.29 in the McPhee Village volume (Kane and Robinson 1988).

Information on ornaments can also be found in other computer files. Look for turquoise in ground stone, shell in organic items and tubes and beads in worked bone. Additionally, the DAP *Final Synthetic Report*, Chapter 15, discusses exchange and interaction in the Dolores Area (Blinman 1986c). The nonflaked lithic discussion includes ornaments – materials, symbolic significance, exchange and distribution. One might expect to find ornaments in conjunction with burial sites. Although there are occasional listings under associated artifacts, discussion of high status burials reveals the general pattern of relatively sparse grave goods in the Dolores area.

RARE ROCKS AND MINERALS

Another small data file of interest is rare rocks and minerals. A search of the volumes will yield a similar result to that of ornaments. DAP volume *Supporting Studies: Settlement and Environment,* contains a useful chapter, 21, entitled "Geologic Sources of Unusual Minerals and Rocks of the DAP" (Keane and Clay 1987). It examines unusual rocks and minerals recovered by DAP and reveals a variety of materials that do not occur naturally within the DAP area. Information in the section on turquoise states that turquoise recovered in the DAP area includes only items that have been extensively worked. All obsidian found is believed to be nonlocal and the result of exchange.

Both local and nonlocal rocks and minerals are represented in the Rare Rocks and Minerals data file. For example, there are several cases of quartz crystals being found in site contexts that suggest they were special items, even though they are locally available. Other local items that might be found in this data include coal, fossils, unusually shaped pebbles, and gastroliths. Nonlocal minerals and rocks include copper, mica, jet, turquoise, galena, magnetite, and nonlocal fossils.

Though the sources on rare rocks and minerals are themselves rare, they are worth searching for. Clay (1988) offers a good discussion of unusual rocks and minerals in the geoarchaeology chapter in the *Grass Mesa Village* volume (Lipe et al. 1988).

MISCELLANEOUS

The name of the miscellaneous data file well describes this class of material. It includes everything from unusual minerals to fossils to petrified wood, feather remains, and eggshell. The miscellaneous category is a true catchall for anything that might have been found in a possible cultural context on a site, but did not fit into traditional archaeological analysis categories. There is no published write-up of this file, and the only documentation we could find is limited to paper records of computer instructions for creating the MISC10 file on file at the Heritage Center. An important aspect to note is that human bone is also accounted for in this class of material.

DESIGN OF THE ORNAMENTS, RARE ROCKS, AND MISCELLANEOUS FILES

ORGANIZATION OF THE DATA

The archaeologists of the DAP organized ornaments, rare rocks, and miscellaneous items into separate data files (ORNMT10, RAREROX, and MISC10). Each of these files was derived from analytical work that was done late in the DAP's history, and essentially these data gather together classes of items that do not fit anywhere else. Each of the data files contains unique descriptive attributes, which are detailed in Appendix II. The kinds of attributes in each file are discussed in general below.

Ornaments

The ornaments data, as most files, begins with the basic site and FS data that allow one to link to more detailed provenience data and which also serve as a key to join these data to other files. Ornaments were generally identified as to material class, such as shell, bone, or ceramic, and more specifically identified within these classes of material. For example, an ornament made of a mineral, might be more specifically identified as turquoise or jet. Form (e.g., bead, tube, bracelet), shape (e.g., disc, tubular, rectangle), and modification (e.g., ground, polished, drilled) were also recorded. Other basic information such as design type, presence of burning or not, and the condition of the piece were noted. Finally length, width, and thickness measurements were taken (in mm).

Rare Rocks

The attributes of the rare rocks are focused primarily on nominal data that describe these items, and did not fit into the usual categories for minerals or rocks found in the DAP area. The analytical data contained in this data file describe three basic kinds of descriptive information about the items. The kind of material—with 49 possible minerals ranging from azurite to galena to fossils—and the form of the item were among the first observations made. Measurements such as length, width, thickness, and weight were all recorded as a second basic kind of data. Finally, both color and hardness were measured using standards such as the Munsell color chart and the Mohs scale. Though these last observations are in the paper records at the Heritage Center, but they were left blank in the computer data set.

There are several attributes in the file which either are computed from other attributes (FormA and FormB) or that incorporate other information found in other files (NewID appears to add several other categories to the material types identified). This is a small file that was not used a great deal by the DAP.

Miscellaneous

The miscellaneous data consist of little more than the basic provenience key (i.e., site and FS information), a general and specific identification of the material type, and the Heritage Center accession information. Materials such as burned pieces of earthen construction (i.e., daub), human bone, minerals, fossils, feathers, and eggshell all can be found in this file. It is a well-named file, in that it gathers together materials that can not be adequately accounted for under other file categories.

Changes in the Data, Analysis Procedures, Data Checks, Potential Pitfalls, and Possible Starting Points

The Ornaments, Rare Rocks, and Miscellaneous files were constructed late in the last years of the DAP work, and they are almost afterthoughts to the larger data classes. They gather together similar classes of artifacts or materials which do not fit elsewhere. As a consequence, there are only limited changes in the files. In several cases, such as the analysis of the color of the rare rocks, we know that the lab analysis was done but was not needed in the computer record. Some of these items, such as ornaments, fall under other preliminary analysis categories (nonflaked lithic analysis in the case of most ornaments). In these cases, the preliminary data for these items was subject to the same data checks and quality control as the nonflaked lithic analysis. However, it is not clear that the additional intensive data in these files received the same scrutiny as the larger files typically did. These files are primarily helpful as catalogs of small classes of distinctive items. At this level, the data appear to be secure.

There are potential pitfalls in using these files, but there is only limited danger here. Problems include limited documentation of how measurements were taken and how judgments as to classification were made. However, most users will seek these files simply to find out whether items are present, to understand whether there are patterns in which rare minerals or ornaments might be found on sites, or to track down items that are so rare that they are difficult to detect using other files. These files will likely be used as a fairly complicated "laundry list" of odd items, and in most cases they should function well for this purpose.

EXAMPLES OF QUERYING THE ORNAMENTS, RARE ROCKS, AND MISCELLANEOUS DATA

The following question is related to the idea of ritual behavior at McPhee Village. William Walker (1995) has suggested that there is generally a relationship between the ritual abandonment of pitstructures—particularly pitstructures with prior association with ceremonial functions—and the type of refuse that is left behind in the fill or on the floors of those structures. I would like to see if such a relationship is suggested at McPhee Village by examining ornaments associated with ceremonial pitstructures in contexts which suggest these items might have been placed deliberately in these structures at or soon after their abandonment. The placement of special objects, such as ornaments or rare rocks, in pitstructure fill or in pitstructure floor contexts is the kind of ritual disposal of esteemed, or possible sacred, objects that might conform to the pattern suggested by Walker.

There is not a great kiva associated with McPhee Village. However, Wilshusen (1986) has shown a significant association between pitstructures burned at abandonment and those with central-vault, roofed *sipapus*. These pitstructures also have much higher numbers of features interpreted as the pits that held altar frameworks. At McPhee Village, four pitstructures have central-vault features (5MT4475, PS3; 5MT4477, PS2; 5MT5106, PS2; 5MT5107, PS9); these pitstructures are also over-sized, with mean floor areas significantly larger than those without vaulted *sipapus* (Wilshusen 1989). Given this relationship, and a lack of other, large ceremonial structures at McPhee, it is reasonable to investigate whether there is a relationship between the over-sized pitstructures at McPhee and the distribution of ornaments, as well as rare minerals and other special objects that might be associated with ritual performance.

To actually have a basis by which to make a comparison with other contexts, it is first necessary to create a linked database and join the provenience and ornament data files. This is necessary to link specific provenience information about where particular ornaments were found with descriptions of those items. As with all the original DAP files, the ornament file has a site and FS number in each line of data which allow us to link these artifact files back to the master provenience file. In this example, I used MS Access to construct the database. This database was constructed by opening a new database in Access and importing the .DBF files for PROV10 (master provenience file) and ORNMT10 (file for all ornaments). Both files were joined together on the common field names of SITE and FS to create a relation that allows us to query both files. In order to perform the following operations using text values for the various attributes, it is important to also import the two data files with lookup tables for all attributes. In the following discussion, the numerical values are given in case one does not import the lookup text values.

The initial investigations with the joined data examined the distribution of Ornaments. There were five steps in examining whether ornaments were over-represented in over-sized pitstructure contexts. These steps allowed us to examine the distribution of ornaments in five different comparable, and increasingly more specific, contexts. In the first step ornaments in clear cultural deposits were separated from all other contexts using the "Fill/Assemblage Type" attribute. The Dolores excavators evaluated all proveniences for what was termed "Fill/Assemblage Type," or FAT. This assessment allowed an excavator to assess whether a context primarily represented a cultural deposit, a post-abandonment deposit, construction fill, a totally non-cultural deposit, or a variety of other categories of mixed fill. Given our desire to determine whether special items such as ornaments were intentionally placed in potentially ritual contexts, the first query was to determine how many ornaments met the criterion of being in "cultural fill" for all of the Dolores investigations. For a small data set such as Ornaments, it is important to assess whether there is sufficient number of ornaments in cultural fill to meaningfully address Walker's proposal.

The attributes in the Fill/Assemblage Type query were:

SITE- a specific site was not specified in this initial examination, as we wanted to know the grand total of items in culturally derived fill for the whole project.

SUTYPE- the type of study unit will be further specified in later steps, as differences between pitstructure, surface structure, trash, and other contexts are examined.

SUNUM- the number of the study unit, which will be important in the last query of this exercise.

STUDY UNIT FILL/ASSEMBLAGE TYPE (FAT)- After some initial examinations of the FAT data for the Ornaments fill, it was clear that the FAT for cultural deposits (10-19) was the most inclusive coding for contexts that were clearly cultural. It also accounted for all but two ornaments in cultural fill.

COBJECTID- This is a critical number for requesting items from the Anasazi Heritage Center. It is included in case the research involved research at the Center and an item needed to be pulled for inspection.

The above initial step identified 109 ornaments that were associated with primarily cultural deposits. These 109 ornaments were found in deposits such as primary refuse, secondary refuse, de facto refuse, and mixed refuse. In addition, there were two other ornaments identified in cultural construction fill, but they were associated with a later Pueblo II occupation, and are not pertinent to this investigation, given that it is focused on the Pueblo I village of McPhee.

Second, third, and fourth queries were executed in order to isolate the general categories of provenience represented in the sample of ornaments found within cultural contexts. In these queries all one needs to do is to add criteria for the *study unit* attribute in the initial query to call for the codes for either surface structures (10-14, 19), pitstructure main chambers (21), or middens (42). After running three successive queries, it is possible to associate 102 of the 109 ornaments in cultural deposits in one of these three general contexts. Of the 109, 24 ornaments (22%) were found in surface rooms, 66 (61%) were in pitstructures, and 12 (11%) were in midden areas. Given these background data, it is now possible to examine whether there is any potential association between particular pitstructures that we suspect were used for community rituals at McPhee Village and the kinds of things left in these pit structures at or soon after their abandonment.

In the final and fifth step of querying the data, it is possible to examine whether particular over-sized pitstructures at sites 5MT4475, 4477, 5106, and 5107 have higher-than-expected numbers of ornaments. This query builds on the previous steps and has the same attributes. The only additions are the appropriate site numbers and pitstructure numbers. The design of the query would have the following attributes:

SITE- The site numbers of the four roomblocks with over-sized pitstructures are 4475, 4477, 5106, and 5107.

SUTYPE- pitstructure, pithouse, main chamber (21)

SUNUM- Pitstructure (PS) 3 for 4475, PS 2 for 4477, PS 2 for 5106, and PS 9 for 5107

STUDY UNIT FILL/ASSEMBLAGE TYPE (FAT)- cultural deposit (10-19)

COBJECTID- in case items need to be requested from the Anasazi Heritage Center.

The results are most interesting, given that 37 ornaments are found in cultural contexts in the over-sized pitstructures at McPhee (4475) and Masa Negra (4477) pueblos. This represents 34% of all ornaments at Dolores recovered from cultural contexts! While an actual test of the significance of this association would require a bit more research and some summary statistical tests, the initial results certainly suggest that Walker's proposal about ceremonial "trash" in ritually used structures is supported by this aspect of the DAP data.

Editor's endnote: Because of limited storage space on the CD we were not able include a number of the tutorials on the CD. However, the instructions given above should allow readers to replicate the above queries.

SAMPLES

Josh Torres

INTRODUCTION

Studies in environmental archaeology played an important role in the DAP. Various samples were taken to facilitate this work and brought to the Environmental Studies Group (ESG) for analysis. Samples were taken not only to get information regarding past environments but also to date various archaeological contexts through archaeomagnetic, dendrochronological, and radiocarbon testing. All of these samples were taken as "Special Specimens" in the field and cataloged in a file called "SAMPL10." This file gives us a list of almost every sample taken and allows us to link this information with temporal-spatial data, as well as the results of specific sample analyses. Thus, it is possible to acquire specific site location information for the dates and environmental research based on these samples and then to compare these data for a whole site or the whole project.

The DAP sample file consists of over 33,000 records. Essentially, this file is a catalog of samples taken at the DAP. Sample types in the file consist of the following: *archaeomagnetic*, *radiocarbon*, *dendrochronological*, *material source*, *pollen cores*, *pollen samples*, *stratigraphic column samples*, *sediments*, *bulk soil*, *botanical*, *latex peels*, *soil monoliths*, *soil peels*, *ethnobotanical samples*, *film* and *radiographic plates*. Utilization of these data, in combination with their analytical results, can provide a powerful tool for examining environmental factors, and temporal affiliations of sites and artifacts in Dolores. The discussion of these various sample types is organized around several key sub-topics, specifically: chronometric samples, environmental studies, geological studies, and special documentation. Let's take a look at each sample type as they pertain to these specific sub-topics.

CHRONOMETRIC SAMPLES

The DAP supported an extensive dating program utilizing radiocarbon, archaeomagnetic and dendrochronological samples and analyses. These chronometric dating techniques are supplemented by several relative-dating methods that were developed and refined by project staff. For example, chronometric methods were used to help support the relative chronologies derived from stratigraphic relationships. Short summaries of the three types of chronometric sampling follow.

- Tree-Ring Samples— One of the primary dating methods employed by the DAP is tree-ring analysis or dendrochronology. Dendrochronological dating often provides specific calendrical dates and hence is usually more precise than other methods. Furthermore, tree ring data can also be utilized to assess climatic conditions though time and support architectural studies.

- Archaeomagnetic— Archaeomagnetic dating is another primary method of temporal analysis—and a valuable complement to tree-ring analysis. Tree-ring dates are often from structural remains and hence tend to date the construction year, or first use, of a room or pitstructure. Archaeomagnetic dates are often collected from domestic hearths or from the remnants of general features; therefore, this method often dates the last use or abandonment of a feature.

- Radiocarbon— Radiocarbon dating has proved to be of limited utility when applied to Anasazi sites but may be more useful when investigating suspected Archaic deposits. In addition, it provides a good complement to the previously mentioned methods in special circumstances, such as dating modern pack-rat middens.

ENVIRONMENTAL STUDIES IN THE DAP

The environmental studies conducted by the DAP were extensive. Modeling ecological changes is extremely important to understand subsistence as well as the functional uses of floral and faunal remains. According to Bye:

> "The underlying assumption made by the ESG is that humans interact with the components of their ambient environment (biotic and abiotic) so as to extract a successful living. Defining the bounds of the vegetation within which humans have acted over time is of primary importance to the botanical studies section. Also providing predictable and testable models of plants (as individuals, as populations, and in communities) that can be connected to the archaeological and historical evidence is critical" (1985:5).

The inventory information for samples utilized in the botanical analysis are present in the Sample data file (SAMPL10). These samples' analytical results reside within several different files in the Botanical data class (MACRO10, POLLN10, CORN10; see Botanical Resources chapter in this user's guide). The primary sample types taken for environmental analysis at the DAP were pollen cores, pollen samples, bulk soils and botanical samples. Therefore, the actual information regarding the results of environmental research at the DAP is not present in the Sample data file. However, one can link between the sample file and other data files to obtain these results. The methods and results of these studies are presented in *Dolores Archaeological Program: Supporting Studies: Settlement and Environment* (Petersen and Orcutt 1987) and the *Dolores Archaeological Program: Studies in Environmental Archaeology* (Petersen et al. 1985). These documents elucidate the types of studies conducted at the DAP as well as relevant interpretations of these data.

The focus of microrecovery sampling designs was to collect samples from contexts associated with specific human activities. The sampling design was established with the intent of: extracting a micro level of information concerning the density and distribution of remains; defining the spatial extent of remains from the features in order to define the spatial extent of activity; and comparing the remains from feature fills to those retrieved from occupation surfaces. The rationale for the sampling design was based on the assumption that debris associated with former occupations of archaeological sites would most likely have been deposited on the occupational surface. A distinct stratigraphic boundary or stratum often establishes boundaries for these habitation features and remains. The boundary usually contains features such as hearths, in situ metates, cists, and various types of artifact assemblages, which help to define it as a living surface. Let's examine these environmental sample types.

- Pollen Samples— This sample type refers to specimens taken for pollen analysis. Pollen samples are taken from situations similar to those of bulk soil samples, with a few exceptions. This file is important because it is associated with various ecological studies that provide a valuable basis for studying the interaction of people and plants in prehistoric times.

- Bulk Soil Samples— This sample type represents soil samples taken for flotation and fine water-screening analysis. One liter samples and one sample per feature or per stratum were typical standards. However, depending on the feature, it was possible for more than one sample to be taken from one feature. Bulk soil samples were collected from occupational surfaces often using central hearths and in situ metates as focal points for the sampling configuration. Though bulk soils were primarily taken to recover the small remains of plants, there were many instances where ceramic sherds, flaked lithic debitage, or other small cultural debris were recovered in bulk soil samples. These items were sent to the appropriate task group for analysis.

- Botanical Samples— This sample type refers to all modern floral samples taken at the DAP. This was done to provide a basis for control and a catalog of botanical species for ESG research. Standard botanical collection methods resulted in a large collection of pressed specimens.

- Ethnobotanical Samples— This sample type represents plant material remains (such as fibers or fruits) collected by DAP personnel at modern fields of traditional southwestern crops. Modern ethnobotanical data were used to inform interpretations of prehistoric botanical data.

GEOLOGICAL STUDIES

In addition to chronometric analysis and environmental research programs, the DAP supported a geological survey of the area. Samples for these studies are represented by the following sample types: *stratigraphic columns, sediments, bulk boils* (however these were primarily used for flotation analysis) and *soil monoliths*. The details of the geologic survey of this area are presented in the *Dolores Archaeological Program: Studies in Environmental Archaeology* (Petersen, Clay et al. 1985) and in Petersen's (1986c) review of geological studies in the *Final Synthetic Report*. At this point, let's examine some of the types of geological samples taken at the DAP.

- Stratigraphic Columns— These were collected to allow for a portion of the archaeological context to be removed intact and returned to the lab for analysis under more controlled conditions. The samples were examined for occupational and post occupational micro-stratigraphy, plus material content (Figure 4.1). These samples were utilized to investigate soil deposition and to test techniques of microfossil recovery.

- Sediments— This refers to samples taken from varying locations of the project area. These samples were used to establish soil composition of the project area and provide spatial context for the distribution of soil types (see SEDS10 file for these data).

- Soil Monoliths— These samples were taken as columns from pitstructures and other filled features to understand stratigraphic contexts.

SPECIAL DOCUMENTATION

The sample types below were recorded in the Sample data class for cataloging purposes only.

- Film—This file contains a catalog of rolls of film. Photographs were an integral part of the DAP cultural resource management operation. Pictures provide an unbiased view and a permanent record of the project area in space and time. All photographs taken at the DAP were computer coded so that the subject of the photograph could be cataloged and referenced for future use. Pictures were taken before excavations, during excavations and after features had been defined. It appears that black and white film was used primarily in the photographic record of the DAP field photography. However, color film was used for publicity, general overviews of site and study units, surface collection documentation, magnetometer surveys, and documentation of floor excavation. For more details concerning photographs, refer to the Photography data class.

- Radiographic Plates—This file is essentially a file of X-ray plates utilized in physical anthropological studies.

- Latex Peels—These were utilized experimentally to document rock art.

SAMPLES AS LINKS TO OTHER SOURCES OF DATA

In conclusion, the sample files contain a listing of samples, which were collected for a variety of special studies and analysis. These files represent inventory information on samples collected primarily during excavation. However, to obtain results for analysis of environmental studies it is necessary to examine other files (i.e. files in the Botanical data class, Photographic data class etc.). The records contained in the Sample data class provide valuable tools for referencing environmental studies, dating techniques and other types of special documentation.

DESIGN OF THE SAMPLES DATA CLASS

ORGANIZATION OF THE DATA

All samples taken by the DAP are cataloged in the general data class called Samples. In turn, there were three groups of secondary data that were regularly used in site report analyses:

- Dating
- Pollen and Bulk Soil (discussed in detail in Botanical Resources chapter)
- Sediments

There were a number of other sample types—such as film and radiographic film plates—but they were not commonly used as analytical data sets. Though information regarding various samples can also be found in other data classes, the above three data groups were the most regularly used data in the DAP work with samples. In this user's guide the Pollen and Bulk Soil samples are more specifically discussed under the Botanical Resources section.

Each data class contains a set of unique attributes relevant to that particular class. All samples taken at the DAP are listed in the Sample data class, which is a catalog of all the samples. Consequently, samples contained in the Dating (DATE10), Pollen (POLLN10), and Sediment (SEDS10) files can be referenced through the Sample file (SAMPL10). The attributes for each of these files are discussed generally below. Specific discussions of each attribute for a file are in the data dictionary in Appendix II, and the values for each attribute are listed in the lookup (LKP) files for each attribute on the CD.

Dating

The attributes in this data file describe the type and confidence of samples taken for various chronometric tests at the DAP. Given the diversity of dating methods used by the DAP—radiocarbon, archaeomagnetic, and dendrochronological—there is considerable variety in the kind of data presented in this file (DATE10). As with almost all files, the initial attributes pertain to the key provenience data that allow one to tie this file to others in the DAP data package. A few basic attributes specify the kind of dating sample and its sample number. Sample numbers were given consecutively for each different kind of dating sample, beginning with 1 for each site.

The *earliest date* and *latest date* typically were given for each sample. For dendrochronological samples the earliest date would be the innermost date, such as a date from the pith of the tree—which would be denoted by a "p" in the *early factor* attribute list. For archaeomagnetic samples that do not have clearly defined early dates, this "early factor" attribute may be either "*pre-*" or "*post-*", as in "pre-A.D.750. The latest date would reflect the outermost date for a tree-ring sample, and would be followed by a *late factor* designation, which would be the appropriate Tree-Ring Lab symbol for dendrochronological samples or again "pre-" or "post-" in the case of some archaeomagnetic samples. See the lookup files on the CD for a listing of possible late and early factors for dates. Finally, the appropriate one of eight different species of datable wood could be designated for dendrochronological samples under an attribute called "*other factor*".

The last information in the dating file, prior to the BLM accession data, were statements about the relative confidence in the date based on context and sample integrity and some more specific data about the tree-ring samples. Confidence was a relatively simple assessment ranging from low to high. Additional data were given to clarify if an archaeomagnetic sample had either not yielded an interpretable date or had been discarded, or if there were other related dendrochronological samples. Finally, there were three additional statements about the tree-ring samples noting length and diameter of the sampled timber and the type of structural member that the timber may have come from.

Pollen and Bulk Soil

The attributes in these data files are described in greater detail in the discussion of Botanical Resources in an earlier chapter. The main files are POLLN10 and MACRO10. It should be noted that materials recovered from bulk soil samples appear in almost all artifact analysis files (i.e., fauna, ceramics, flaked lithic tools and debitage, etc.).

Sediments

Sediment sample analysis yielded both descriptive and quantitative data. Besides the regular provenience key data, the specific type of the sample—sediment, stratigraphic column, or bulk-soil sample—was listed. Standard soil description data such as Munsell color, percent loss after ignition of organic material, a 1-6 ranking of phosphorus, a quantitative assessment of the reaction of hydrochloric acid with the soil, pH, and then a series of *phi* scale values of the soil texture (i.e. grain size composition) were given. Phi (f) is a number at different percent marks (5%, 16%, 25%, 50%, 75%, 84%, 95%) that represents a point on a cumulative curve for the grain-size analysis. These *phi* values are followed by median, graphic mean, inclusive graphic standard deviation, inclusive graphic skewness, kurtosis, and any text observations about inclusions and disturbance. The file is named "SEDS10."

Samples

The sample file (SAMPL10) is a catalog of the various samples taken at the DAP with limited information about possible associations with point located items or cultural features. These associations were not regularly recorded because in many cases there was not a clear association between a sample and a cultural item or feature. The file is primarily useful as a rather complete catalog of DAP samples and as a source for finding the Heritage Center accession numbers for the samples.

CHANGES IN THE DATA AND DATA CHECKS

Changes in these data primarily affected the samples taken for botanical remains. These changes are discussed in the chapter on Botanical Remains. The sediment samples and dating samples employed fairly standardized analytical methods and terminology. Data checks followed regular procedure for all computer files; there was a recheck of the data after initial entry and computer screening for duplicate lines or out-of-range values.

FIELD AND LAB PROCEDURES

General field procedures for sample collection are spelled out in the DAP field manual (Kane and Robinson 1984). Specific sampling concerns and strategies are oftentimes also addressed in the individual site reports (e.g., Matthews 1986b or Scott 1986). There is such a wide variety of sampling issues that the reader is referred to the published DAP literature on the particular data sets. For botanical remains and sediments a good starting point for understanding sampling are various status reports and the midlevel research design (Matthews 1985; Petersen, Clay et al. 1986), as well as the chapter on Botanical Resources in this user's guide. For dating samples, there are varied references. Archaeomagnetic sampling is discussed in specialist reports at the end of site reports (e.g., Hathaway 1986), in general reports of dating methods and results (Hathaway and Eighmy 1984; Hathaway 1988), and in the Special Studies chapter in this Guide. Tree-ring dating methodology is only discussed generally in the *DAP Field Manual* (Kane and Robinson 1984), but there are site-specific discussions (e.g., Brisbin et al. 1986:588-592) and a general summary of all absolute dates that includes all tree-ring dates (Appendix A in Breternitz et al. 1986). Though there were a number of radiocarbon samples taken over the length of the project, an evaluation of the radiocarbon dating program showed that it had only very limited success (Gross 1983), especially when more precise and cost-effective methods such as tree-ring or archaeomagnetic dating were alternatives. For a published list of all DAP radiocarbon dates consult Appendix A in the *Final Synthetic Report* (Breternitz et al. 1986).

POTENTIAL PITFALLS AND POSSIBILITIES

The sample data are unified by one single fact: they are samples taken as part of the DAP research. They represent samples from a mix of different research foci, ranging from botanical sampling to dating to soil stratigraphy. Consequently, most of these files are primarily useful as either catalogs to find different samples and data, or as secondary sources for the dates or botanical remains associated with particular study units. In most cases, a researcher will need to link these files with others in the DAP data set to do full-scale research. The sample data are more of a beginning than an end.

EXAMPLES OF QUERYING THE SAMPLES DATA CLASS

From the above, it is obvious that the Samples data class consists of several very different groups of data. Perhaps one of the most obvious uses for these various data is to use them to corroborate other lines of evidence. Archaeologists often employ more than one type of information to investigate a particular research question, and questions of chronological assignment almost always require multiple lines of evidence. The following example suggests how an archaeologist might use information derived from the DATE10 data file to support the temporal assignments of two sites that were discussed earlier for the ceramics data class: 5MT2193 (Dos Casas Hamlet) and 5MT2194 (Casa Bodega Hamlet).

In the ceramics tutorial we were interested how possible technological differences might help understand the degree of socioeconomic integration within the southwest corner of the DAP project area for a particular time period. In addition to being a possible proxy measure of integration, the remains of ceramics may also let us gauge the time in which they were produced. Generally speaking, different kinds of painted designs and even vessel form were produced at different times. These sherd assemblages give us a good approximate date for the sites, but to understand better the movement of populations into and out of the area, it behooves archaeologists to get as firm a grasp on a site's date as is possible. A very effective method of dating these ceramic artifacts is by dendrochronology.

Dendrochronology, or tree-ring analysis, is based on the examination of growth rings that accumulate annually in a tree. Given a complete set of tree-rings and the right species of tree, an analysis of a tree's rings can yield its age. Dendrochronology is also based on the premise that tree species grow similarly across a region according to the amount of precipitation that the region receives. Wet years yield wide rings, while dry years induce little growth, which results in relatively narrow rings. Thanks in part to the dry environs of the semi-arid Mesa Verde region, wood beams with well-preserved growth ring patterns are fairly common to archaeological and historic sites in the region. This record of growth ring patterns essentially documents the environmental history of the region. By tracing this record back from modern times, archaeologists have developed a "library" of tree rings that allow us to very accurately date a site within which a tree-ring sample is found. Therefore, even though we might have a good idea about when the site was occupied based on the ceramic assemblage, one or more tree-ring dates would help narrow down the occupation time even better.

To construct our query of the DATE10 file, we should call up the appropriate sites [SITE] – 2193 (for Dos Casas Hamlet) and 2194 (for Casa Bodega Hamlet). We also need to distinguish the sample type [SAMPTYP] which is 3 (for dendrochronological samples). In this case we also need to describe the "late date factors" [LFACT] of the sample, which address how close the late date is to being a "cutting date" for the tree. A good cutting date, or the last ring on a tree before the bark, will let us know in what year the tree was harvested. The exterior date of a sample, or the latest ring on the sample cross-section of timber, is assigned the latest date value (LDATE), and ultimately, this is the number that we are interested in. Another attribute that we might be interested in is the "confidence" [CCONF] DAP archaeologists assigned to each sample.

Our results are rather typical of archaeological projects in the Southwest. We see that only one dendrochronological sample was obtained from Casa Bodega and it did not produce a date. However, we do have a large number of tree-ring samples (228) from Dos Casas Hamlet (Figure 4.2), and 25 of these samples produced some sort of interpretable chronological data. We should observe that most of the "LFACT" dates yield late date factors of "vv" or "very variable" exteriors that represent "noncutting dates." This means that we have rings from the interior of a construction timber, but do not know how many rings have been eroded from the exterior of the sample. Therefore, while we know that the beam had to be acquired after this date, we don't know exactly when. However, the strong clusters of "vv" dates from different samples suggest that these dates are not far from being cutting dates (Table 4.1).

It should be noted at this point that the "late" dates in the DATE10 file are recorded in a manner similar to how C-14 dates would be. In other words, an outer dendrochronological date is recorded as the number of years before A.D. 1950 that would yield the calendar date reported by the Tree-Ring Lab. This is a result of needing to record C-14, tree-ring, and archaeomagnetic dates all in the same file. So, the dates plotted in Table 4.1 are the calendar dates that result after subtracting the data from 1950.

Table 4.1 Stem and Leaf Diagram for "vv" Tree-Ring Dates from Site 5MT2193.*

73	27
74	2
75	99
76	3455556678899999
77	0

* For readers unfamiliar with stem and leaf diagrams, the dates in the first line of the diagram are 732 and 737 vv. The last date in the diagram is 770. There are a total of 16 dates in the 760s.

Three of the beams have LFACT values of "v" or "near-cutting dates" (see Ahlstrom 1997 or Dean 1978). In other words, DAP researchers had evidence that the exterior of the beam was nearly at hand. These samples with "v" dates have LDATE values of "1181," meaning that the beams were cut shortly before 1181 B.P. Remember, B.P. refers to 1950, so subtract the LDATE from 1950! Doing this, we see that the three beams were cut shortly after A.D. 769. This small cluster of "v" dates is reinforced by five other dates for the same year in the "vv" dates and the single 770vv date noted above, so it is very likely that Pitstructure 2, which produced these dates, was built within a year or two of A.D. 770.

The one piece of data we have not obtained is the provenience for these samples. Using the site number and FS numbers for these dated samples it is easy to link back with the main DAP provenience file (PROV10) and find that two of the above dated tree-ring samples come from the surface of Pitstructure 1 (737vv and 759vv) and all of the remainder come from various roof fall or surface proveniences for Pitstructure 2. This suggests that Pitstructure 1 predates Pitstructure 2. After examining the excavation report for the site (Brisbin et al. 1986), the dendrochronological dates support the same patterns seen in the stratigraphic evidence for the structures. Pitstructure 1 appears to have been built first and later abandoned and burned. Pitstructure 2 is superpositioned on a portion of what must have then been an abandoned Pitstructure 1, and trash and backdirt from the construction and occupation of Pitstructure 2 are in the post-abandonment fill of Pitstructure 1.

While much of the information gleaned above from the DATE10 file are available in the site report, the dating file is particularly useful in gathering these data together and tying them to other data such as information from the ceramic data file. By linking data from the DATE10 file with other files, it is very likely that the chronology originally used at Dolores could be much refined. For example, most researchers now accept that the Grass Mesa subphase represents a much shorter, and more intense, occupation than originally projected (Blinman 1994). In the twenty years since the Dolores Program, there have been many changes in how we regard the culture history of the Mesa Verde region, and it is likely the dating information in these files will be of considerable use in future rethinking of the DAP data.

PHOTOGRAPHS

Brian Yunker

PHOTOGRAPHY IN ARCHAEOLOGY

For most archaeological projects photographs can provide more information about the context in which things were found than any other kind of data. Additionally, photographs provide this information in a highly accessible form. Setting and landscape, in particular, often are best understood from photographs. Today the sites examined by the Dolores Archaeological Program (DAP) are underwater. Since one cannot go back to these sites, photographs offer the best line of evidence for checking discrepancies in descriptions. For these reasons, and others, the photography of the DAP is an invaluable resource.

Photographs provide the only evidence in many cases, of the setting and placement on the landscape of sites that are now underwater (Figure 4.3). Thus they offer the researcher his or her best chance at understanding the visual context of sites. This is illustrated by William Lipe's comments about a 1997 tour of the DAP area, "....it was only with great difficulty that I could relate the familiar geography of the project days to what I was seeing...the filling of the lake [had] obscured my perspectives of the actual sites…." (Lipe, this volume). This geographic perspective is invaluable if one is to gain an understanding of how a community settled itself on the landscape. The flooding of the DAP area erased this perspective. It exists today only in photographs.

Within sites, photographs give the investigator an understanding of the relative integration of a community. The montages of bipod photographs, which are recorded in the DAP MAPS10 file, are excellent illustrations of the overall shapes of roomblocks, and their contexts to implied public areas. These photographic maps are an efficient way to contextualize specific features, such as rooms, pitstructures, and extramural hearths. In this way, the photographic evidence collected by the DAP provides the investigator with ways to understand the spatial integration of households and communities.

Without the ability to literally put one's self on the ground to understand a DAP site, one must turn to the photographs. And, although not ideal, they offer the next best thing to being there.

THE USE OF PHOTOGRAPHY IN THE DAP

The DAP generated over 16,000 photographs during excavation and subsequent lab work. A little less than 800 made their way into the published reports. The majority of this 16,000 were either used only for analysis, or not used at all. But, like all other aspects of the DAP, these photographs were systematically recorded and entered into a data set. This electronic catalog facilitates the retrieval of frame and roll numbers based on sites, artifact classes, and other criteria.

The size of the DAP dictated that crew leaders be sparing in their use of photography while in the field. A full third of published photographs are of artifact groups, and are taken in a post-excavation context. If this estimate is true of the photographic output of the project as a whole, then there are roughly 11,000 photographs from the field.

Photographic Methodology of the DAP

The necessity of using photographic documentation efficiently brought about an explicit methodology of photo taking. While the decision of when to take a photograph was left in the hands of the crew chief, guidelines were set and published as to what should be photographed and when (Kane and Robinson, 1984). Pre-excavation site photos from high vantagepoints, or *stations*, were stressed, as well as the taking of photographic evidence of past vandalism and looting. In addition, *bipods,* large two-legged camera supports, were used to suspend the camera high over the site, giving a straight down view. This allowed for photographic mapping and photomontages of large sites. These photographic maps are indexed in the Maps data class. Wherever the topography allowed, these bipod photographs were prescribed after the removal of vegetation, and before excavation, and then again at the end of excavation. Beyond these requirements, the published guidelines suggested photos before subsurface investigation, after the removal of non-cultural overburden, after the removal of roof fall, and after the clearing of floors and surfaces. The guidelines also suggested the photographing of stratigraphy, both during hand excavation and after mechanical trenching. Additional photographs were suggested for features, such as benches, burials, hearths, and others, both as work progressed and as final photographs. At a minimum, progress photos were to be taken once a week.

Also included in the photographic collections were those photos that could be used in publications and as publicity shots. These are typically "people shots," showing archaeologists at work (Figure 4.4). While of limited value to the researcher, it should be noted that these photographs were recorded and cataloged in the same manner as all other DAP photographs.

Quality of DAP Photographs

Researchers using the photo archives have to recognize that not all of the photos are of uniform quality. Those given the task of handling the cameras were archaeologists, and for the most part not trained photographers. This is not only reflected in the wide range of photographic quality (even some published photographs are of limited quality), but also in the fact that the writers of the excavation manual felt it necessary to include such basic instructions as how to set a shutter speed, and how to expose for shadows. In some cases, such as the photos of rock art, the authors of the published volumes chose to include drawings along with their photos, since the published photos are often difficult to decipher. However, many of the photographs generated by the DAP are of high enough quality to give the researcher invaluable insight into archaeological contexts.

FINDING AND USING DAP PHOTOGRAPHS

Whether or not a particular photo is of high quality not recorded in the data file. However, the investigator can reference contact sheets that were made of each roll of film in order to ascertain the relative quality of a particular negative before pulling and printing that negative. These contact sheets are curated at the Anasazi Heritage Center and are cataloged by roll number. They can be cross-referenced with the data file.

Lab-generated photographs of artifacts are of good, consistent quality and could be used very efficiently by the researcher interested in specific artifact types. Artifacts are typically grouped by type, and photographed against a white or black background, and scales are consistently used (Figure 4.5). Examples of these shots are found throughout the published literature. The use of these photographs, published and unpublished, may be an acceptable alternative to pulling the artifacts out of storage.

While the photo archive from the DAP is an element separate from the data, the fact that the photographs are described in the data file allows for the two resources to be used in unison. If a researcher were to query the roll and frame number of photographs that deal with the data he or she is using, then a visual record could accompany the descriptions. This could potentially greatly facilitate research.

DESIGN OF THE PHOTOS DATA CLASS

ORGANIZATION OF THE PHOTOS DATA CLASS

The Photos file (PHOTO01) is organized unlike any other in the DAP. During the course of the DAP a re-design of the forms used to record photographs, and the way that the information on those forms was coded into the data file, resulted in a very efficient coding protocol (Hilton 1982). This protocol is such that the meaning of a particular field's value, in many of the attributes of the Photos data class, is dependent on the value of another attribute in the record. Thus the value of any field cannot be interpreted when removed from the context of the record as a whole.

Several different versions of the photographer's coding form were used over the course of the DAP in the field and lab. Later versions of the form eliminated some fields that pertained to provenience, and substituted a more efficient coding protocol (Hilton 1982). This later protocol was such that the meanings associated with the values of certain attributes depended upon the values of other attributes within the same record. This resulted in multiple meanings for single values of certain attributes, when that attribute is utilized independently of the context of the other attributes it was designed to be dependent on. Lookup tables, therefore, should be used within the appropriate context of subsets of the data class which have been filtered for THEME, CCODE, and in some cases OTYPE, values. When properly filtered, the attributes contained in the photos data class can very specifically describe the subject matter and retrieval information of individual photographs.

The Photos data class is intended to be used in conjunction with the Provenience data class, in order to link it to other data classes of the DAP (Hilton 1982). For instance, a subset of the Photos data class (filtered by THEME value, as is mentioned above) can be linked to the Provenience data class through the use of such attributes as "FS number" or "study unit number." These attributes from the Provenience data class would be linked to the FSSUNUM attribute of the Photos data. The filtering for the THEME value is of utmost importance in this example if one is to avoid conflating FS numbers with study units.

Potential Pitfalls and a Suggested Starting Point

Building the Photos data file (PHOTO01) so that all attributes were dependent on the record as a whole allowed for an extremely efficient use of drive space on the DAP's computers. The number of possible values stored in an attribute was kept to a minimum without compromising the range of possible descriptions. However, this structure does create certain difficulties for the researcher interested in using the PHOTO01 file. When searching for a specific type of photograph, the search must employ multiple attributes, even the information that specifies the photographs that are of interest is found in a single attribute. For instance, a researcher interested in looking at photographs taken at DAP headquarters cannot simply search on OTYPE "01"; the value of CCODE must also be taken into consideration. This is because the meaning of a value of "01" in the attribute OTYPE could be "Activity Area," "Unassigned," or "Headquarters" depending on the value of the attribute CCODE. The meaning of the value of CCODE puts the meanings of the values of OTYPE into meaningful context, such as

> CCODE "A":OTYPE "01"::Spatial and Temporal Units:Activity Area,
> or
> CCODE "Q":OTYPE "01"::Miscellaneous:Headquarters.

A key distinction in the Photos data is found in the THEME attribute. A value of "9" in this attribute indicates that the photograph was taken using the coding guidelines of the Laboratory Photos form. This includes photographs that may have been taken in a context other than the laboratory. Thus records that have a THEME value of "9" have a different set of attributes recorded. However, several pairs of attributes, one each from the field and laboratory forms, were combined into single attributes. An example of this is FSSUNUM which is the combination of "FS number," if the data is from the laboratory form (THEME=9), and the "study unit number," if the data is from a field form (THEME=0 through 4). Filtering the Photos data class for a single THEME value, or set of THEME values if that set does not include a value of "9," would therefore be the starting point for most queries of the Photos data. For an explanation of the dependent relationships in the Photos data class, see Appendix II.

PHOTOGRAPHS TUTORIAL: QUERYING THE PHOTO DATA CLASS

Archaeological fieldwork, especially excavation, demands rigorous, and often redundant, documentation. Whenever excavation is undertaken, an archaeological site is essentially destroyed -- it cannot be returned to its original condition. This would entail returning ALL the sediments and their contents to their original position. This is practically impossible; however, an archaeologist can record as much data as is possible and feasible for a given project to reconstruct the site after the fieldwork is accomplished. Therefore, fieldwork includes such documentation as copious notes, sketch maps and artifact illustrations, and numerous photos. This documentation is also invaluable for others who wish to research the materials even many years after the fieldwork has taken place.

As an example of this documentation use, let us return to our ceramics researcher and her interest in studying style. She may be able to do some of her research at the AHC, but she can't very well remove the 69 whole white ware vessels from McPhee Pueblo. However, she can request copies of photographic data. Using the Microsoft Access database program, let's see how she can use the data set to figure out what photos she requires.

From the query of whole vessels from McPhee Pueblo, our researcher makes a table to store this data, saving it as "Whole Vessels from McPhee." Now, she needs to cross-reference the ceramics data with the photo files. To do this, she first queries the PHOTO01 file for the THEME attribute and selects for photos that were taken in the "lab" (09). She also includes all the other attributes in the query (but selects for none of their specific values) and saves this as a table labeled "Lab Photos."

Next, she decides to make a table query that will use the two new tables: "Whole Vessels from McPhee" and "Lab Photos." Basically, she is going to use the former to select the roll and exposure numbers from the "Lab Photos" table. To do this, the archaeologist creates links from: the SITE attribute in the "Whole Vessels" table to the SITE attribute in the "Lab Photos" table; the SSTYPE attribute in the "Whole Vessels" table to the SSFETYPE attribute in the "Lab Photos" table; and the SSNO attribute in the "Whole Vessels" table to the SSFENUM attribute in the "Lab Photos" table. The links that she creates here will include all records from the "Whole Vessels" table and only those that match from the "Lab Photos" table.

At this point, our researcher is getting to know the data set pretty well. She notices that there are records of whole pots for which there are no photographs. To avoid seeing these records, she includes the "is not null" criteria for the ROLL NUMBER. She also notices that the photo list contains duplicated information. She decides to make life a little easier for her friends at the AHC (it is always good to help your curator out if you can!) and attempts to eliminate the duplicates. First, however, she names her newly created table, "Photo List with Duplicates."

Next, the archaeologist copies the "structure" of the "Photo List with Duplicates" table to a new table labeled "Final Photo List." She opens the design view of this new table and selects the ROLLNUM and EXPONUM attributes. She then establishes the fields as "primary keys" by clicking on the key button in the menu bar. Next, she needs to run an append query to append to the "Photo List with Duplicates" table to the "Final Photo List" table. The database program flashes her a warning that it can't put all of the data in the new table because of the primary keys; however, this is exactly what she wants, so she selects "Yes" to proceed. The "Final Photo List" table now contains 96 unique Roll and Exposure numbers. Our researcher now has her list of photos to request from the AHC!

MAPS

Michael P. Larkin

MAPS IN ARCHAEOLOGY

Maps, and other cartographic representations, are used by archaeologist to represent, record and interpret sites. Cartographic representation is very effective in displaying spatial data in a variety of scales, as well as reconstructing a site long after it has been excavated. Like other archaeological research, the Dolores Archaeological Program (DAP) created an extensive collection of surface maps, subsurface maps and reconstructions. Information about each of these maps was then recorded into the data file. These maps are very useful in obtaining archaeological information from very small artifacts to larger regional interpretations of what took place in the Dolores area.

USE OF MAPS IN THE DOLORES ARCHAEOLOGICAL PROGRAM

The Dolores Archaeological Program created maps in association with nearly every aspect of the project. There were 5595 maps created throughout the course of the project and 47 different types are recognized within the data file. Surface maps were used to assist in sampling techniques and survey work while subsurface maps were made throughout the excavation process to record the spatial context of objects. Profiles were used to explain stratigraphy and temporal contexts and recreations reinterpreted past landscapes. Because maps were created for so many different aspects of the project, it is an important file to understand.

WHERE TO FIND MAP INFORMATION IN THE DAP REPORTS

Maps are located in two primary locations: within the published volumes produced by the project and at the Anasazi Heritage Center in Cortez, Colorado.

The set of published materials that found its way into the DAP volumes is a relatively small percentage of the total collection. Maps and cartographic representations are found in every volume supporting nearly every topic and data class. These maps were not created in the field but were re-created based on field data for the sole purpose of being published. To locate these readers must familiarize themselves with each individual volume and its table of contents. A listing of maps for each volume can be found in the table of contents under "Figures." It is important to point out that this list also includes photographs, drawings and graphs.

The vast majority of cartographic materials was not published, but came directly from the field to storage and is kept at the Anasazi Heritage Center in Dolores, Colorado. These maps are much less refined but still offer a wealth of information. Researchers interested in these original field maps will have to visit the Heritage Center and set up an appointment to look at the collections.

DESIGN OF THE MAP DATA CLASS

ORGANIZATION OF THE DATA

The data for DAP maps contains unique descriptive attributes. While we do not think of maps as artifacts, in one sense they are important artifacts of the field documentation process. The information recorded in the map file allows one to not only trace the progress of an excavation, but also to understand how interpretations of a feature or structure may have changed from the field to a lab setting. In a sense the maps, like other key documentation such as the FS forms, allow us to see the most fundamental recorded data from an archaeological site. While the map file (MAP10) has its pitfalls, it does allow one to readily see what maps are available for a particular site, topic, or study unit.

The key attributes fall into several basic categories. Besides the basic provenience key found in almost all files, there are several attributes that record the number of the map and whether it is an original or a revised copy. Maps were sequentially numbered by crew chiefs for each site and, once the year's analysis and write-up were finished, maps were turned over for curation in the DAP lab. This enumerative data often reflects the relative order in which a map was created, but this is not always necessarily true. Once the maps were turned over to the lab they were classified into one of 47 taxa, which differentiated what general type of information was the subject of the map—vegetation, magnetometer, etc.

An important function of the map file is to reference the most important study units (structures, trenches, etc.), surfaces, and excavation areas represented on the map. While not all study units on a map may be listed in the file, the most important or central units usually are referenced.

The origin of the map, whether it be field or lab, is important in understanding the circumstances under which the map was created. For example, if someone wanted to scrutinize how a particular stratigraphic profile was drawn, it would be important to begin with the earliest field drawing of the profile to understand if there were interpretive differences that emerged once the lab analysis and formal drafting of the map began. Maps can be located in four different record areas at the Heritage Center; they can be found with surface forms, with stratigraphic forms, with field notes, or within the map file.

CHANGES IN THE DATA CLASS

The map data saw only limited use at Dolores, so there were few changes in it. If anything, the main issues with the map data class have to do with it being a minimalist data set rather than one which saw a lot of changes.

Field Procedures

Many archaeologists have well-developed visual skills and maps are oftentimes some of the most important recording devices for archaeologists. Site work often began with the drawing of topographic, surface collection, and sampling design maps. Key study units, such as pitstructures or plazas ("nonstructural units" in DAP parlance), often were documented on multiple field maps as they were excavated and exposed at different levels. For example, a pitstructure might have a map of the "stain" of its upper fill at detection, multiple maps of its stratigraphy, maps of rooffall and various surfaces, maps of feature locations, point locations, and other details. These maps were often keyed to notes, tables, or other documentation that might enumerate point locations, explain stratigraphic units, or detail possible associations between different features. Field maps were typically drawn on high-quality drafting paper, but sometimes they were drawn on the backs of FS forms. They oftentimes show the effects of having been in excavation units during inclement or windy weather. Maps were numbered, labeled, and cataloged for each site in order to keep track of them in the field and thereafter. Standards and procedures for mapping are laid out in the field manual (Kane and Robinson 1984).

Site mapping was typically done with K+E transits, stadia rods, and 50 m tapes. Structural or feature maps were made by triangulating from established subdata using hand tapes, line levels, or other handheld measuring devices. Though some trigonometry was still done by hand, hand calculators such as the HP-41 had become inexpensive enough and powerful enough to handle many mapping tasks with subroutines written by several crew chiefs. Maps ranged in scale from 20 cm to 16 m per inch, depending on what was being mapped.

Lab Procedures

Lab procedures for handling, drafting, and curating maps were revised over time at the DAP. For the first half of the project, until approximately 1981, field maps were kept in possession of the crew chiefs in the field and in the lab as they completed their site reports. As first drafts of the reports were finished and requests were made for drafted maps for the published reports, maps were turned over to the DAP lab, the drafting staff, and ultimately the BLM. By approximately 1981 a more stringent set of guidelines was instituted for cataloging the large maps that were not attached to specific FS forms and enclosing these maps in Mylar as soon as possible. After each field season crew chiefs made sure all their maps were cataloged and checked in with the BLM. Thereafter the larger field maps were rechecked to the crew chiefs and drafting staff for temporary use in report production. Small maps of particular proveniences might be attached to the FS forms since they were primarily intended as documentation of a particular excavation unit. Crew chiefs were given xerox copies of these forms and their smaller attached maps.

Only a very small fraction of the total number of maps were drafted for publication, but oftentimes drafted maps combined the information on two or more field maps to gather all the pertinent information for a particular study unit or feature into a single presentation. Though most information on maps was entered in the field, in almost all cases corrections or additions were made to maps during the report write-up, drafting, and data checking process. Once the DAP finished with the use of the field and drafted maps they were turned back to BLM for permanent curation.

DATA CHECKS

Formal data checking was part of the editing process of all DAP site reports and all maps that had data or images that were part of the text, figures, or tables in the site reports were checked for consistency with the draft reports. If errors or contradictions were encountered, notes were made by the data checker, and corrections implemented if possible. This data checking process may allow the maps to continue to be quite useful to researchers for many decades to come, given that many errors and contradictions were dealt with as part of the DAP write-up.

PROBLEMS AND PITFALLS WITH THE MAP FILE

The map file was intended to be a catalog of all the maps created by the project, and was not built to be a particularly robust search device. The map data allow one to find particular maps associated with particular sites, or to get a general idea of how many maps were drawn of a particular topic in DAP work, but the map file was not designed to generate robust statistics or comprehensive searches. If someone has a fairly good idea of what they want to find, then the file should be helpful in finding whether there is a drawing of this item and what kind of map it is.

There are a number of fields in the map file that appear to have never been used. For example, there are six columns that remained blank. There is special samples information that is poorly understood within the context of maps. Finally, as noted above the maps are found in a variety of locations in the Heritage Center, so quick comparisons of different maps are unlikely. However, as archaeological interpretations and knowledge change through time, the maps may become important points for consultation, to see if profiles have alternative interpretations, or if someone wants to produce new maps or figures from the legacy data set.

EXAMPLE OF QUERYING THE MAPS DATA CLASS

The maps data class was not designed to be used in the same way as, say, an artifact data class. Unlike individual artifacts, which are included in large summary tables and not illustrated or discussed individually, many of the DAP field maps were redrafted and presented in the published site reports. Consequently, many map related questions can be addressed using the DAP publications. However, it is still quite possible that an investigator may need to reexamine the original maps to help verify or clarify issues raised while investigating a provenience, feature, or artifact question. In this case, an investigator working at the Anasazi Heritage Center might need to query the MAP10 file for specific maps regarding a specific feature or study unit.

In the example offered below, we will venture beyond our primary investigations in the McPhee community in other chapters. For example, if we wanted to know how long villages lasted at Dolores, there is only a certain amount of chronological data available for McPhee Village, primarily derived from tree-ring dating of different contexts, stratigraphic and construction sequences, and changes in the frequencies of associated ceramic types. To really understand village occupation length, we would also need comparative information from other villages investigated along the Dolores River—Grass Mesa, Rio Vista, and House Creek.

In the last few years there has been renewed attention in the use of small probability samples to generate estimates of the total number of artifacts associated with a residential occupation. This total number can then be used to estimate how long a certain number of people must have lived in a particular place (e.g., Lightfoot 1994; Nelson et al. 1994; Varien 1997; Varien and Mills 1997). If we were going to use probability data and accumulations estimates to estimate village use-life, then we would have to also use the investigations of Grass Mesa Village or Rio Vista Village. This is because probability investigations were conducted at only one of the roomblocks (13 squares, each being a 2 x 2m unit) out of the nine pueblos excavated or tested in McPhee Village. In contrast, a total of 113 probability squares were completed at the villages of Rio Vista and Grass Mesa. (See more on the probability sample in Special Studies chapter by Jordan.)

In working through the probability data, an eagle-eyed researcher might spot a discrepancy in one of the maps for one of the areas for Rio Vista Village, site 5MT2182. In going through the published maps of the sampling plans for this village, there is a slight, but possibly troubling contradiction in the probability sample for Area 3 of Rio Vista. In Figure 3.89 there are only 16 probability squares portrayed on a map of the major cultural units for Area 3. In contrast, Wilshusen and Varien (1986) note in a number of places throughout the report that there were 17 probability units and illustrate 17 units in the site sampling plan (Fig. 3.88 in the site report and used as Figure 4.6 in this chapter). Though the missing probability square on Figure 3.89 (Square 180S/152E) appears to just be an error in the map, we can use this slight contradiction to illustrate how this slight problem could be put to rest with a visit to the original field maps.

A query for this problem would involve at the minimum the following attributes:

- SITE- the site number for the village we are working with, that is, 2182.
- AREA- sites could be divided into different areas, which in the case of very large villages may represent different pueblo-plaza units. In this case we need Area 3 of Rio Vista Village.
- COPY- we would like to get the original map (0), if possible, but we should be aware that we may need to use a revised copy if there were several working copies of the sampling map in use in the field. So, we simply will call this up as an attribute, but not specify a criterion.
- TAXON- this designates the type of map we desire. In this case, our best guess is that we want some sort of “excavation plan map for the whole site” map, but there are several possible categories: “not further specified” (10 and 15) or, ideally, a “sampling plan map” (16). It is also possible that the field map for probability sampling may only portray part

of the area of the site, and be coded as a "partial" map of Area 3, so these values should also be solicited for the not further specified (25) and sampling (26) subcategories.

- SUTYPE-this should either be "0" or "1", given that the whole area of investigation, Area 3, is sought.
- MAPNUM- this is a primary piece of information for which we are searching, since each map for a site was given a sequential number.
- COBJECTID- this an accession number that the Heritage Center will need to actually retrieve the object.

This query produced two maps that potentially should have the information we seek. Both maps, Maps 214 and 238 for Area 3 of site 5MT2182, are sampling maps for all of Area 3. The COBJECTID numbers for these maps are "78.1.5MT2182.MAP.111.214.0" and "78.1.5MT2182.MAP.111.238.1B". Here's hoping that after pulling the maps that you discover that the error was just a slip of the drafting pen, otherwise get ready to learn the details about the Provenience data class and field notes!

The emphasis in this exercise is that the map file is a very crude instrument. Time during excavation is always short, and crew chiefs and crew members are forever using maps to record multiple kinds of information. As a consequence, anyone using this file should expect that it will be necessary to pull several—if not a number of—maps, for perusal at the Anasazi Heritage Center. Maps made in the field are far from complete masterpieces. They are works in progress, portraying the unfolding information yielded by site excavations. Just as the archaeological record is a palimpsest of past activities, archaeological field maps are similarly complicated and may portray multiple study units and types of investigations in the same area. So, it may take several field maps to find all the information given on a single drafted and published map.

4.6 Probability and judgmental sampling plan for Area 3, Site 5MT2182 (Rio Vista Village). From Wilshusen and Varien 1986: Fig. 3.88.

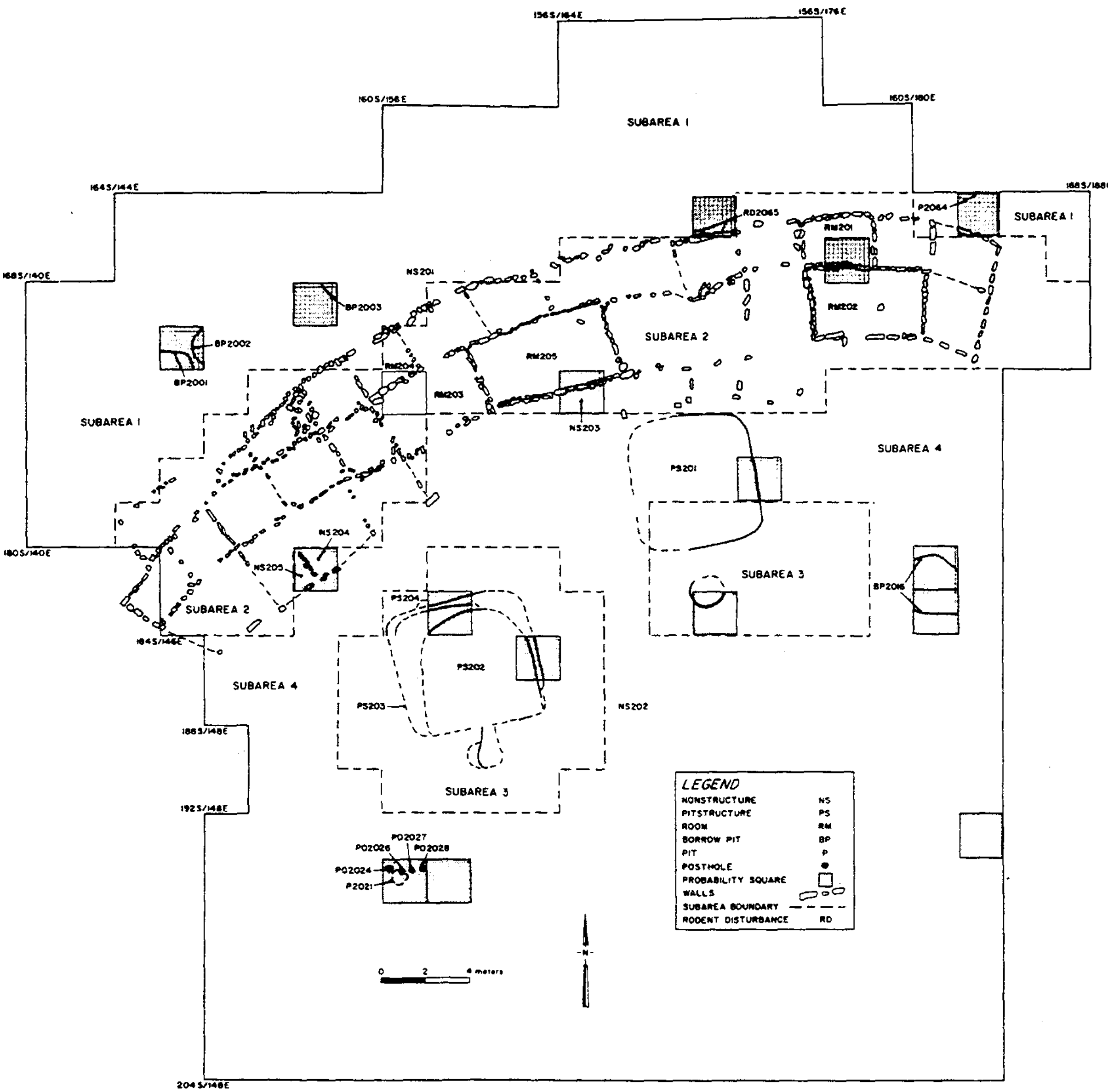


Figure 3.89 - Spatial relationships of major cultural units, Area 3, Rio Vista Village.

SPECIAL STUDIES

Gretchen Jordan

Special Studies refers to a number of research projects, shown below, which generated significant data sets during the Dolores Archaeological Program (DAP). Unlike other data files described in this user's guide, these studies are not included in the DAP data recorded on the CD. Instead, most of the Special Studies topics have been presented in the DAP published volumes and technical papers. However, a person interested in the DAP data set should be aware of these studies since they continue to have potential for research. Specific references are provided below for each of these projects. The special studies briefly summarized here include:

Site Surveys Extensive surface surveys were done in the McPhee reservoir and areas around it in order to identify sites and define the boundaries of the larger area used by the Dolores Anasazi;

Catchment Studies This includes descriptions of resources like water, agricultural-quality soils, vegetation, and climatic conditions inside the reservoir area and extending slightly beyond;

Roomblock Rubble Estimates Mounds of building materials, or rubble, were evaluated for size and content in order to establish correlations between prehistoric buildings and population size;

Pitstructure and Architecture Studies A prehistoric type of subterranean room, called a *pitstructure*, and several aboveground, or *surface* rooms, were built by DAP archaeologists. The purpose of these experiments was to better understand Puebloan architectural technology, and to evaluate how this technology may have changed over time;

Experimental Gardens Two garden plots were planted and maintained by archaeologists over a two-year period. The gardens provided a model for studying prehistoric agriculture in the Dolores area and for testing how productive agriculture may have been there;

Archaeomagnetic Dating Program Several sites in the Dolores research area were dated by using archaeomagnetic analysis. In addition, archaeologists set up an experimental study to assess the reliability of their testing procedures against known dates;

Probability Sampling Program The research design for excavations at Dolores required that some sites be sampled according to a mathematically random, or *probabilistic*, strategy. This report discusses the goals of this strategy and how it was implemented.

THE DAP SITE SURVEYS

Surveys help define a site. They provide an inventory of what prehistoric remains have been observed in an area and, usually, a map of the potential site. Surveys are accomplished in several ways. One of the most common is having fieldworkers simply "walk" across a site and record artifacts and features that are on the ground surface.

The focus for surveys in the Dolores Archaeological Program areas was in the area referred to as the *takeline*. This includes both the McPhee Reservoir itself (about 4500 acres) and the surrounding buffer areas (about 11,500 acres). The takeline was defined as the primary impact area where the majority of research and mitigation efforts were made. Multiple institutions were involved in these surveys between 1954 and 1982: the University of Colorado, the National Park Service Midwest Archaeological Center, the Bureau of Reclamation, Washington State University and the Dolores Archaeological Program. Unfortunately, some problems arose later in trying to evaluate all the sites cataloged over this time period of almost 30 years. These problems were a direct result of differences between various institutions in terms of methods used and also due to the fact that archaeologists are continually refining approaches to research—our ideas about how to design and implement surveys changed considerably over that three decade period.

Attempts were made to evaluate each site in the survey for the time period it was occupied and to determine its function. These sites were also analyzed to see whether changes in function through each time period affected population changes. The total number of sites recorded in the DAP survey was 1626 (Table 5.1). Of the sites that could be given temporal assignments, most were Basketmaker III and Pueblo I. Of those that could be given a functional assignment, the majority of these sites were defined as areas of special use, or *limited activity areas*, followed by *habitation* sites and, finally, *seasonal use* sites. However, there is wide variation in site size: individual site numbers were assigned to loci as small as rubble mounds or as large as villages. Consequently, a simple count of the number of sites in a given area does not correlate very well to the population size for that area.

Table 5.1 Known Cultural Resources of the Dolores Archaeological Program Area, as of 1983.

Survey project	Within Dolores Program Takeline	Outside Dolores Program takeline	Total
Pre-1978 surveys	159	397	556
1978 Bureau of Reclamation survey	148	9	157
DAP-CU survey	576	177	753
DAP-WSU survey	44	84	128
Miscellaneous	6	26	32
TOTAL	933	683	1626

All site inventory data, both paper and electronic, were turned over to the Colorado Historical Society, which maintains the state site records. To ascertain which sites were recorded as part of the DAP research, you should consult a summary discussion by Robinson, Gross and Breternitz (1986) entitled "Overview of the DAP" in the *DAP Final Synthetic Report*. For an evaluation of the survey, see Orcutt and Goulding's 1986 report, "Archaeological Survey of the McPhee Reservoir Area" in *DAP: Research Designs and Initial Survey Results*. A good example of how these survey data were used can be found in a chapter by Blinman (1988a) which provides a calibration of ceramic changes over time used to solve dating problems in some of the sites.

DAP Catchment Areas Research

Catchment area refers to the resources available to a prehistoric community in the place where they live. Catchment areas can be described by identifying what each resource was and how diverse they were in a given area. Analyses of water sources, plants, animals, arable land, clays for pottery and stone quarries can all provide valuable insights into how prehistoric people lived.

Information for defining and describing catchment areas for the Dolores Program was based on two sources: site surveys conducted in the takeline (referred to above) and environmental analyses. The environmental data include evaluations of water, soils, length of growing season and vegetation. Each of these elements was recorded on a gridded map of the Dolores takeline. Each grid corresponded to a 200 square meter section of the takeline.

Water sources could be drainages (described as either permanent or intermittent), marshes or springs. Soil quality was defined according to agricultural potential and described as good, adequate, marginal or nonagricultural. Growing season was evaluated in conjunction with cold air drainage risk, which was described as low, moderate or high risk—depending on the number of frost-free days. Reconstructions of vegetation patterns were derived for both wet and dry periods. Vegetation in the Dolores area generally includes sagebrush, aspen, oak, pinyon-juniper, ponderosa and mountain brush.

Orcutt (1986) evaluated relationships between catchment areas and other social variables in her discussion "Settlement Behavior Modeling Synthesis" in the *DAP: Final Synthetic Report*. Her analysis used *Thiessen polygons* (an idealized geometric representation of how population centers are spread out) for seven Dolores villages and communities: McPhee Village, House Creek, May Canyon, Rio Vista, Grass Mesa, Windy Ruin and Cline Crest. This study focused on the variability shown in location preferences. Not only did prehistoric peoples tend to select in favor of good quality agricultural lands, they also actively selected against poor quality lands.

Orcutt's chapter (1986) is a key reference for information on the DAP catchment areas research. In addition, the catchment analysis data were used in a study to evaluate the ratio of caloric input to caloric return, or *energetics*, in situations where the Dolores Anasazi had to travel back and forth between fields and residences. These relative differences in energetics across the project area and over time are discussed in Kohler, Orcutt, Blinman and Petersen's (1986) chapter "Anasazi Spreadsheets: The Cost of Doing Agricultural Business in Prehistoric Dolores" in the *Final Synthetic Report*.

RESEARCH ON RUBBLE MOUNDS IN THE DAP

Rubble mounds are useful to archaeologists for a number of reasons. Architectural rubble is generally easy to see, and is a good indicator of locations of structures and potential communities on the landscape. Mound size and shape are usually correlated to the size and plan of the prehistoric walls and structures they came from. Analysis of architectural rubble for size and form can also be used inferentially in estimating population size.

Room block rubble mounds have been used in the Dolores Program to make population estimates. For example, the number and size of dwelling rooms are used as a proxy measure for population, based on the premise that they are the architectural expression of a household unit. Rubble left from prehistoric structures is particularly useful in the Dolores area for three reasons. First, structures are easy to see in the field; second, field investigators explicitly gathered architectural data during surveys; and third, the Dolores excavation data includes over 400 investigated structures which gives us a sizable study sample.

Rubble mounds were evaluated for both quantity of materials and their dimensions, and this resulted in an estimate of the number of dwelling structures in a site. To make the conversion from number of structures to number of rooms, Schlanger (1986) used a conversion equation of 50 square meters per dwelling room. These estimates were incorporated in studies of population size, growth rates and regional population trends (Figure 5.1). This information is presented by Schlanger's "Population Studies" in the *Final Synthetic Report*. Aggregation and space usage studies are discussed in Orcutt's "Settlement Behavior Modeling Synthesis," also found in the *Final Synthetic Report* (1986).

ARCHITECTURE STUDIES IN DAP RESEARCH

Architecture is a broad category because it refers to almost any human modification of the environment. Architectural features can be anything from a small field house to an imposing public monument like the Taj Mahal or the Great Wall of China. Analyzing these features can provide important information about population size, how people organized their communities, and what kinds of activities they performed from day to day. As the architectural design and technology in a site change over time, we can trace corresponding changes in social life. As a cultural tradition, architecture reflects both a mental template of "how things should be built" and the technological resources and expertise of prehistoric builders.

There were two major accomplishments in the Dolores architectural studies. One was an experiment in constructing a pitstructure and three surface rooms, referred to as *replication* study. The other was the analysis of structures in the Dolores Archaeological Program Area, which focused on trends in architectural changes over the time period A.D. 600 to 1200.

Replication of an A.D. 780 pitstructure demonstrated that in some cases previous interpretations of construction techniques were in error (Glennie 1983). In other cases, however, they confirmed architectural calculations for load-bearing members, building sequences, etc. The most important information resulting from this replication was related to roof design and especially roof destruction, which has a significant impact on our interpretation of site formation processes.

Three surface structures were also built, to represent late A.D. 800's building trends (Varien 1984). This research provided previously missing information regarding the uses of various materials and the construction and maintenance costs required for surface structures.

Both replicative studies are critical for the insights they provided in understanding the slow, step-wise changes in Dolores area architecture. This marks a gradual development from Basketmaker architecture, with dispersed pitstructure settlements, to Pueblo II construction with its more elaborate, differentiated forms. A relationship is also evident in the design shifts between pitstructures and surface rooms. As surface rooms became more elaborated over time, pitstructure excavation was modified to provide more surplus dirt, which in turn required changes in roof design. Shifts in usage eventually de-emphasized importance of pitstructures and focused more on surface rooms, accompanied by other modifications in construction techniques.

Much of the architectural research is summarized in *DAP: Supporting Studies: Additive and Reductive Technologies* (Blinman et al. 1988). The main architectural chapters in this volume are all by Wilshusen (1988a-f) and include "An Introduction to Architectural Supporting Studies," "Architectural Trends in Prehistoric Anasazi Sites during A.D. 600-1200," "Household Archaeology and Social Systematics," "Sipapus, Ceremonial Vaults, and Foot Drums," "Abandonment of Structures," and "The Pitstructure to Pueblo Transition: An Alternative to McGuire and Schiffer's Explanation".

TREATMENT OF EXPERIMENTAL GARDENS IN THE DAP

Empirical research in studying prehistoric agricultural practices has several advantages. By planting a garden using prehistoric techniques, researchers can test their ideas first-hand. They can control for different conditions like depth of planting, water requirements, seed hardiness, and so on. Results from such tests can then be used to develop more accurate models and to make better predictions about potential agricultural productivity in various culture areas.

In 1979 and 1980, two experimental gardens were planted and maintained as part of the DAP Environmental Studies Program. The overall goal was to aid in modeling prehistoric agricultural potential in the Dolores Archaeological Program area.

The gardens were planted at two different elevations, using traditional varieties of plants obtained from various southwestern tribes and pueblos. Crops tested in both upper and lower gardens included varieties of maize, beans, squash, cotton, chili peppers, tobacco, devil's claw and bottle gourd.

Productivity of these crops was evaluated for density of plantings, abiotic factors (temperature, moisture and soil chemistry) and biotic factors (competition between plants, between plants and weeds, predation by insects and animals and variability in plant properties). Two important factors affected actual productivity in the gardens. One of these was moisture, which was especially critical during seed germination. The other was length of growing season, which was unusually short for both 1979 and 1980. Early frosts significantly lowered productivity for both these years.

For a summary of the experimental gardens work, see Shuster and Bye's (1984), "Preliminary results from the DAP gardens," as well as Petersen's (1985) retrospective of the garden studies.

THE USE OF ARCHAEOMAGNETIC DATING IN THE DAP

The technique of dating materials using archaeomagnetism requires two steps. First, the magnetic alignment of particles in an artifact or feature must be determined. Second, that alignment is compared to a master table, or curve, which "maps" changing alignments in the earth's magnetic field to specific time periods. In order to be sure that the particles in an artifact had their alignment "set" during a human or cultural event—for example, the burning of a hearth—it is necessary for the temperature of that burning to be at or above what is called the Curie temperature. This temperature ranges from 570 to 670 degrees centigrade. This level of heat is required to re-set the molecular alignment to the magnetic angle for that time period.

Archaeomagnetic dating was implemented in two ways in the Dolores Program. First, samples were tested from hearths at 13 sites in order to derive occupation dates. Various other methods were used to corroborate these findings, such as *dendrochronology* (tree-ring dating), and typologies of known ceramic and architecture styles. The results of the derived dates were then compared to two earlier curves established for the Southwest by Wolfman and DuBois (discussed in Hathaway 1988). The result of this comparison was a modification of the earlier curves for three separate time periods: A.D. 775-800, A.D. 850-880, and A.D. 869-890. These modifications should provide more accurate and more reliable dates for the Southwest master curve for future research.

The second use of archaeomagnetic dating in the Dolores Program was an experimental study in which 12 hearths were constructed for controlled testing. The variables under study were the type of sediment in the surrounding matrix and the temperature of burning. Both of these variables were analyzed to determine the most reliable sampling conditions for using archaeomagnetic analysis. Three results of this study bear further description.

First, the proportions of clay, silt and sand were highly variable in the Dolores testing area. It was hoped that reliability of dating would vary directly with the matrix composition. However, this was not the case. There was no clear correlation between clay or sand content and magnetic properties needed for dating. Second, various positions in the test hearths were monitored for reliability of dating results. It was determined that the best place to take samples was from the rim of the hearth. Third, temperature of burning is a critical factor. There is evidence that hearth fires in the Dolores area did not attain Curie temperatures. As a result, the magnetization or particle alignment being measured in those hearths may reflect the first burning rather than the last (the last burning provides an abandonment date). However, it was also found through testing that when multiple firings occurred, even at too-low temperatures, it increased the reliability of dating analysis.

The key summary of the archaeomagnetic studies in the DAP are found in Hathaway's (1988) "Archaeomagnetic Dating Results". A shorter summary of the archaeomagnetic research is available in Hathaway and Eighmy (1984) in "The Archaeomagnetic Dating Program". However, two additional sources may be helpful. The first is an edited volume by Eighmy and Sternberg (1990), *Archaeomagnetic Dating*. The second is a single chapter by Sternberg (1997) on archaeomagnetic dating in a general volume on chronometric dating.

PROBABILITY SAMPLING IN ARCHAEOLOGY AND IN THE DAP

In a sense, archaeologists always "sample" a site when they excavate because they can never recover all the materials from the prehistoric world they are investigating, even if they are trying to get a 100% recovery. But, how sampling is planned is a critical step in designing research so that the results of the research are useful not only for a particular site but also when compared to other sites. Sampling can proceed informally, as when the researcher selects an area to investigate because it is interesting, or accessible, or simply the most visible thing on the landscape. This is based on judgment and is referred to as a judgmental sampling strategy. When areas are chosen mathematically, "randomly," from numbered grids on a survey map, it is called a probabilistic sampling strategy. By employing a probabilistic approach, the researcher minimizes personal bias and maximizes the utility of his or her work for comparative applications.

In all, 18 sites in the Dolores area were sampled using a probability approach. Each sample was a 2 x 2-meter unit in which all sediments, or matrix, were sifted through a screen with ¼ inch mesh. In addition, all artifacts in the sample unit were collected for analysis.

The purpose of the Dolores sampling program was to test how much of a site needs to be excavated in order to make reliable conclusions about the entire site. In other words, could a 1% sample yield valid information? Would a larger sample, like 15%, be worth the additional effort and cost by providing results that were significantly more accurate? This aspect of the program was referred to as *calibration*. A second goal was to improve reliability of *inference*. In this sense, the probability sampling program could ensure that any differences that were apparent from one site to the next were not due to variations in the excavators' methods. The third goal was *estimation:* to look for regularities in the relationship between the duration of the prehistoric occupation, the population size and the accumulation of debris. If clear relationships could be identified, they could potentially provide predictive insights for other situations where only partial information might be available.

Table 5.2 (adapted from Nelson et al. 1994) shows which sites in the Dolores area were tested in the probability program. The site number, name, time period and percentage of the site represented by sample, are shown.

Table 5.2. DAP Sites with Excavated Probability Samples.

Site Number	Site Name	Date Range (Years A.D.)	Sample Proportion	Sample Size (No. of Units)
5MT23	Grass Mesa	750-910	.010	56
5MT2182	Rio Vista	750-910	.030	57
5MT4477	Masa Negra	850-975	.021	13
5MT2161	Prince Hamlet	750-850	.050	10
5MT2194	Casa Bodega	750-850	.030	20
5MT2215	Sundance	1050-1200	.050	12
5MT2226	Dovetail	825-875	.034	12
5MT2336	Kin Tl'iish	775-1200	.017	13
5MT2854	Aldea Sierritas	600-850	.018	20
5MT4545	Tres Bobos	600-700	.042	20
5MT4614	Prairie Dog	700-760	.080	35
5MT4650	Hanging Rock	860-880	.070	13
5MT2729	Paintbrush House	1025-1125	.056	14
5MT4751	Pinyon House	1050-1125	.058	12
5MT2242	Ridgeline	Archaic	.030	30

5.1 Momentary human population by modeling period.
From Schlanger 1987: Fig. 23.2.

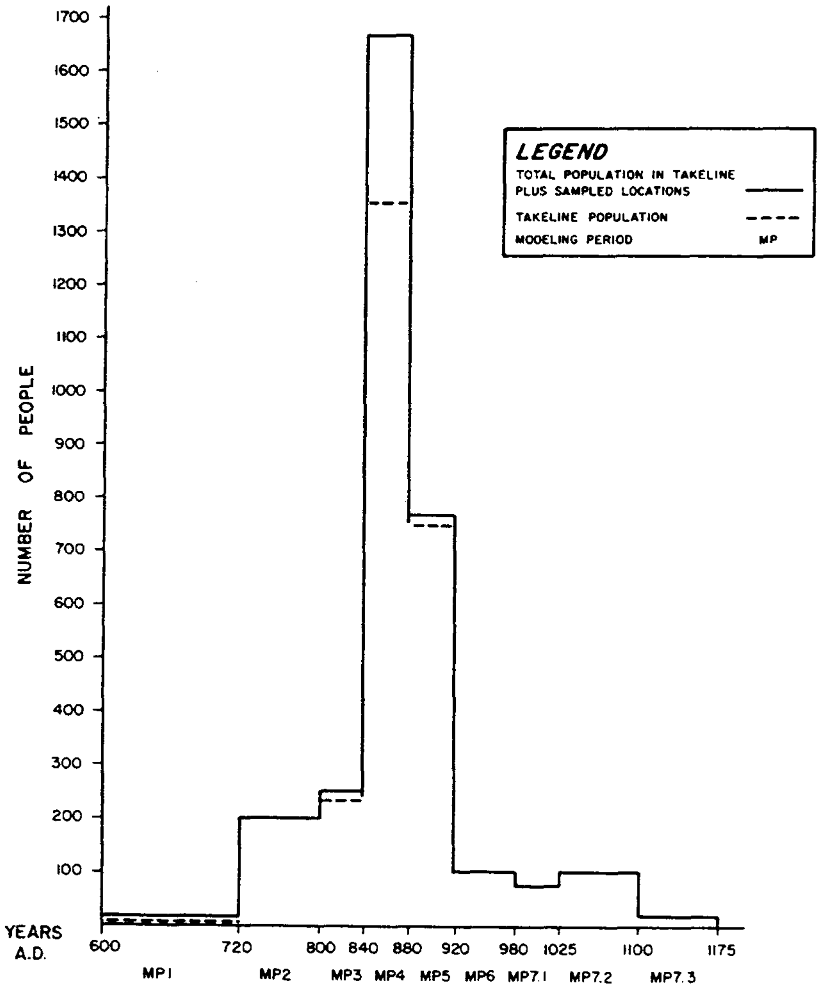


Figure 23.2 – Momentary human population, by modeling period.

5MT4681	Hawk	Archaic	.075	6
5MT4789	Quasimodo Cave	Sundial	.050	4
5MT2199	Horse Bone	Archaic	.171	20

The probability sampling program yielded very useful results, and has been referred to in several later publications. Varien and Mills (1997) and Varien (1997) used these data in their accumulations research, to estimate population size and duration of site use. Nelson, Kohler, and Kintigh (1994) reviewed the Dolores data as well in an excellent overview of demographic thinking in current models of southwestern prehistory.

For an overview of the probability sampling program, see Kohler and Gross' (1984), "Probability Sampling in Excavation: A Program Review," in the *Synthetic Report 1978-1981*. Kohler also reviews sampling procedures in "Probability Sampling," in Appendix B in the *DAP Excavation Manual* (Kane and Robinson 1984).

6

View from the Lake: Legacies of the Dolores Archaeological Program, SW Colorado

William D. Lipe

INTRODUCTION

In the summer of 1997, I cruised McPhee Reservoir in a boat, trying to recognize the locations of archaeological sites that were excavated by the Dolores Archaeological Program (DAP) in the late 1970s and early 1980s. I found myself disoriented much of the time, and it was only with great difficulty that I could relate the familiar geography of the project days to what I was seeing in 1997. Although the filling of the lake has obscured my perspectives of the actual sites, the passage of time has made it easier to gain a more abstract perspective on the contributions made by the work that was done at those sites.

The DAP was one of the largest archaeological mitigation projects ever carried out in the U.S., and was accomplished in several phases or sub-projects. I will focus on the work done to mitigate the effects of the reservoir and dam construction proper between the years 1978 through 1985 (Breternitz 1993; Robinson et al. 1986). Another part of the project dealt with the construction of the water delivery system and this archaeological work is just being finished.

There were over 1600 sites—most of them prehistoric—in the reservoir Program area; 101 sites were tested or partially excavated, with 41 of these sites receiving more than one crew week of fieldwork (Robinson et al. 1986). In some years, the project budget rivaled the funds allocated to NSF for archaeological research projects throughout North America. The DAP made a number of contributions to American archaeology, including: (1) Establishment of an excellent public museum at the Anasazi Heritage Center near Dolores, Colorado, now visited by over 40,000 people a year. (2) Concurrent establishment at the Heritage Center of a well-run repository that makes collections and records from numerous federally-related projects in the region available for continuing study. The museum and repository were built by the Bureau of Reclamation and are operated by the Bureau of Land Management. (3) Well-ordered DAP collections, paper records, and a large computer database, accessible at the Heritage Center. (4) Training of many young archaeologists who continue to work as professionals. (5) Lessons in the effective organization of large-scale, multidisciplinary projects. (6) A number of substantive and methodological contributions to American archaeology. I will focus here only on this last point and ask to what extent the work of the DAP has improved our understanding of Southwestern archaeology and has increased the power and efficiency of archaeological methods.

This last point is an important one, because the underlying premise of the mitigation of adverse effects through "data recovery" is that information gained through study of the archaeological record can compensate in some ways for the loss of the physical record itself. Therefore, the expenditure of public funds on these projects can be justified only if they in fact lead to an increase in knowledge about the past. The development by such projects of more powerful and efficient ways of learning about the past is another way they can meet their obligations to society. I think the DAP meets this standard pretty well; below, I'll review what I think have been the most important contributions of the project.

PRINCIPAL ARCHAEOLOGICAL CONTRIBUTIONS

Understanding Puebloan Culture, A.D. 650-900

Although the lands in and around McPhee Reservoir have sites of many periods, the bulk of the archaeological record resulted from intensive use of the area by Mesa Verde Puebloans between about A.D. 650 and 900--the late Basketmaker III and Pueblo I periods in the Pecos chronology (Kane 1986a). Although a number of "classic" excavations had focused on this time interval in previous years (e.g., Brew 1946; Hayes and Lancaster 1975; Martin 1938, 1939; Morris 1939; Roberts 1930), the DAP resulted in a much improved understanding of it. And although evidence to the contrary was produced by some of the earlier workers, this period has consistently been interpreted by most Southwestern archaeologists in terms of a model of gradual, progressive change (cf. Berry 1982). I call it the "Mesa Verde diorama" view of Four Corners archaeology. It goes something like this: Early groups were small, scattered, and nomadic. As they gradually added new traits such as farming, pottery, and masonry wall building, their communities became progressively larger, more aggregated, more permanent and more like historic period Pueblos. The DAP results pretty conclusively blew this model away, and in doing so, have helped loosen the grip of similar implicit gradualist models on interpretation of the archaeological record elsewhere in the Southwest.

To make a complex story simple, the DAP showed that the area was settled in the A.D. 600s by Basketmaker III farmers living in dispersed single family homesteads, each including a large pitstructure with outlying above and below-ground storage structures and other features. In the Pueblo I period, population size and density gradually increased in the late 700s, may have declined in the early 800s (Orcutt et al. 1990; Schlanger and Wilshusen 1993), and then rose very rapidly—almost certainly due to immigration—in the middle A.D. 800s (Schlanger 1986, 1988). The population increase was accompanied by the formation of seven large villages in the period A.D. 850-880. McPhee Village—the largest—probably had a peak population of 150-200 households (600-1000 people) about A.D. 860-870 (Kane 1986b, 1989; Wilshusen 1991). At the end of the ninth century, reservoir area population declined even more precipitously than it had grown a few decades earlier, and by A.D. 900, the area was nearly or completely unoccupied.

The DAP also documented a number of changes in architecture and artifact assemblages. Prudden Unit-type habitations become the norm after about A.D. 750, each consisting of a large pitstructure and several associated contiguous surface rooms devoted both to storage and habitation; each such unit appears to have housed one or a few families (Wilshusen 1988b).

With settlement aggregation, these habitation units become connected side-by-side to form long roomblocks, which cluster in varying numbers to form villages (Kane 1986b; Wilshusen 1988b). Wide-mouthed cooking jars become relatively more abundant after A.D. 800 (Blinman 1986b, 1988c); this change, along with the construction of increasingly well built surface storage rooms, probably correlates with greater reliance on stored maize (Gross 1986, 1987, 1992).

The occurrence of a few "great pitstructures" with elaborated ritual floor vaults in association with distinctive "U-shaped" roomblocks and higher frequencies of traded ceramics in some of the mid- to late ninth century villages indicates a modest level of social differentiation, probably mediated by religious ritual and feasting (Blinman 1989; Kane 1986b, 1989; Orcutt et al. 1990; Wilshusen 1989).

The demonstration of a population boom and bust cycle in the Dolores Valley in the A.D. 800s raised the obvious question of where the settlers came from and where they went. This helped stimulate the DAP researchers to take a geographically much broader view of settlement and population dynamics in the Four Corners area. Follow-up work to the DAP has shown that a number of village-level aggregates formed in the Four Corners area during the late A.D. 700s and 800s, but that not all were contemporaneous and most were short-lived (Wilshusen 1991; Wilshusen and Blinman 1992). This suggests that some communities either moved more or less intact, or that their inhabitants dispersed and joined existing or newly-forming villages. Large-scale community mobility may have been associated with a farming pattern that resulted in fairly rapid resource depletion, in the context of relatively low regional population density that permitted communities easy access to new lands (Kohler 1992a and b; Kohler and Matthews 1988).

Recent work also indicates that the movement of people out of the Dolores Valley in the late A.D. 800s was part of a larger pattern. The A.D. 900s appear to be a time of very low population in the northern San Juan or Mesa Verde region (Wilshusen and Schlanger 1993; Wilshusen and Wilson 1995). Although this remains speculative, the area that seems most likely to have received these emigrants is the San Juan (geologic) basin of northwestern New Mexico, where they may have contributed to the emergence of the Chaco phenomenon.

Reconstruction of Past Environmental Conditions

Ken Petersen and his co-workers in the DAP Environmental Archaeology group did a masterful job of developing a model of past climatic change and relating it to physiography and agricultural conditions in the reservoir area (Petersen 1986b, 1987a-d; 1988; Petersen and Clay 1987). The climatic model was based primarily on non-DAP supported studies, which included palynological data from lake cores in the La Plata Mountains and tree-ring data from several areas of the Four Corners region, plus the Colorado Front Range (for bristlecone pine tree-ring sequences indicative of temperature variations). Additional relevant palynological data were obtained in the project area from Sagehen Marsh, which also showed an increase in charcoal during the A.D. 600s, suggesting that the initial Basketmaker III period settlers were using fire to clear fields. Using these data, Petersen and colleagues reconstructed annual precipitation, summer precipitation, and summer warmth, as well as the effects of physiography on cold-air drainage and pooling. Taking into account elevation, exposure, and cold-air drainage, Petersen proposed episodic changes in the width of the "dry-farming belt" in southwestern Colorado from the late A.D. 500s through 1300 (Petersen 1987d). Data on frequency of drought and short summers also enabled measures of agricultural costs and stresses to be created (Kohler et al. 1986; Orcutt 1986, 1987).

The DAP model of environment and subsistence potential showed generally good agreement with the main contours of project area population and settlement (Schlanger 1986, 1988). In particular, the eighth and ninth centuries showed declines in annual precipitation that would have made the high elevation environs of the Dolores Valley attractive for farmers, relative to a number of other parts of the northern San Juan region. Severe drought in the very late A.D. 800s and early 900s, coupled with probable short growing seasons in the early 900s, may have contributed to the abandonment or near-abandonment of the reservoir area at that time (Petersen 1988). The various DAP studies of subsistence, environment, and population attempted to situate demographic change in the Reservoir area within a larger frame of regional cost-benefit and risk considerations. In other words, even if farming conditions were tolerable in the Reservoir area, they might be better somewhere else; hence, the analysis attempted to consider "pull" as well as "push" factors in the movement of populations into and out of the area (Lipe 1986).

<u>Understanding Processes of Socio-cultural Change</u>
The DAP provided an opportunity for an intensive, multidisciplinary investigation of prehistoric social and economic change over a relatively short time (by archaeological standards) in a small region (Breternitz et al. 1986). DAP studies showed that population increase in the A.D. 800s was associated with settlement aggregation, intensification of farming, anthropogenic impacts on the local environment, elaboration of religious ritual, and some degree of concentration of social power, though not of the sort that was clearly expressed by individual display of status markers (Blinman 1989; Kane 1986b; 1989; Lipe and Kane 1986; Orcutt et al. 1990). The environmental context for these changes was one in which the Dolores region was attractive for farming relative to adjacent lower-elevation regions, but in which farming was nonetheless risky. In my opinion, the DAP research provides one of the best-documented case studies of the interaction of demographic, social, and environmental variables in American archaeology (cf. chapters in Breternitz et al. 1986).

In attempting to find causal factors in the changes observed in the Reservoir area, DAP researchers attempted to compare "social" and "economic" models (Lipe 1986; Lipe and Kane 1986). The "social" or "sociopolitical" model was based on work by Kent Lightfoot (1984). It saw regional-level competition among emerging leaders and their kin groups as the primary process driving population aggregation, subsistence intensification, and the development of social hierarchy. The "economic" model saw regional resource stress as leading to a concentration of population in the Reservoir area, and hence to subsistence intensification. This and increasing competition for land in turn led to the development of community-level control over land use and conflict resolution, and hence to aggregation and the intensification of ritual.

It proved difficult to develop test expectations that unequivocally distinguished the two models, but the richness and comparability of DAP data sets did support a number of tests, which had varying degrees of success. Some results supported the economic model, some the social, suggesting that both sets of processes were at work, and that an either-or choice between the models was too simplistic (Kane 1986b, 1989; Lipe and Kane 1986; Orcutt 1986, 1987).

In a larger sense, this work introduced a much-needed empirical case study into the raging early-1980s debate about whether prehistoric Pueblo societies were rigorously egalitarian tribes or represented more complex social formations having strong hierarchical institutions (e.g., Plog and Upham 1983; Reid 1985; Upham 1982). By conducting well-designed studies of multiple lines of evidence, the DAP produced answers that were more complicated and interesting than either hypothesis had suggested. Since the mid-1980s, studies of Puebloan social and economic change have been less rhetorically strident and more empirically robust. I would like to believe that the DAP example helped establish this trend.

The DAP also attempted with some success to move away from prevailing models of organizational change that explicitly or implicitly assumed that changes could be explained by processes operating largely in situ within relatively small regions (such as a river valley or mesa). The DAP explicitly attempted to relate changes in the project area to those occurring in the broader Four Corners area, and to consider interregional differences in social and economic "push" and "pull" factors that may have influenced population movement.

Development of Archaeological Methods

Several methodological contributions of the DAP stand out. One was the use of archaeobotanical samples to document changing patterns of firewood and construction timber use as population size and density increased, and as households aggregated into village-sized settlements of several hundred individuals (Kohler 1992b; Kohler and Matthews 1988). Interpretation of these results was facilitated by reconstructions of the probable prehistoric distribution of vegetation in the project area, and of the probable amount of land cleared for farming at various levels of population. Together, these studies supported the inference that in the A.D. 800s, the large Dolores area population had begun to impact the local environment by depleting certain wood resources, leading to a shift to less desirable species (Kohler and Matthews 1988).

The DAP also contributed to the use of simulation in the study of social and environmental relationships. Using survey data in conjunction with soil maps, physiography, and reconstructions of climate and agricultural yield, Kohler and others (Kohler et al. 1986; Orcutt et al. 1990) modeled the growth of project area population, starting with settlement by dispersed households. They predicted that as population rose, household agricultural and foraging catchments would increasingly overlap, and that one likely response would be for people to move away from fields into villages, where ritual and political measures to resolve resource conflicts could be maintained. In the simulation, the appearance of a significant overlap in household catchments coincided well with the archaeological timing of population aggregation into villages. In recent years, Kohler, Van West, and others have continued to develop increasingly sophisticated simulations, using archaeological and environmental data from a much larger area of southwestern Colorado (Kohler and Van West 1996; Van West 1994).

DAP researchers also did some pioneering work in "accumulations research" (Varien and Mills 1997), i.e., the rates at which various kinds of materials are deposited in the archaeological record to form assemblages. Kohler and Blinman (1987) showed that length of occupation of sites could be inferred from sound estimates of total sherd populations, if number of households and pottery breakage rates were reasonably well known. This paper also discussed ways that long-term assemblages could be "unmixed" by calculating the inputs from different periods required to achieve the observed archaeological assemblage characteristics. Blinman (1988c) showed that estimates of standing household inventories of pottery vessels could be estimated if length of occupation and number of households were reasonably well known. Several "graduates" of the DAP, as well as others, have continued to use DAP data to carry forward similar research into accumulation rates and assemblage formation processes in recent years (e.g., Nelson et al. 1994; Schlanger 1990, 1991; Varien and Mills 1997).

The DAP lab programs in artifact analysis developed a number of methodological improvements and innovations (Blinman 1986d; Phagan 1986b). In ceramics, there were important contributions to the use of pottery types, in conjunction with assemblage formation analysis and tree-ring dating, to refine chronologies and to systematize chronological placement of archaeological contexts (Blinman 1986d; 1988a, b, c). There was some success in developing and chronologically calibrating attribute-based seriations (Blinman 1984). Important work was also done in functional interpretation of pottery vessels (Blinman 1986b, 1988b and c) and in determining whether production was at the household or specialist level (Blinman 1988c; Blinman and Wilson 1988a). Studies of the interregional exchange of ceramics documented changing patterns through time, and were successful in factoring out changes that were caused by population decline in the trade vessel source areas from those likely due to social or economic factors (Blinman 1986a, 1988b; Wilson and Blinman 1988).

The lithic artifact analysis program developed methods for facilitating comparisons across large data sets and large numbers of archaeological contexts (Phagan 1986b). These included the use of broad "morpho-use categories" to characterize assemblage variability across time periods, and to identify functionally different contexts at the site and intra-site levels (Phagan 1986b). Comparisons were assisted by use of standardized graphs of flaked and nonflaked lithic tool assemblage profiles and by indices of assemblage diversity and tool production cost. Systematic identification of lithic raw materials permitted analysis of variability in materials by sub-phase, tool morpho-use category, and functional site type. In addition, a multivariate analysis of projectile point form permitted comparison of statistically-derived and intuitive point typologies (Phagan 1988a and b). The large sample of excavated contexts provided by the DAP fieldwork also enabled the analysis of changes in lithic toolkits associated with households and spatially clustered groups of households, across the transition from a dispersed to aggregated settlement pattern (Hruby 1988).

<u>Data Comparability and Quality Control</u>

The DAP was able to tackle large-scale problems in processual archaeology and to develop or test important new methods because a serious commitment was made to obtaining comparable, high-quality data. This was not an easy problem, because up to 10 excavation crews were in the field at the same time, and the central analytical laboratory operated for a number of years, with several changes in key personnel.

Several steps were taken to ensure data comparability and quality. The DAP leadership saw the project as a once-in-a-generation opportunity to obtain the large, controlled data sets from a regional sample of sites that processual archaeology requires (Binford 1964; Struever 1968). But to be useful, these data would have to be comparable; that is, measured differences among contexts would have to be more than just a reflection of different archaeologists' recording style.

First, although most DAP excavations were designed to sample particular kinds of structures, features, or contexts, a sample of sites was also subjected to probabilistic sampling by standard-sized pits (Kohler and Gross 1984). This permitted the collection of representative samples of artifacts and ecofacts, and to some extent of feature and architectural data, for the main time periods and site types being investigated. The "probability sample" made possible systematic comparison of quantities and rates of deposition of various kinds of material from across the project. These data were critical in a number of project-wide, problem-oriented studies.

Second, the DAP leadership team invested an enormous amount of effort in developing field forms that required certain kinds of data to be recorded in a certain way. This did not preclude narrative comments, sketch maps, or the like, but for field forms to be accepted by the laboratory, the appropriate blanks had to be filled in with entries that made sense, in terms of the coding lexicon. I think there was a fair amount of overkill in this effort, which put a heavy burden on crew chiefs and assistant crew chiefs, some of whom no doubt still have nightmares about "Fill/Assemblage Position" and "Fill/Assemblage Type" codes. But the result was the generation of an enormous amount of detailed and reasonably comparable data on features, architecture, artifacts, and depositional contexts, from both the judgmentally chosen as well as the probabilistically selected excavation units. In addition to the field recording, the lab analysis systems were designed to generate comparable data within each main class of artifacts. Too many variables may have been recorded in some cases, but a serious and continuing effort was made to measure the same things in the same way on each item.

Third, the DAP made a strong commitment to data quality. The fact that most of the standard field and lab data had to be entered into a computer data set exercised one form of control—if it was not in a form that the computer could recognize, it was probably wrong. More importantly, Lab Director Paul Farley personally examined and approved most of the field and laboratory records before they were accepted for entry into the data files, and had no qualms about rejecting forms that did not meet DAP standards. This provided an incentive for both field and lab crew chiefs to clean up their data records before they submitted them.

Finally, much effort was expended to develop a comprehensive computer data set, despite the relative primitiveness of the computer hardware and software available in the early 1980s. This data set continues to be accessible at the Anasazi Heritage Center and in several copies located at other institutions, and has been used in a number of studies done since the DAP ended (e.g., Hegmon 1995; Kohler 1992a; Potter 1997; Schlanger 1991). The present user's guide provides a much-needed upgrading of the documentation, and conversion to a much more user-friendly format, so that it can continue to support new research in the future.

The intrinsic complexity of archaeological data, and the difficulty of recording them accurately and consistently in the field and lab, should make data quality and comparability a major issue in archaeological project design and administration. And many projects accept this responsibility and allocate resources to it, as did the DAP. However, there is a striking lack of discussion of these aspects of archaeological research, either in print or at professional meetings. Even the DAP under-reported this important aspect of its work. This is an area where things that were learned by the DAP have not generally been made available for discussion by the archaeological community. On the other hand, there has been an indirect influence through DAP's exposure of a cadre of young professionals to high standards for data comparability and quality control.

CONCLUDING COMMENTS: DISSEMINATION OF RESULTS

I want to conclude by returning to the question I started with—to what extent did the public funds spent on the DAP result in an increase in knowledge about the American past and an improvement in our ability to learn about the past through the practice of archaeology? I think I have made a case that the DAP made some important contributions of both sorts. To fully answer the question, however, we must consider how effectively knowledge about these contributions has been disseminated. No matter how good the research has been, if scholars and ultimately the general public never learn about the results, the social benefit of the project remains unfulfilled. My consideration of the issue of dissemination will necessarily be personal and subjective, although I think it could be addressed systematically through various kinds of citation analysis.

First, the development of the Anasazi Heritage Center as one outcome of the DAP provided both an immediate and continuing focus for public education, not only about the DAP itself, but about the archaeology of the Four Corners area. The permanent exhibits are well done, and temporary exhibits regularly bring fresh topics to the public. The Center has worked with the Southwest Natural and Cultural Heritage Association to have several popular books and a video produced about the archaeology of southwest Colorado. The Center is also home to the BLM's Imagination Team, which is playing an important national role in the development of archaeological education materials, with special emphasis on providing information to K-12 teachers. So the establishment of the Heritage Center has speeded up and facilitated the ordinarily slow process of translating the results of technical archaeological research into forms that the public can enjoy.

Second, the DAP technical reports were produced in a timely manner. Thirteen weighty volumes containing detailed site reports, as well as a number of synthetic and topical studies, were published by the Bureau of Reclamation during the project and shortly after its end, and were distributed to a list of libraries, agencies, and individuals. In addition, over 200 other technical reports were produced and given much more limited circulation. These are available at the Heritage Center in Dolores.

Third, a number of theses, dissertations, journal articles and book chapters have been based on DAP studies and data. Many of these were written by DAP personnel during or after the project, and some were originally presented in more detailed and technical form in the DAP reports. There also has been a continuing stream of more recent articles that follow up on the issues raised by the first round of publications, or that address new questions with data from DAP collections or the computer data set. The funds expended to do the basic fieldwork, analysis, and reporting thus continue to generate contributions to knowledge that are paid for from other sources. These shorter, more widely distributed articles and chapters have resulted in a much broader understanding of a variety of DAP-related topics by scholars and interpretive specialists than was achieved by the technical volumes alone, which are primarily used by specialists in the archaeology of the region.

Fourth, I think that all of us who are knowledgeable about the project continue to be surprised at how slowly some of the principal substantive results of the DAP have come to be incorporated into the general literature on Southwestern and American archaeology. The DAP convincingly and empirically demolished the "uniform gradual progress" model of early Anasazi prehistory, and produced important new insights into early Puebloan adaptive and organizational change, but you would never know it from some of the characterizations of Northern San Juan culture history that continue to appear in print. It is also surprising that although the DAP has provided some of the most detailed and best-documented site reports for the Southwest, DAP sites such as McPhee Village or Grass Mesa are seldom used as examples of settlements of the Pueblo I period.

I don't think that there is any evil conspiracy afoot here. It is just that the literature of the Southwest is so enormous that even accomplished scholars quail at the thought of trying to read an 1100-page technical report about a project outside their own research area, let alone 13 such monographs and 200 other unpublished reports. As noted above, detailed documentation of basic project results are an absolutely essential component of fulfilling a project's obligations to science and ultimately to the public; the DAP reports are remarkably good, were produced in a timely manner, and will probably still be valuable data sources a hundred years from now. However, the problem-oriented articles and chapters that have more recently emanated from the DAP have been more effective than the technical reports in "making a difference" in scholarly and public knowledge of the project's findings because 1) they are short and 2) they are published in journals and books that are circulated at a broad regional or national level.

In retrospect, I wish that some of the DAP fieldwork, analysis or technical reporting had been cut back just a bit and some time made available at the end of the project so that key project staff members could have produced one or two compact, book-length syntheses of the project's most important results. Such a book or books would have been addressed to Southwestern archaeologists, but would also have made the project findings more accessible to a variety of public interpretive specialists as well (e.g., journalists, free-lance writers, K-12 teachers, museum exhibitors, video producers, etc.). Publication would have been by a university or trade press, in order to ensure 1) rigorous peer review before publication; 2) aggressive marketing to libraries, the archaeological community, and the interested public; 3) solicitation of book reviews in a variety of journals; and 4) continued availability to scholars, students, and the public as long as the books were still selling. In other words, dissemination of the project's most important contributions to knowledge would have relied on the standard, existing, commercial system that all of us use to find out about what is happening in our field, and to acquire (or have our employer acquire) those books that appear to be worth having.

Of course, it can be argued that the archaeologists who participated in DAP or who were interested in its results could have produced such a book on their own, and that federal agencies are not responsible for funding anything beyond basic "data recovery" reports. On the first point I would say, yes, it is unfortunate that none of us followed through on this, and I wish that I had taken the lead in doing so. On the second point, however, I would disagree. Obviously, there has to be a limit on how much public money is spent on mitigation projects, and on what it is spent for. But again, the overall goal of a mitigation project is to provide scholars and ultimately the general public with new information about the past, as a replacement for what is lost when the sites themselves are destroyed. If it takes publishing an attractive, readable, peer-reviewed book to ensure that this information actually becomes widely available, that is what should be done. Cut back some of the other components of major projects, if necessary, but don't skimp on ensuring that society gets something reasonably user-friendly for its money, in addition to the required technical documentation reports.

In sum, I think that the DAP has made and continues to make a significant contribution to our understandings of what happened in the past and to our ability to do better archaeology in the future. The large investment of public funds in this project has paid off in many ways, including direct provision of interpretive materials to the public through the Anasazi Heritage Center, the prompt publication of detailed technical reports and the continued availability of collections, archives, and a data set to support new research. Dissemination of the principal substantive and methodological results of the project has had variable success, and might have been improved if a more compact, user-friendly synthesis had been produced at the close of the project and published through standard commercial or academic channels. In future project planning, federal agencies charged with implementing major mitigation projects should attempt to achieve a good balance among their several knowledge-dissemination needs: 1) putting technical documentation on the record, 2) reaching a wide audience of scholars, and 3) providing information to the general public.

Appendix I. The Ten Commandments for Using the DAP Data

Richard H. Wilshusen and Paul J. Farley

Commandment 1. *Thou shalt not worship the DAP data set as a graven image.*

The organization and computerization of the Dolores data was an experiment conducted at time before relational databases and before widespread use of personal computers. Though the project resulted in the archaeological analysis of over a million artifacts from over thirty thousand proveniences, the data set was not necessarily designed for individual users. There are aspects of the Dolores data and the attendant programming that were very elegant at the time (1979-1985), but modern database computing has made significant strides over the last decade. The user is urged to find the strengths in the DAP data set and to build upon them. At the same time it is important to understand and accept the limits of these data and their organization.

Commandment 2. *Thou shalt consult the User s Guide before, and while, using the DAP data on the CD-ROM.*

Though we look forward to creative computing with the DAP data, it is extremely important that the user understand the definition of the DAP terms, the limits of the DAP analysis, and the assumptions made by DAP researchers in observing the archaeological record, recording information about it, and coding the FS and laboratory analysis forms. It is possible to simply shotgun an answer out of the present data without knowing much about assumptions, definitions, or analytical constraints. There is a long tradition of getting partial answers in archaeology, but as Americanist archaeology has become more scientific in its focus, it has increasingly been important to publish data, replicate results, and to confirm or deny another researcher s conclusions. We hope that other researchers will use the DAP data to boldly go where DAP researchers could not go, but in so doing we hope that new researchers will recognize the inherent limits of these data.

Commandment 3. *Thou shalt not confuse the Dolores archaeological data with a random sample, nor confuse statistically significant results you obtain with these data with truly consequential results.*

The Dolores excavators did obtain a very small, but important, probability sample, but the majority of the excavations at Dolores consisted of judgmental excavations in sites immediately threatened by the construction of the vast McPhee Reservoir. In using the non-probabilistic data a researcher should consider how adequate and representative the sample is and try to take this into account when asking questions.

In addition, the DAP data set is a very large sample which may allow one to obtain statistically significant results especially for some non-parametric statistical tests. One should always take into account the assumptions of the statistical test and the size and nature of the sample before one accepts results as being substantive results. As David H. Thomas, and others have noted, archaeologists need to be clear about not confusing statistical significance with substantive significance. Use common sense and archaeological savvy in evaluating your results from explorations with the DAP data set.

Commandment 4. *Thou shalt honor the values of the original codes until it is either clear that either recoding is required for new analyses or reanalysis of artifacts is needed.*

Though the succeeding 15 years since the end of the Dolores Program have resulted in a number of changes in archaeological method and theory, the data codes should be respected until good cause can be offered for changing them. Researchers should keep a careful account of any revisions or recodings they make in their use of the data. If major coding errors, problems, or needs for major reanalysis are detected, a listing of these problems with suggestions for corrections should be sent to the Anasazi Heritage Center.

Commandment 5. *Thou shalt understand the temporal and spatial contexts of the Dolores sample.*

There were a total of 13 different volumes with a total of 16 books of site reports, synthetic analytical reports, and overviews published as part of the DAP. These reports are often dense with archaeological information and interpretations. They are not always easy to read, nor readily accessible, but they are the heart and soul of the Dolores Program. The reader is urged to treat these reports as Readme files that should be consulted at the beginning of any investigation. The DAP report series was distributed to major libraries with Government Publication holdings and to many researchers in southwestern archaeology. The reports are also available through the National Technical Information Service (NTIS), 5285 Port Royal Rd., Springfield, Virginia 22161.

Summaries of the published DAP reports are included as an appendix in this user s guide.

Commandment 6. *Thou shalt not confuse the DAP data set with a database.*

The DAP data in its original construction was not a true database, in the way that researchers have used this term in the last decade. The computer technology available to us in Dolores at the time we assembled the data (i.e. the early 1980s) only allowed us to assemble the data as a series of flat files (i.e., files configured to stress row and column linkages rather than relationships between multiple sets of data). Consequently if we wanted to relate the flaked lithic tool data to the ceramic analytical data we needed to either join the files into one immense table or to compare attributes within the two files using a tool such as SPSS (Statistical Package for the Social Sciences).

Artifact attributes (i.e. variables in the DAP, or the columns [fields] that comprised the DAP data set) were given discrete names from one another within each file. Though the names were thought to be unique even between files, in a few cases we have found common usage of the same name for different attributes in various files. For example, the attribute TAXON represents totally different values in the original Faunal and Map data sets.

While in our present assembling of the user s guide we have tried to catch the potential contradictions that might occur between interlinks different DAP files, the reader is cautioned to check interlinks. The only attribute data types that are commonly shared between almost all the files are the *provenience data for state and county, site number, and FS* (field specimen) *number*. Primary database linkage is to be derived through these shared provenience data.

Commandment 7. *Thou shalt not place the numbers of the DAP data set above the archaeology of the DAP data set.*

Archaeology is a very imprecise and soft science. It studies the formation of an often-times muddled record of prehistoric events, and tries to understand the behaviors that might have resulted in this muddled archaeological record. The occurrence of a frozen event in prehistory such as the disaster of a Pompeii or the burning down of a Dolores structure is unusual. Most archaeological data are a mix of different uses of a space and all the post-abandonment processes which have operated on this space through time. In short, archaeology is much more complicated than the numbers associated with archaeology.

DAP archaeologists encoded interpretations about the archaeological formation processes in what we called the FAP and FAT codes. FAP stands for fill/assemblage position and describes the general location of the provenience unit relative to archaeological structural elements, surfaces, or natural depositional units. FAT stands for fill/assemblage type and is a general term that describes the formation processes that may have primarily contributed to the deposition of the archaeological and other materials within the provenience unit. While the FAP and FAT codes offer only a limited interpretation of the nature of the provenience units, they are a start in understanding the archaeological interpretation of these units.

Commandment 8. *Thou shalt read the Readme files attached to each data set as thou usest it.*

There are quirky aspects to each and every data set that a user may encounter. The DAP data set is no exception. We have tried to call some of the particular peculiarities of some files to the reader s attention in an attached Readme file.

Commandment 9. *Thou shalt not use the Temporal-Spatial files without knowing the basics of the DAP data set. The god of the Central Limit Theorem will burn thy works to cinders if thou usest the TS files in vain.*

The Temporal-Spatial files were the best attempt by DAP senior staff to integrate all of what we knew about each provenience unit into a unified temporal and spatial matrix. As Jonathan Till explains in his introduction to these data, the spatial data were organized hierarchically so that information about activity areas, households, and sites were used as successively larger building blocks to understand how to integrate spatial and social organization concepts in the archaeological interpretation of these data. Similarly the temporal data were organized from individual specific chronometric or relative dates to phases, Pecos periods, and cultural traditions. The temporal-spatial (TS) files are complicated and hazardous to use, but very powerful for large-scale and high-resolution uses of the DAP data.

We have been able to include only a limited number of the TS files for both reasons of their size and complexity. Use these files cautiously because of their interpretive power. As the DAP files are used more and more, it is likely that the TS files will need to be rethought and recomputed, but they remain one of the most powerful attempts by a large archaeological project to truly synthesize final results.

Commandment 10. *If thou art an archaeologist, then takest the DAP data set and go forth and make more and better data sets. Thou shalt send all analyses and suggested amendments to the data to the Anasazi Heritage Center.*

Data sets such as the Dolores data are only the beginning. Once archaeologists truly become experts in databases, the science of archaeology will truly blossom.

If you write a formal paper using the DAP data, whether published or unpublished, please send a copy of it to the Anasazi Heritage Center, 27501 Highway 184, Dolores, Colorado 81323, USA. The Heritage Center is the primary curation facility for the DAP data and analyses. This way the data and its uses can live on for generations. This is the true meaning of legacy data sets.

Appendix II: Abridged Data Dictionary for the DAP Data Sets

The Data Dictionary gives general summaries of the attributes for the following data classes:

Provenience data class: (Prov10.dbf) and Linked Provenience-Feature (Featlnk.dbf)

Temporal-spatial data class: (Tsbot4.arc, Tscer4.dbf, Tsdat3.arc, Tsdeb4.arc, Tsfau4.mdb, Tsflt4.dbf, Tshft3.arc, Tsmis4.arc, Tsmwr3.arc, Tsnfl4.dbf, Tsprv4.dbf). These files are found in the Archives, DBF, or Tutorial folders. There are four additional TS files we are aware of—Tsflp3, Tspjp3, Tssam4, and Tswbs4 but for which we do not present data on the CD. It should be possible to use the Tsprv4.dbf file to construct new temporal-spatial files for all data classes, but this is a problem for the future.

Ceramic data class: (Ceram10.dbf)

Flaked Lithic data class: (Debtg10.dbf, Flt10a.dbf, Flt10b.dbf, Micwr10.dbf). There are also several specialized analysis data files Pjpall.dbf, for example for which we have data files, but for which we are still lacking full lookup tables.

Nonflaked Lithic data class: (Haft10.dbf, Mano10.dbf, Metat10.dbf, Nflt10.dbf)

Faunal data class: (Fauna10.dbf, Wbone20.dbf). The attributes for Bunny10.dbf are not given, but should be obtainable from the Anasazi Heritage Center.

Botanical data class: (Corn10.dbf, Macro10.dbf, Polln10.dbf)

Ornaments, Rare Rocks, and Miscellaneous data class: (Ornmt10.dbf, Rarerox.dbf, Misc10.dbf)

Dating, Samples, and Sediments data class: (Date10.dbf, Sampl10.dbf, Seds10.dbf)

Photo data class: (Photo01.dbf)

Map data class: (Map10.dbf)

Specific values for specific attributes (variables) for each file are given in the lookup tables on the CD-ROM.

PROVENIENCE AND LINKED PROVENIENCE-FEATURE DATA CLASS (Prov10.dbf, Featlnk.dbf)

Provenience (Prov10.dbf)

FLAG This letter (choices A-Y) corresponds to the particular project, site, or level of work conducted. It may be left blank if not applicable to that provenience. The most frequently used letter, P’, refers to probability sampling.

STCO This attribute, representing the *state* and *county* in which a site is located, is to be used in conjunction with the attribute below, SITE. For Grass Mesa Village, or site 5MT23, the 5MT part of the site number is found as a choice within this attribute. There are 7 choices, each of which represents a county in Colorado, New Mexico, or Utah. The one most frequently found among the DAP data is Montezuma County, Colorado (1).

SITE This numeric response is the number of the *site*. For instance, the full site number that a researcher might be interested in is 5MT23. Under this attribute, only the 23 will be present. In order to get the full site number, this attribute must be used in conjunction with the following attribute, STCO.

FS This is the *field specimen* number. It was assigned sequentially within each site and it is unique within that site.

AREA *Area* was assigned only if the site was excavated in subsections (choices 1-9). If no areas were assigned, the default is 0’.

SUBAREA *Subarea*, like area above, was assigned only if the site was excavated in subsections. The default answer of 0 indicates that subareas were not assigned.

SUTYPE For *Study Unit type*, there are 64 choices including both culturally- and arbitrarily-defined entities. Examples of culturally-defined study units are Surface structure, room, masonry walls’ (11) or Non-structural unit, plaza’ (44). Arbitrarily-defined study units include Excavation unit, trench’ (51) or Recent disturbance area, looter’s spoil dirt’ (61).

SUNUM The *Study Unit number* was assigned sequentially within each study unit type within a single site. For example, there can only be one Pitstructure 1 at site 5MT23.

SUHORIZ The *Study Unit horizontal* gives information about the horizontal excavation strategy that may or may not have been chosen for a particular provenience within a study unit. It can range from a one to a four digit number depending on the horizontal excavation strategy used. The seven possible horizontal provenience possibilities include: not applicable (0000), whole study unit (0001), locus (1001-1999), segment (2001-2999), half (3001-3999), strip (4001-4999), quadrant (5001-5999), grid square (6001-6999), and grid square tied to a local datum (7000-7999). For “locus” or “segment” assignments excavators gave consecutive numbers within a study unit to these proveniences. For “half”, “strip”, and “quadrant” excavators assigned directional indicators to these units in the fourth digit of SUHORIZ. The directions and their numerical equivalences are: north (1), northeast (2), east (3), southeast (4), south (5), southwest (6), west (7), and northwest (8). For the grid square alternatives, the second through fourth digits in SUHORIZ indicate the grid coordinates south in meters.

SUGRID The *Study Unit grid* is a subdivision of Study Unit horizontal. It is only used when horizontal first digit is 6' or 7', or when the study unit was a grid unit. It is the grid coordinates east in meters.

SUVERT The *Study Unit vertical* gives information about the vertical excavation strategy that may or may not have been used for a particular provenience within a study unit. It consists of three digits, with the first digit (0-3, 9) indicating the type of vertical excavation that was done (not applicable, stratum, level, surface, or full cut). The last two digits refer to the sequential numbering of the different types of vertical excavation for the study unit.

SULEVL The *Study Unit level* is a subdivision of the Study Unit vertical. It was only used when SU vertical, digit 1, referred to a stratum, level, or surface.

SUSURF The *Study Unit surface* is not necessarily applicable. There are 15 choices which describe a cultural or natural surface.

SUFAP This is the *Study Unit Fill/Assemblage Position*. There are 40 choices describing the position of the deposits, such as fill inside or outside a structure.

SUFAT This is the *Study Unit Fill/Assemblage Type*. There are 43 choices describing the type of deposits, such as cultural, post-abandonment, or mixed and consisting further of several choices within each category.

FETYPE This is the *Feature type*. This is only applicable if the provenience being described is within a feature. There are 91 choices which define the type of feature. Examples include pit features, wall features, or artifact features various types of each are among the choices.

FENUM The *Feature number* was assigned sequentially within each site.

FEHORIZ *Feature horizontal* gives information about the horizontal excavation strategy that may or may not have been chosen for a particular provenience within a feature. It can range from a one to a four digit number depending on the horizontal excavation strategy used. The seven possible horizontal provenience possibilities include: not applicable (0000), whole feature (0001), locus (1001-1999), segment (2001-2999), half (3001-3999), strip (4001-4999), quadrant (5001-5999), grid square (6001-6999), and grid square tied to a local datum (7000-7999). For "locus" or "segment" assignments excavators gave consecutive numbers within a feature to these proveniences. For "half", "strip", and "quadrant" excavators assigned directional indicators to these units in the fourth digit of SUHORIZ. The directions and their numerical equivalences are: north (1), northeast (2), east (3), southeast (4), south (5), southwest (6), west (7), and northwest (8). For the grid square alternatives, the second through fourth digits in SUHORIZ indicate the grid coordinates south in meters.

FEVERT The *Feature vertical* gives information about the vertical excavation strategy that may or may not have been used for a particular provenience within a feature. It consists of three digits, with the first digit (0-3, 9) indicating the type of vertical excavation that was done (not applicable, stratum, level, surface, or full cut). The last two digits refer to the sequential numbering of the different types of vertical excavation for the feature.

FEGRID The *Feature grid* is a subdivision of the Feature horizontal. It was only used when the feature horizontal first digit is 6' or 7', or when the feature provenience was tied to a grid unit. It is the grid coordinates east in meters.

FELEVEL The *Feature level* is a consecutive subdivision of the Feature vertical. It was only used when Feature vertical was stratum, level, or surface.

FEFAT The *Feature Fill/Assemblage Type* refers to the type of deposits in the feature. There are 43 choices which describe the type of fill within, or directly associated with, the feature.

COLLECT The *Collection method* refers to the method used in the collection of the material from the provenience being described. There are 29 choices which differentiate between not screened, dry screened, wet screened, size of mesh, or sampled for flotation, among others.

COBJECTID This is the *Center s object ID,* a unique number that the Center assigns to every object. It is derived from a string of numbers: accession number + site number + three letter code referring to department + FS + CATNO + PL. An example of such a number is 78.1.5MT2151.NFL.402.2.42. *This is a critical number for requesting objects from the Center s curator*. In the case of provenience there is no material object to request.

CSITEID This is the standard Smithsonian Site Number. An example of such a number would be 5MT2151 where the first 5 represents Colorado (alphabetically the fifth state), MT is a two-letter county name abbreviation (in this case, Montezuma County), and the number of the site listed in the order in which it was recorded (this would be the 2151st site recorded in the county).

CCACNID This is the *Anasazi Heritage Center s Collection s accession ID*, essentially a management tool for the Center. Even though proveniences were not accessioned into the Heritage Center, this number was assigned.

CDEPT This is the *department code*, another management tool used by the Anasazi Heritage Center s Collections. This attribute keys for such values as DAPBOT (DAP Botanics), DAPCER (DAP Ceramics), and DAPNAL (DAP Not Analyzed).

Linked Provenience-Feature Class (Felnk.dbf)

FLAG This letter (choices A-Y) corresponds to the particular project, site, or level of work conducted. It may be left blank if not applicable to that provenience. The most frequently used letter, P', refers to probability sampling.

STCO This attribute, representing the *state* and *county* in which a site is located, is to be used in conjunction with the attribute below, SITE. For Grass Mesa Village, or site 5MT23, the 5MT part of the site number is found as a choice within this attribute. There are 7 choices, each of which represents a county in Colorado, New Mexico, or Utah. The one most frequently found among the DAP data is Montezuma County, Colorado (1).

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SUBAREA Subarea, like area above, was assigned only if the site was excavated in subsections. The default answer of 0 indicates that subareas were not assigned.

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SUGRID The *Study Unit grid* is a subdivision of Study Unit horizontal. It is only used when horizontal first digit is 6’ or 7’, or when the study unit was a grid unit. It is the grid coordinates east in meters.

SULEVL The *Study Unit level* is a subdivision of the Study Unit vertical. It was only used when SUVERT is a stratum, level, or surface.

SUSURF The *Study Unit surface type* is not necessarily applicable. There are 15 choices which describe a cultural or natural surface.

SUFAP This is the *Study Unit Fill/Assemblage Position*. There are 40 choices describing the position of the deposits, such as fill inside or outside a structure.

SUFAT This is the *Study Unit Fill/Assemblage Type*. There are 43 choices describing the type of deposits, such as cultural, post-abandonment, or mixed and consisting further of several choices within each category.

FETYPE This is the *Feature type*. This is only applicable if the provenience being described is within a feature. There are 91 choices which define the type of feature. Examples include pit features, wall features, or artifact features various types of each are among the choices.

FENUM The *Feature number* was assigned sequentially within each site.

FEHORIZ *Feature horizontal* gives information about the horizontal excavation strategy that may or may not have been chosen for a particular provenience within a feature. It can range from a one to a four digit number depending on the horizontal excavation strategy used. The seven possible horizontal provenience possibilities include: not applicable (0000), whole feature (0001), locus (1001-1999), segment (2001-2999), half (3001-3999), strip (4001-4999), quadrant (5001-5999), grid square (6001-6999), and grid square tied to a local datum (7000-7999). For "locus" or "segment" assignments excavators gave consecutive numbers within a feature to these proveniences. For "half", "strip", and "quadrant" excavators assigned directional indicators to these units in the fourth digit of SUHORIZ. The directions and their numerical equivalences are: north (1), northeast (2), east (3), southeast (4), south (5), southwest (6), west (7), and northwest (8). For the grid square alternatives, the second through fourth digits in SUHORIZ indicate the grid coordinates south in meters.

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FEGRID The *Feature grid* is a subdivision of the Feature horizontal. It was only used when the feature horizontal first digit is 6' or 7', or when the feature provenience was tied to a grid unit. It is the grid coordinates east in meters.

FELEVEL The *Feature level* is a consecutive subdivision of the Feature vertical. It was only used when Feature vertical was stratum, level, or surface.

FEFAT The *Feature Fill/Assemblage Type* refers to the type of deposits in the feature. There are 43 choices which describe the type of fill within, or directly associated with, the feature.

COLLECT The *Collection method* refers to the method used in the collection of the material from the provenience being described. There are 29 choices which differentiate between not screened, dry screened, wet screened, size of mesh, or sampled for flotation, among others.

PLAN This is the s*hape* of the feature in *plan* view. There are 10 choices (0-9) describing the shape.

PROFILE This is the s*hape* of the feature in *profile*. There are 10 choices (0-9) describing the shape.

EXLNGTH This refers to the e*xisting length* of the feature, in centimeters. The existing length is that which remains at the time of excavation.

INLNGTH This refers to the *inferred length* of the feature based on the existing portion, visible curvature, etc..., in centimeters.

EXWIDTH This is the e*xisting width* of the feature, in centimeters.

INWIDTH This refers to the *inferred width* of the feature based on the existing portion, in centimeters.

EXDEPTH This refers to the *existing depth* of the feature, in centimeters.

INDEPTH This is the *inferred depth* of the feature based on the existing portion, in centimeters.

MATER1 This is the *material* of which feature is constructed. There are 10 choices (0-9); this attribute applies to those features with a single construction material as well as those with multiple materials. In the case of multiple construction materials, MATER1 refers to the material that dominates in the construction. This attribute was used only when a material was used to construct a feature. In many cases, no materials were used in construction.

MATER2 This is the *material* of which the feature is constructed. As above, there are 10 choices (0-9). This attribute applies only to those features with multiple materials; Mater2 refers to the material that is the second most dominant in the construction. This attribute was used only when a material was used to construct a feature. In many cases, no materials were used in construction.

MATER3 This is the *material* of which the feature is constructed. Again, there are 10 choices (0-9). This attribute applies only to those features with multiple materials; MATER3 refers to the material that is the third most dominant in the construction. This attribute was used only when a material was used to construct a feature. In many cases, no materials were used in construction.

TEMPORAL-SPATIAL FILES (ALL FILES THAT BEGIN WITH TS)

The archaeologists of the DAP organized the temporal-spatial system according to the various data classes, essentially pairing up each "basic" data class with a fairly standardized set of temporal-spatial attributes. Additionally, the provenience information specific to each specimen is included. Each pairing constitutes a new data file which is quickly identified with the prefix "TS-" in front of the initial data class abbreviation (e.g., "Flaked Lithic Tools" is "FLT"). In a few cases, the abbreviated name for a data file is somewhat shortened in the TS named version (e.g., "Miscellaneous" is "MIS" rather than MISC). Some of these data files are somewhat specialized or redundant (and are marked as such); their attributes may partially be contained within another data class. Not all of these files are presently available on the CD. A list of these temporal-spatial data classes, under their "basic" data class headings, follows:

Flaked Lithic Tools

TSFLT4 This data file consists of the temporal-spatial attributes paired with the provenience file and the data file for flaked lithic tools.

TSFLP3 This data file includes some additional temporal analysis fields. It also includes some source materials data and toolkit study variables.

TSPJP3 This data file consists of temporal-spatial attributes paired with projectile points (some of these data are already included in TSFLT4).

TSMWR3 This data file consists of temporal-spatial attributes paired with data obtained during lithic microwear analysis. Please note that these data may be obsolete and should only be used after conferring with the Anasazi Heritage Center.

Nonflaked Lithics

TSNFL4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for nonflaked lithic artifacts (e.g. ground stone).

TSHFT3 This data file consists of temporal-spatial attributes paired with objects determined to be hafted tools (some of these data are already included in TSFLT4).

Debitage

TSDEB4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for lithic debitage.

Ceramics

TSCER4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for ceramics.

Botanical Resources

TSBOT4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for macrobotanical collections.

Bone and Shell

TSFAU4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for non-human bones.

TSWBS4 This data file consists of temporal-spatial attributes paired with data from worked bone and shell data file (WBONE20) and the TSFAU4 data file.

Samples

TSSAM4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for samples.

TSDAT3 This data file consists of temporal-spatial attributes paired with the information for dates (some of these data are already included in TSSAM4).

Miscellaneous

TSMIS4 This data file consists of temporal-spatial attributes paired with the provenience file and the data file for miscellaneous objects.

Provenience

TSPRV4 This data file consists of temporal-spatial attributes paired with provenience data only. There are no objects in this data class; nonetheless, the data contained herein are critical since provenience is the one variable that links all the files.

Shared Attributes of Temporal-Spatial Data Class (Tsbot4.arc, Tscer4.dbf, Tsdat3.arc, Tsdeb4.arc, Tsfau4.mdb, Tsflt4.dbf, Tshft3.arc, Tsmis4.arc, Tsmwr3.arc, Tsnfl4.dbf, Tsprv4.dbf)

CCN is the *community cluster number*. At the largest end of this spatial hierarchy, the community cluster is the "space, facilities, and architecture normally used by a community." The DAP defined three basic types of community clusters in the area: dispersed, dispersed/aggregated, and aggregated. These community types have a rough temporal correspondence, with dispersed communities (or "neighborhoods") tending to be early, aggregated communities late, and dispersed/aggregated somewhere between. Thus community clusters occupy different spaces and times. A range of 22 values is available for this attribute, which includes 21 community clusters identified for the DAP area.

CCC is *community cluster confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

CCI represents *community cluster integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable

RN is the *roomblock number*. The term roomblock "refers to aggregated groups of interhousehold clusters." Roomblocks describe discrete units of interhousehold clusters which are identifiable through architectural layout (see Figure 2.3). These consist of 2 or more nuclear family dwelling units fronted by 2 or more pitstructures. Kane notes that "Roomblock clusters may represent the locations of suprahousehold organizations, operating above the household and interhousehold levels." The values represented under this attribute vary according to the site.

RC is *roomblock confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

RI refers to *roomblock integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable.

IHN refers to the *interhousehold cluster number*. The term interhousehold cluster "refers to the space used by a multiple household" and may include one or several dwelling units and associated rooms, plaza space, pitstructure, midden, and outdoor workspace(s) (see Figure 2.3). The values for this attribute are assigned in the order that they are found within the locality.

IHC is *interhousehold cluster confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

IHI refers to *interhousehold cluster integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable.

HN is the *household cluster number*. This term "refers to the space representing the nuclear family unit" and includes the dwelling as well as the use space outside of the dwelling and being used by the family. It is important to note that the "household cluster" will tend to manifest itself in different ways at different times. For example, during the Tres Bobos, Sagehill, Grass Mesa, and Marshview Subphases, household clusters are apparently inhabited by independent nuclear families and tended to include pitstructures. During the Dos Casas, Periman, and Cline Subphases, these units tend to "consist of roomsuite dwelling units and extramural work areas representing a nuclear family cooperating in a larger group." Combined, these units are the interhousehold cluster described above which share a pitstructure (see Figure 2.3). The values represented under this attribute vary according to the site.

HC is *household cluster confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

HI refers to *household cluster integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable.

UAT is the *use area type*. The use area is "a space used by individuals and task groups for multiple activities" which consist of several or many activity areas. The use area value generally describes the function of the location being considered (e.g. the value "14" means "Intrahousehold or household, economic, maintenance), although a value's definition may include an image that is more accessible to the mind's eye (e.g. the value "60" cues "Interhousehold, multipurpose, enclosed space (protokiva or kiva). A range of 51 values is available for this attribute.

UAN is the *use area number*. The range of values for this attribute varies according to site.

UAC is *use area confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

UAI refers to the *use area integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable.

AAT refers to the *activity area type*. An activity area is any "location where an activity or series of activities was performed" involving one or more people. Examples of values for this attribute include: 09 = mealing area; 14 = social/ceremonial—complex; and 42 = tool manufacture lithic, flaked, processing. A range of 85 values is available for this attribute.

AAN refers to *activity area number*. The range of values for this attribute varies according to site.

AAC is *activity area confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

AAI refers to the *activity area integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable.

EEF keys for one of the two "basic units" of the DAP temporal system: the *element* or the *episode*. The episode is the smallest of the two basic units in the DAP; it represents the "brief transitory use of a site by an individual or small task group for a specific purpose, often economic in nature." The episode may be as short as a few hours or a few weeks. The larger of the basic units, the element, is associated with "the construction and use of major architectural facilities." Generally, the span of time represented by this unit may range from 10 to 30 years. A range of 4 values are available for this attribute.

EEN refers to *element* or *episode number*. The range of values for this attribute varies according to site.

EEC is *element or episode confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

EEI refers to the *element* or *episode integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable.

TN is *tradition*. This is the largest of the "synthetic units." These broad categories only number seven in the DAP: the Paleoindian, the Archaic, the Anasazi, the Shoshonean, the

Prehistoric Athabascan, the Protohistoric, and the Historic Anglo (see Table 2.2). There is a range of 8 values available for this attribute (the seven traditions listed above and "not applicable"). It should be noted that there was limited DAP research on the Historic use of the area, but that this has only been mentioned in this user's guide. See Bloom 1984 for an overview of the Historic studies.

TC is *tradition confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

TI refers to *tradition integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable.

PN refers to *phase*. This is the middling-sized member of the "synthetic units" and is nested within the larger synthetic unit, the tradition. One should recall that these units are partially based on archaeological content, the "cultural patterns" mentioned earlier, and so they may slightly overlap in time. The DAP phases are as follows: Great Cut, Cougar Springs, Sagehen, McPhee, and Sundial (see Table 2.2). This particular attribute, however, includes several other values that are not included in the DAP synthetic "language"; a little of the Pecos Classification terminology creeps in here as well (e.g. Basketmaker III-Early Pueblo I, Protohistoric, etc.). A range of 15 values is available for this attribute.

PC is *phase confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

PI refers to *phase integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable.

SPN refers to *subphase*. This is the smallest of the "synthetic units." The subphases are contained within the overarching phases. There are a total of 8 subphases defined for the DAP: Tres Bobos, Sagehill, Dos Casas, Periman, Grass Mesa, Cline, Marshview, and Escalante. A range of 9 values is available for this attribute.

SPC is *subphase confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

SPI refers to *subphase integrity*. A range of five values (0 through 4) exists for this attribute where 1 = lowest integrity, 4 = highest integrity, and 0 = not applicable.

MPN1 is the first of several attributes that key for *modeling period* information. In this case, the attribute is yielding information about the *period* only. The period is the larger of the two purely temporal units of measure. Periods may be as short as 40 years in length, but maybe as long as 270 years (e.g. Period 7); there are a total of 7 modeling periods (I through VII). There are a total of 8 values available for this attribute.

MPNEW also keys for modeling periods. Like MPN1, it groups the subperiods into the seven modeling periods, however, it lumps those elements which start in one period and end in another with the later modeling period.

MPC1 is *modeling period confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

MPC2 is *modeling subperiod confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

MPN keys for individual modeling *subperiods*, combinations of subperiods, or combinations of whole periods. Subperiods are the smaller of the purely temporal units of measure and are generally 20-45 years in length (see Table 2.2). There are a total of 18 subperiods defined for the DAP. A range of 80 values is available for this attribute.

ST1 is *site type 1*. This attribute basically accounts for the frequency and duration of use for a site (limited activity vs. seasonal occupation vs. habitation). Additionally, it distinguishes the kind of primary behavior hypothesized for the nonpermanent site types (e.g. economic and social behaviors). There is a total of seven values available for this attribute.

ST2 is *site type 2*. This attribute codes for subtypes. It is used in conjunction with ST1 to yield the SITTYPE attribute. This attribute should not be used when writing a query. While ST1 can stand on its own, the values for ST2, in determining SITTYPE, vary.

STC1 is the *site type confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

STC2 is the *site subtype confidence*. A range of five values (0 through 4) exists for this attribute where 1 = lowest confidence, 4 = highest confidence, and 0 = not applicable.

SITTYPE refers to the *site type*. This attribute is the result of the combination of ST1 and ST2. There is a total of 22 values available for this attribute, including Limited activity-economic-not further specified (11), seasonal-economic-fieldhouse (32), and village-large unit (72).

CERAMIC DATA CLASS (Ceram10.dbf)

STCO indicates *State/county*. The Smithsonian state and county designations were condensed into a single digit. Several values for this attribute includes geographic areas other than county designations due to the inclusion of some non-DAP data in the ceramics file. San Juan county has two values because sites equal more than 9999. There are 9 values for this attribute.

SITE *Site numbers* were assigned sequentially within each county and are expressed in four digits. If the site number is five digits or more, the state/county code value will imply that you should increase the number by 10,000. Site number 0000 was used to label ceramic data for which the site location is unknown. This applies only to a small number of isolated finds that were collected during surveys prior to 1980 and for which survey records are not complete enough to determine the location of the find. (For the majority of isolated finds, the site number and location were known and site numbers are given in the files.)

FS is the *field specimen number*. This number is used to label all artifacts and artifact data from an individual provenience. These were generally unsystematically assigned so that the number itself carries no contextual information with two exceptions. FS 1 labels materials from a site for which there is no other provenience information. Survey collections are labeled with FS numbers greater than 90,000; FS 90,001 is reserved for non-intensive or intensive collections that represent the site as a whole. Prior to 1982, FS 0 was sporadically used by the ATG to label RC data lines that describe all the sherds belonging to a single vessel. This caused problems, so the convention was discontinued.

An edit should have removed all these from the data set by September 1984.

CATNO lists the *catalog number* of the record. In the DAP, *catalog* numbers 001-003 prefixes were reserved to designate specific types of lots. Only 003 was used, and it indicated the presence of a reconstructible vessel (RC). Since RC s are recorded in other attributes and this system inherently introduced too many repeats, the practice was dropped in 1982. An edit should have removed the 003 from the data set in September of 1984.

PL is *point location number*. Point location numbers were assigned in the field to record more exact provenience data than was included in the electronic files. PL s are generally, but not necessarily, associated with structure floors or occupational surfaces. A zero recorded on the data line indicates no PL recorded for the record.

FIRING indicates the *firing atmosphere* and records characteristics that reflect the effects of heat on ceramic items. This category attempts to record effects of the original firing, but in some cases it is not possible to distinguish these from subsequent firings, such as from a structure fire. Nine values are recorded for this attribute ranging from smudging to vitrification, as an example.

TEMPER *Temper* selection by prehistoric potters can be used to infer the probable geographic origin of a vessel or sherd. The ATG recognized 32 temper classes in this analysis. These range from sand to trachybasalt. Several temper values were added throughout the duration of the DAP analysis.

MANIPUL or *surface manipulation* is used to describe the surface characteristics that result in the manipulation of the clay on the vessel exterior while the clay is still in plastic state (before it was fired). For example, the surface of a vessel can be plain, filleted, or corrugated. There are 9 values for this attribute. Prior to October of 1981, coiled surfaces were systematically coded as clapboard, therefore misidentified. However, after October 1981, this was corrected, the code for clapboard was changed and coiled surfaces were no longer coded as clapboard. Additionally, coiled was originally defined to record pinched manipulation. This definition changed in October 1981, to represent coiled manipulation and pinched manipulation was coded as other.

COMPACT is *surface compaction*. This attribute is intended to record the presence or absence of polishing as a step in vessel production. The values include not applicable or indeterminate to presence or absence of polish.

COVER *Surface cover* was designed to record the presence of slips or fugitive red coatings. These values are coded as: not applicable, indeterminate, no cover, slipped or fugitive red.

PNTTYPE *Paint type* is divided into three major classes: organic, mineral, and clay. There are nine values recorded for this attribute consisting of one of the above classes or some combination of these. Errors in paint type classification are biased against the rarer organic paint and are more likely to be associated with the analysis of survey collections prior to 1980.

COLOR indicates the *color* or colors of the paint used to paint the designs on the surface of the sherd. This is not a Munsell value, but rather a basic distinction between basic colors of pigment used. There are a total of 9 values recorded for this attribute, ranging from black or brown to a combination of colors.

CULTCAT *Culture category* and track are both expressed in this attribute. There are 15 culture categories listed. Culture categories consist of the traditional four groups: Mesa Verde, Kayenta, Chuska, and Cibola. Ceramic manufacturing tracks are subdivisions within culture categories and are intended to represent discrete geographic areas of ceramic production. These are only defined and coded within the Mesa Verde culture category.

WARE *Ceramic wares* are groups of types within a culture category that reflects manufacturing technique, or the methods of construction. The DAP has recognized 8 different wares in the data set, which range from gray to brown to white to red. This attribute is useful in traditional pottery classifications.

TYPE *Pottery type* codes include both formally defined types and grouped types. Type codes are only meaningful when interpreted within a given culture category and ware. Therefore these codes should all be examined together. There are 197 type values assigned in the DAP analysis. Prior to 1981, all white ware sherds that could not be classified as one of the formally defined white ware types were typed as Early or Late Pueblo White. After 1981, two types were added to account for and further explain the variation found in these groups. These are Painted White and Polished White. A replacement was made of Early and Late Pueblo with these new codes. If Early and Late Pueblo White still remains anywhere in the data set, it is an error in the coding change and reflects analysis completed prior to October 1981.

FORM is designed to record the variety in the *general vessel form*. There are 33 values recorded for this attribute and they range from bowl or jar to bilobe or feather box. In 1982, the general form attribute values were edited so that they would describe pre-firing form only. Due to this change certain other values were removed.

LOTWT signifies *lot weight* to the nearest 0.1 gram. Although weights are recorded to the tenths of grams, practical or significant accuracy is to the nearest gram.

LOTCNT signifies *lot count*. All sherds identified by a single catalog number are counted. Before September 1981, no conventions existed concerning counts of freshly broken sherds and old breaks that fit together. After September 1981, an effort was made to ignore matched across old breaks and use matches across new breaks to decrease sherd count.

RIMCNT *Rim count* identifies rims counted and recorded for a single catalog number. This attribute is a subset of the lot count.

MODCNT This attribute was initially designed as a count of modified sherds within a lot. In 1982, this attribute was redefined as a *modification class*, and all modified items were reanalyzed and given catalog numbers. Modification is defined as an alteration of a vessel or sherd by abrasion, drilling or chipping after the vessel had been fired. This does not account for wear on ceramics due to normal use or erosion or trampling. Most modification classes are morphological classes, but some represent a suite of attributes that are functionally related as a tool type. There are 32 values listed in the Modification class attribute ranging from ceramic scraper, to pendants to abraders.

SPHANDL indicates *special handling status*. This attribute was intended to label sherds that had been subjected to a variety of laboratory analyses or processes. However, it was sporadically used and finally abandoned. Now is reflects the photographic status of reconstructible vessels. A blank indicates that the attribute is not applicable to the data line, a 1 denotes that one or more photographs were taken, and a 2 indicates that no photograph exists.

SSTYPE *Special specimen type* is a attribute that has been standardized for all DAP data files. Only three *Special specimen types* are applicable to the ceramics file. These include bulk soil samples, reconstructible vessels, and isolated finds during site survey.

SSNO *Special specimen number* is assigned sequentially within each special specimen type within each site.

CCACNID This is the *Anasazi Heritage Center s Collection s accession ID*, essentially a management tool for the Center.

CDEPT This is the *department code*, another management tool used by the Anasazi Heritage Center s Collections. This attribute keys for such values as DAPBOT (DAP Botanics), DAPCER (DAP Ceramics), and DAPNAL (DAP Not Analyzed).

COBJECTID This is the *Center s object ID,* a unique number that the Center assigns to every object. It is derived from a string of numbers: accession number + site number + three letter code referring to department + FS + CATNO + PL. An example of such a number is 78.1.5MT2151.NFL.402.2.42. *This is a critical number for requesting objects from the Center s curator*.

CSITEID This is the standard Smithsonian Site Number. An example of such a number would be 5MT2151 where the first 5 represents Colorado (alphabetically the fifth state), MT is a two-letter county name abbreviation (in this case, Montezuma County), and the number of the site listed in the order in which it was recorded (this would be the 2151st site recorded in the county).

FLAKED LITHIC DATA CLASS (Debtg10.dbf, Flt10a.dbf, Flt10b.dbf, Micwr10.dbf)

Debitage (Debtg10.dbf)

STCO *state-county designation* for the site from which the record came.

SITE *site number* within the state and county from which the record came.

FS *specific field specimen number*; given to a record in the field.

CATNO *record catalog number*, a unique number given to a record in the laboratory.

PL *exact provenience* for a record; given in the field as deemed necessary by excavators.

ANGNO number of pieces of angular debris in the record.

ANGWT weight of all pieces of angular debris in the record to the gram.

MEDNO number of pieces with medium grain size in the record.

MEDWT weight of all pieces with medium grain size in the record to the gram.

MEDCOR number of pieces with medium grain size and cortex visible over most of a surface. For further details, see the entry on FGCOR in this document.

MEDWFN number of complete flakes with medium grain size in the record. This attribute was not identified until the 1980 analysis season.

FGNO number of pieces with fine grain size in the record.

FGWT weight of all pieces with fine grain size in the record to the gram.
FGCOR number of pieces with fine grain size and cortex visible over most of a surface. Because of flaws in raw material, cortex may at times be identified on the ventral surface of a piece. Cortex of this type is noted because it may have affected the fracture process.
FGWFN number of complete flakes with fine grain size in the record. This attribute was not identified until the 1980 analysis season.
VFGNO number of pieces with very fine grain size in the record.
VFGWT weight of all pieces with fine grain size in the record to the gram.
VFGCOR number of pieces with very fine grain size and cortex visible over most of a surface. For further details, see the entry on FGCOR in this document.
VFGWFN number of complete flakes with very fine grain size in the record. This attribute was not identified until the 1980 analysis season.
MICRONO number of pieces with microscopic grain size in the record.
MICROWT weight, to the gram, of all pieces with microscopic grain size in the record.
MICROCOR number of pieces with microscopic grain size and cortex visible over most of a surface. For further details, see the entry on FGCOR in this document.
MICROWFN number of complete flakes with very fine grain size in the record. This attribute was not identified until the 1980 analysis season.
NONLOCL number of pieces in the record that are derived from a nonlocal raw material. Note that in the 1978-1979 season only obsidian was identified as nonlocal.
SSTYPE *special specimen type*. Both SSTYPE and SSNO refer to special specimens such as bulk soils and comparative lithic, clay, or botanical specimens .
SSNO *special specimen number*. See SSTYPE for definition.
COBJECTID indicates the *object number* assigned to the particular record. This is used with the ARGUS database to keep track of the record s location at the Anasazi Heritage Center (AHC). This attribute is useful when requesting specific information on the object, and is necessary for the AHC to locate an artifact to be viewed.
CSITEID The specific *site number* from which the record was taken.
CACCNID The *accession number* that the record is a part of at the Anasazi Heritage Center. The first part of this number denotes the year in which the record was accessioned. (78.1 = accessioned in 1978)
CDEPT indicates the *tool department* that the record pertains to (NFL=nonflaked lithic, FL=flaked lithic, etc.)

Flaked Lithic Tools (Flt10a.dbf, Flt10b.dbf)

STCO *state-county designation* for the site from which the record came
SITE *site number* within the state and county from which the record came
FS *specific field specimen number*; given to a record in the field
CATNO *record catalog number*, a unique number given to a record in the laboratory
PL *exact provenience* for a record; given in the field as deemed necessary by excavators
LITHMAT *lithic material* describes the petrological classification of the raw material from which the record was produced. Values serve to identify types of rock such as shale (33),

chert (44), or jasper (45).

GRAIN *grain size* describes the size of grains within the silicious matrix of the raw material using nominal categories beginning with very coarse (01) and extending to microscopic (06). For a detailed description of several of these values, see the discussion on debitage, above.

SPEFID *specific identification* describes the probable geologic formation from which the raw material was obtained. Nonlocal materials are also identified simply by petrological class (i.e. nonlocal chalcedony [06]). It is important to note that until 1983, a complete collection of local material sources was not available and analysts used the indeterminate (00) value with greater frequency.

WEIGHT *weight* of the record, measured to the nearest gram.

MORPHO *morpho-use* attribute is a whole-item typological assignment, with values defined by emphases on shape characteristics, technological characteristics, assumed functional correlates, and traditional Southwestern artifact categories (Phagan and Hruby 1984:44). This is perhaps the most subjective of the categories used in the flaked lithic artifact analysis system, but still one of great use. There is a total of 38 values for this attribute that identify a range of tool types from used cores (04) to drills (34) to stemmed projectile points (63).

CONDTN *condition* describes the completeness of the study item in an attempt to identify tool breakage. Values for this attribute include the section of a tool present (i.e. distal [02], proximal [03], or medial [04]). Note that in tools lacking an easily identifiable distal end, the edges perpendicular to the long axis of the tool were considered the ends.

ADHSNS *adhesions* simply indicates whether a tool has cultural adhesions on any surface.

DORSAL the DORSAL and VENTRAL attributes together describe the thinness of a tool. Since a single surface cannot be thin without reference to the other, each attribute actually measures the flatness of each face of an artifact. Flatness is defined as a result of the effort put into creating a flat surface by the artifact s maker. For instance, the facially unworked with cortex (02) value indicates that no effort was placed upon manufacturing a thinner surface for that particular record. The well-shaped face (08) value indicates a face with symmetry along its margins as well as a clearly thinned face.

VENTRAL see definition for DORSAL.

EDGEDIR *edge production-directionality* describes the directionality of the blows that created the edge of a flaked lithic tool. To determine directionality, analysts relied upon groups of flake scars to determine if the edge was created using unidirectional flaking (02) or bidirectional flaking (04), for instance.

EDGEPLA *edge production-placement* is a complement to EDGEDIR. This attribute describes the proportion of a tool s edges that have been created using formal flaking techniques. Tools with selected edges (01), for instance, were chosen for the edge already extant on the tool and thus no proportion of the edge has been modified by flaking.

CORE describes the form of a core. The values for this attribute are general even arbitrary and are identified as unspecialized (01), specialized (02), or stylized (03).

SSTYPE *special specimen type*. Both SSTYPE and SSNO refer to special specimens such as bulk soils and comparative lithic, clay, or botanical specimens .

SSNO *special specimen number*. See SSTYPE for definition.

COBJECTID indicates the *object number* assigned to the particular record. This is used with the ARGUS database to keep track of the record s location at the Anasazi Heritage Center (AHC). This attribute is useful when requesting specific information on the object, and is necessary for the AHC to locate an artifact to be viewed.

CSITEID The specific *site number* from which the record was taken.

CACCNID The *accession number* that the record is a part of at the Anasazi Heritage Center. The first part of this number denotes the year in which the record was accessioned. (78.1 = accessioned in 1978)

CDEPT indicates the *tool department* that the record pertains to (NFL=nonflaked lithic, FL=flaked lithic, etc.)

<u>Microwear (Micwr10.dbf)</u>

STCO *state-county designation* for the site from which the record came

SITE *site number* within the state and county from which the record came

FS *specific field specimen number*; given to a record in the field

CATNO *record catalog number*, a unique number given to a record in the laboratory

PL *exact provenience* for a record; given in the field as deemed necessary by excavators

SPEFID *specific identification* a description of this attribute is available under the Flaked Lithic data class SPEFID attribute. This attribute does differ from the Flaked Lithic data class in that the raw material of pieces of flaked lithic debitage was also coded.

WEIGHT states the weight of the record to the nearest gram.

MORPHO *morpho-use category* is described under the Flaked Lithic data class MORPHO attribute. Note that all items of debitage were coded as not applicable (00), even if the record showed evidence of use-wear. This was done to retain integrity between the Microwear and Flaked Lithic data files.

FUNCTION *functional unit* describes the portion of a record that was studied as a single unit. This unit had to be continuous and represent one activity. These are numbered consecutively, for each section of the record that shows evidence of use.

THICK *edge strength* describes the average thickness of the edge to the nearest millimeter, taken two millimeters from the edge in several locations. The average of these measurements was then recorded as this attribute.

EDGESHAP *edge shape* describes the shape of the functional unit (see FUNCTION, above) along the edge, as opposed to on either face of the record. These are subjective categories such as concave (02) or straight (04).

EDGEROUN *edge rounding* describes whether edge rounding is not present (00), light (01), or heavy (02).

EDGEPOL *edge polish* describes whether edge polish is not present (00), matte (01), or sickle (02). Because this was a low-power analysis of wear, finer distinctions in polish could not be made.

EDGESTRI *edge striation* describes the directionality of striations along the edge of the tool. Values are either not present (00), parallel (01), perpendicular (02), or diagonal (03) to the edge under study.

ALTSCARS *alternating scars*, also known as a denticulated edge, are either present (01) or absent (02). Alternating scars are a common result of motion longitudinal to an edge.

DROUND *dorsal face rounding* describes whether rounding is not present (00), light (01), or heavy (02) on the dorsal face of the record.

DPOLISH *dorsal face polish* describes whether dorsal face polish is not present (00), matte (01), or sickle (02).

DSTRIAT *dorsal face striations* describes striations evident on the dorsal face of the record (see EDGESTRI, above, for details).

DSCSHAP *dorsal surface scar shape* describes the shape of flake scars on the dorsal face. Values include traditional flake terminations such as well-defined feather (01), hinge (03), or step (04).

DSCSIZE *dorsal face scar size* describes the size of flake scars on the dorsal face. These values are nominal, being small (01), medium (02) or large (03).

DSCDIST *dorsal face scar distribution* describes the distribution of flake scars across the dorsal face. These nominal values range from run together (01) to clumped (04).

DSCORNT *dorsal face scar orientation* describes the orientation of flake scars on the dorsal face in relation to the utilized edge. Records generally have values of perpendicular (01). Oblique (02) was used if the scars are not clearly perpendicular to the edge.

DINITNS *dorsal face initiations* describes initiations of the majority of flake scars on the dorsal face. Most records have the value point contact (01).

DSHAPE *dorsal face shape* describes the shape of the dorsal face when viewed in profile. Thus values range from flat (01) to irregular (04).

DINPUT *dorsal face input* describes, using an ordinal scale of one to four, the technological input required for the dorsal face of the record. One represents a completely unworked face while four indicates both edge and facial modification.

VROUND *ventral face rounding* describes ventral face rounding. See DROUND.

VPOLISH *ventral face polish* describes ventral face polish. See DPOLISH.

VSTRIAT *ventral face striations* describes striations evident on the ventral face of the record. See DSTRIAT.

VSCSHAP *ventral face scar shape* describes the shape of the ventral face. See DSHAPE.

VSCSIZE *ventral face scar size* describes the size of ventral scars. See DSCSIZE.

VSCDIST *ventral face scar distribution* describes ventral face scar distributions. See DSCDIST.

VSCORNT *ventral face scar orientation* describes ventral face scar orientation. See DSCORNT.

VINITNS *ventral face scar initiations* describes ventral face initiations. See DINITNS.

VSHAPE *ventral face shape* describes ventral face scar shapes. See DSCSHAP.

VINPUT *ventral face input* describes ventral face input. See DINPUT.

ACTIVITY describes the primary activity indicated by the damage recorded on the functional unit. Values include standard categories such as cut/saw (01), project/penetrate (06), and hammer (09).

MATERIAL *material worked* describes the probable material that caused the damage evident on the functional unit (see FUNCTION). Values represent a ranked scale that indicate the hardness of the material worked. Values range from soft animal (01) to hard inorganic (06).

COMMENT *information not available*

COBJECTID indicates the *object number* assigned to the particular record. This is used with the ARGUS database to keep track of the record s location at the Anasazi Heritage Center (AHC). This attribute is useful when requesting specific information on the object, and is necessary for the AHC to locate an artifact to be viewed.

CSITEID The specific *site number* from which the record was taken.

CACCNID The *accession number* that the record is a part of at the Anasazi Heritage Center. The first part of this number denotes the year in which the record was accessioned. (78.1 = accessioned in 1978)

CDEPT indicates the *tool department* that the record pertains to (NFL=nonflaked lithic, FL=flaked lithic, etc.)

NONFLAKED LITHIC DATA CLASS (Haft10.dbf, Mano10.dbf, Metat10.dbf, Nflt10.dbf)

Nonflaked lithic tools (Nflt10.dbf)

STCO indicates the *state/county* designation from which a particular record was taken. The Smithsonian state and county designations were condensed into a single digit. There are three designations for this data file: Colorado, Montezuma County (1), Colorado, Dolores County (2), and Colorado, Montrose County (7).

SITE The *site number* designation is expressed in four digits. These numbers are assigned sequentially within each county.

FS indicates the *field specimen number* assigned to all artifacts and artifact data from an individual provenience.

CATNO gives the *catalog item number* for a particular artifact.

PL describes the *point location* for a particular artifact. Point numbers were assigned in the field to label subdivisions of FS numbers. Point locations are generally, though not always, associated with structure floors or occupational zones. A zero in this column indicates no point location was recorded.

MATERIAL evaluates the *lithic material class* (the artifact s raw material category); there are 35 possible entries for this attribute. Values were divided by major igneous, sedimentary, and metamorphic classes. Values 01-09 are igneous, and all are locally available within the Dolores River gravels except for obsidian (09). Values 10-29 are sedimentary materials, including values used to further describe the various sandstones by grain size. These are: very coarse (11), coarse (12,13), medium (14,15), and fine to very fine (16,17). Shale (19) is common in the DAP area, but less often used for tools than other materials. Values 20-29 occur rarely in the DAP assemblages, and are almost always ornaments. Of these materials, only microcrystalline quartz (21) is locally available. Values 30-34 indicate locally available metamorphic materials. These are: quartzite (31), schist/gneiss

(32), fissile shale (33), and siltite (34). Additionally, River cobble NFS (99) was used for items obviously produced on cobbles, but a fresh break surface could not be examined for more specific material identification. Also see MATERA and MATERB.

WEIGHT gives *item weight* to the nearest gram for all items less than 2000g, and to the nearest 50 g for heavier items. Items analyzed in the field were not weighed.

MORPHO indicates *morpho-use*; values of this attribute are types or classes of ground stone implements. There are 60 possible values for this attribute, and were determined largely by traditional southwestern typological schemes that rely heavily on functional assumptions. They are as follow: polishing stone (03-04), abrading/grinding stone (05-07), shaped stone slab (09), anvil stone (12), palette (14), mortar (15), pestle (16), lapstone (17), hammerstone (20-23), mano NFS (31), one-hand mano (32-35), two-hand mano 940-47), metate NFS (51), trough metate (52-59), slab metate 960), basin metate (65), maul (70-71), axe (73-75), ornaments (90-96), petroglyph (97). Also, see MORPHOA and MORPHOD.

BLANKTYP indicates the *blank type* of a particular item. There is a range of 25 possible entries describing the natural form of the stone before it was selected for use, and the nature of the basic modification used to produce the tool or ornament. Material from 1978-79 excavations may not have this information because this attribute was added in 1980. Also see recode BLANKA.

CONDTN indicates the *condition* of the artifact. There are four values for this attribute: indeterminate (00), broken, unidentifiable as to tool form (01), broken, but identifiable as tool form (02), complete or nearly complete item (03).

PRODEVAL indicates the *production stage evaluation*. This attribute is a roughly ranked evaluation of the amount of energy invested in the production of an artifact. These are: indeterminate (00), natural form (01), altered or modified (02), well shaped (03), and stylized (04).

ADHESNS indicates the presence and type *of culturally significant adhesions*. These are presumably cultural materials adhering to the nonflaked lithic tool as noted at time of excavation, at the processing lab, or after. There are 5 possible values: indeterminate (00), pigment (02) this is the most common adhesion identified, resinous (03), fibrous (04), and other organic or mineral (05).

LTVERT indicates the various expressions of *light vertical force*; this is created by tapping or pecking the stone and results in a slight dimpling of the surface. There are eight values for light vertical force: indeterminate (00), no evidence present (01), present but indistinguishable as production, use, or maintenance (02), production (03), use (04), maintenance (05), production plus maintenance (07), or production, use, and maintenance (06). A value for production and use was not considered until too late, and so all items to which this applied were coded (06).

MEDVERT indicates the various expressions of *medium vertical force*; this is created by battering, and results in pitting or crushing. It differs from light vertical force only in degree or intensity. The values are the same as given for light vertical force.

HEAVERT indicates the various expressions of *heavy vertical force*; this is created by hammering or pounding the stone and results in the production of flakes and corresponding flake scars. The values are the same as given for light vertical force.

LTHORIZ indicates the various expressions of *light horizontal force*; this is created by combining horizontal force with some abrasive element, resulting in a polishing or buffing of the surface. There would be no gross or overall change in item shape or size. The values are the same as given for light vertical force.

MDHORIZ indicates the various expressions of *medium horizontal force*; this is created by the application of moderate horizontal forces, and produces surfaces that are very smooth and sometimes lightly striated. The values are the same as given for light vertical force.

HEHORIZ indicates the various expressions of *heavy horizontal force*; heavy horizontal force is often accompanied by coarse abrasives, and is indicated by obvious striations and marked changes in general item morphology. The values are the same as given for light vertical force.

SSTYPE *Special specimen type* is a standardized attribute for all DAP data files.

SSNO *Special specimen number* is assigned sequentially within each special specimen type, within each site.

GRAINSZ (Recode) There are a range of 5 possible entries describing the grain size of a particular record.

MORPHOA (Morpho-use Recode) describes the general artifact class. This recode combines several morpho-use values into a single category and was supplied to authors of site reports. It includes: indeterminate (00), miscellaneous, NFLT (01), hammerstone (02), mano, fragmentary, NFS (03), one-hand mano (04), two-hand mano (05), metate, fragmentary, NFS (06), trough metate (07), slab metate (08), basin metate (09), hafted item (10), and ornament (11).

MORPHOD (Morpho-use Recode) was designed for analysis of toolkit diversity. This recode also combines several morpho-use values into a single category. These are: not applicable (00), polishing stone (01), abrading stone (02), shaped stone slab (03), anvil stone (04), lapstone (05), hammerstone (06), one-hand mano (07), two-hand mano (08), metate (09), basin metate/grinding slab (10), maul (11), axe (12), notched item, NFS (13), and ornament (14).

MATERA (Material Recode) separates sandstone materials by grain size and isolates ornaments as a single category. These are: indeterminate (00), igneous (01), coarse sandstone (02), medium sandstone (03), fine sandstone (04), other sedimentary (05), metamorphic (06), and ornamental (07).

MATERB (Material Recode) indicates very broad petrologic categories. These are: indeterminate (00), igneous cobble (01), sandstone (02), other sedimentary (03), metamorphic cobble (04), and nonlocal (05).

BLANKA (Blank type Recode) describes the shape of the raw material form selected from the environment. There are nine values for this attribute: indeterminate (00), rounded cobble (01), core (02), flattened cobble (03), slab, fragmentary NFS (04), thick slab (05), thin slab (06), very thin slab (07), completely modified (08).

COBJECTID indicates the *object number* assigned to the particular record. This is used with the ARGUS database to keep track of the record s location at the Anasazi Heritage Center (AHC). This attribute is useful when requesting specific information on the object, and is necessary for the AHC to locate an artifact to be viewed.

CSITEID The specific *site number* from which the record was taken.

CACCNID The *accession number* that the record is a part of at the Anasazi Heritage Center. The first part of this number denotes the year in which the record was accessioned. (78.1 = accessioned in 1978).

CDEPT indicates the *tool department* that the record pertains to (NFL=nonflaked lithic, FL=flaked lithic, etc.).

Hafted tools (Haft10.dbf)

STCO indicates the *state/county* designation from which a particular record was taken. The Smithsonian state and county designations were condensed into a single digit. There are three designations for this data file: Colorado, Montezuma County (1), Colorado, Dolores County (2), and Colorado, Montrose County (7).

SITE The *site number* designation is expressed in four digits. These numbers are assigned sequentially within each county.

FS indicates the *field specimen number* assigned to all artifacts and artifact data from an individual provenience.

CATNO gives the *catalog item number* for a particular artifact.

PL describes the *point location* for a particular artifact. Point numbers were assigned in the field to label subdivisions of FS numbers. Point locations are generally, though not always, associated with structure floors or occupational zones. A zero in this column indicates no point location was recorded.

MORPHO indicates *morpho-use*; values of this attribute are types or classes of hafted tools. There are six values for this attribute. *Mauls* can have opposing notches (70), or can be completely grooved (71), *axes* can also have opposing notches (73), be fully grooved (74), or grooved or tri-notched (75). Notched or grooved haftable item, NFS (79) was used for severely broken items.

MATER evaluates the *lithic material class* (the artifact s raw material category); there are 35 possible entries for this attribute. Values were divided by major igneous, sedimentary, and metamorphic classes. Values 01-09 are igneous, and all are locally available within the Dolores River gravels except for obsidian (09). Values 10-29 are sedimentary materials, including values used to further describe the various sandstones by grain size. These are: very coarse (11), coarse (12,13), medium (14,15), and fine to very fine (16,17). Shale (19) is common in the DAP area, but less often used for tools than other materials. Values 20-29 occur rarely in the DAP assemblages, and are almost always ornaments. Of these materials, only microcrystalline quartz (21) is locally available. Values 30-34 indicate locally available metamorphic materials. These are: quartzite (31), schist/gneiss (32), fissile shale (33), and siltite (34). Additionally, River cobble NFS (99) was used for items obviously produced on cobbles, but a fresh break surface could not be examined for more specific material identification.

WEIGHT gives *item weight* to the nearest gram for all items less than 2000g, and to the nearest 50 g for heavier items. Items analyzed in the field were not weighed.

DIST measures the *distance between notches* in millimeters.
DEPTH measures *notch depth* in millimeters.
BITLEN measures *bit length* in millimeters.
BITDIS measures *haft-to-bit distance* in millimeters.
TOTLEN measures *total length* in millimeters.
BLAN indicates the *blank type* of a particular item. There is a range of 25 possible entries describing the natural form of the stone before it was selected for use, and the nature of the basic modification used to produce the tool or ornament. Material from 1978-79 excavations may not have this information because this attribute was added in 1980.
PRODBIT indicates *production: bit* or the techniques used to produce the tool s bit. A total of six values is available for this attribute.
PRODHAFT indicates *production: haft* or the type of the tool s haft. A total of six values is available for this attribute.
PRODBUT indicates *production: butt* or the techniques used to produce the tools butt. A total of six values is available for this attribute (these are the same as the PRODBIT attribute).
USEBIT indicates *use: bit* or the use-wear type apparent on the tool s bit. A total of five values is available for this attribute.
USEBUT indicates *use: butt* or the use-wear type apparent on the tool s butt. A total of five values is available for this attribute (these are the same as the USEBIT attribute).
SSTYPE *Special specimen type* is a standardized attribute for all DAP data files.
SSNUM *Special specimen number* is assigned sequentially within each special specimen type, within each site.
COBJECTID indicates the *object number* assigned to the particular record. This is used with the ARGUS database to keep track of the record s location at the Anasazi Heritage Center (AHC). This attribute is useful when requesting specific information on the object, and is necessary for the AHC to locate an artifact to be viewed.
CSITEID The specific *site number* from which the record was taken.
CACCNID The *accession number* that the record is a part of at the Anasazi Heritage Center. The first part of this number denotes the year in which the record was accessioned. (78.1 = accessioned in 1978)
CDEPT indicates the *tool department* that the record pertains to (NFL=nonflaked lithic, FL=flaked lithic, etc.)

<u>Manos (Mano10.dbf)</u>

STCO indicates the *state/county* designation from which a particular record was taken. The Smithsonian state and county designations were condensed into a single digit. There are three designations for this data file: Colorado, Montezuma County (1), Colorado, Dolores County (2), and Colorado, Montrose County (7).
SITE The *site number* designation is expressed in four digits. These numbers are assigned sequentially within each county.
MATID refers to *material ID*. However, beyond this brief definition, no other explanation for this attribute was located. Presumably it keys for something as simple as nonflaked

lithic artifact. All values for this attribute in the MANO10 file are coded as 4. It should not be mistaken for CLASS (*lithic material class*) which is described below.

FS indicates the *field specimen number* assigned to all artifacts and artifact data from an individual provenience.

CATNO gives the *catalog item number* for a particular artifact.

PL describes the *point location* for a particular artifact. Point numbers were assigned in the field to label subdivisions of FS numbers. Point locations are generally, though not always, associated with structure floors or occupational zones. A zero in this column indicates no point location was recorded.

EXASSOC means *external temporal-cultural associations*. This attribute codes for cultural affiliations (e.g., Archaic and Anasazi) as well as DAP temporal entities such as phases and subphases. However, a few of the subphase designations are not consistent with the DAP chronological terminology (e.g. 4 which codes for the Windy Wheat Subphase). This should pose little problem to the analyst as only a relatively small number of records were coded for this attribute. A total of ten values is available for this attribute.

INASSOC means *internal temporal-cultural associations*. These values refer to particular temporal units referred to as elements. As with the EXASSOC attribute, few records were coded for this attribute. A total of ten values is available for this attribute.

SPAFUNC refers to the *spatial functional assignment*. A total of 44 values is available for this attribute.

CLASS refers to the *lithic material class* of the artifact. A total of 70 values is available for this attribute.

CONDTN indicates the *condition* of the artifact. There are four possible values: indeterminate (00), broken, unidentifiable as to tool form (01), broken, but identifiable as tool form (02), complete or nearly complete item (03).

WEIGHT gives *item weight* to the nearest gram for all items less than 2000g, and to the nearest 50 g for heavier items. Items analyzed in the field were not weighed.

MORPHO refers to the *morpho-use* of mostly generic nonflaked lithic tools. The term morpho-use in the DAP language refers to a grouping of tools into a particular morphological/functional type. There is a total of 51 values available for this attribute.

MORPHOB refers to the *morpho-use b*, an attribute which, in this case, particularly focuses on manos. A total of 21 values is available for this attribute.

BLANKTYP indicates the *blank type* of a particular artifact. The blank type describes the natural form of the stone, before it was selected for use, as well as the nature of the basic modification used to produce the artifact. There is a total of ten values available for this attribute.

SHAPE describes the *shape* of the artifact, generally as it is viewed from plan view (looking down on the ground facet(s). A total of nine values is available for this attribute.

SURFACE describes the *number and type of ground surfaces* on the artifact. A total of ten values is available for this attribute.

DIMENSNS records the *maximum dimension* of the artifact. It is measured in centimeters and is only applied to complete or nearly complete artifacts only.

LENGTH1-2 describes the maximum *length* of the individual use surface(s). Length was determined, in order of importance, by 1) the long dimension (presumably of the use surface), 2) the primary striation direction, and 3) arbitrary decisions (Orth 1981). Length is measured in centimeters.

WIDTH1-2 describes the maximum *width* of the individual use surface(s). Width was determined, in order of importance, by 1) the short dimension (presumably of the use surface) and 2) being perpendicular to the length (Orth 1981). Width is measured in centimeters.

LNGCRV1-3 describes the *curvature of the use surface along the long axis* (i.e. the length described above) of the artifact. A total of ten values is available for this attribute.

SHTCRV1-3 describes the *curvature of the use surface along the short axis* (perpendicular to the long axis) of the artifact. A total of ten values is available for this attribute.

TEXTURE1-3 refers to the *texture of the use surface* (Orth 1981). A total of ten values is available for this attribute.

STRIATN1-3 describes the striations apparent on the ground surface(s) of the artifact. A total of ten values is available for this attribute.

GRIPS1-3 refers to the *finger grips* attribute. Finger grips, according to Orth (1981), include those changes in morphology or texture which improve grip. This attribute is generally found on the long margin of the artifact. A total of five values is available for this attribute.

COBJECTID indicates the *object number* assigned to the particular record. This is used with the ARGUS database to keep track of the record s location at the Anasazi Heritage Center (AHC). This attribute is useful when requesting specific information on the object, and is necessary for the AHC to locate an artifact to be viewed.

CSITEID The specific *site number* from which the record was taken.

CACCNID The *accession number* that the record is a part of at the Anasazi Heritage Center. The first part of this number denotes the year in which the record was accessioned. (78.1 = accessioned in 1978).

CDEPT indicates the *tool department* that the record pertains to (NFL=nonflaked lithic, FL=flaked lithic, etc.).

<u>Metates (Metat10.dbf)</u>

STCO indicates the *state/county* designation from which a particular record was taken. The Smithsonian state and county designations were condensed into a single digit. There are three designations for this data file: Colorado, Montezuma County (1), Colorado, Dolores County (2), and Colorado, Montrose County (7).

SITE The *site number* designation is expressed in four digits. These numbers are assigned sequentially within each county.

MATID refers to *material ID*. However, beyond this brief definition, no other explanation for this attribute was located. Presumably it keys for something as simple as nonflaked lithic artifact. All values for this attribute in the MANO10 file are coded as 4. It should not be mistaken for CLASS (*lithic material class*) which is described below.

FS indicates the *field specimen number* assigned to all artifacts and artifact data from an individual provenience.

CATNO gives the *catalog item number* for a particular artifact.

PL describes the *point location* for a particular artifact. Point numbers were assigned in the field to label subdivisions of FS numbers. Point locations are generally, though not always, associated with structure floors or occupational zones. A zero in this column indicates no point location was recorded.

EXASSOC means *external temporal-cultural associations*. This attribute codes for cultural affiliations (e.g., Archaic and Anasazi) as well as DAP temporal entities such as phases and subphases. However, like the MANO10 data file described earlier, a few of the subphase designations are not consistent with the DAP chronological terminology. This should pose little problem to the analyst as only about ten records were coded for this attribute. A total of ten values is available for this attribute.

INASSOC means *internal temporal-cultural associations*. These values refer to particular temporal units referred to as elements. As with the EXASSOC attribute, very few records were coded for this attribute. A total of ten values is available for this attribute.

SPAFUNC refers to the *spatial functional assignment*. A total of 44 values is available for this attribute.

CLASS refers to the *lithic material class* of the artifact. A total of 70 values is available for this attribute.

CONDTN indicates the *condition* of the artifact. There are four possible values: indeterminate (00), broken, unidentifiable as to tool form (01), broken, but identifiable as tool form (02), complete or nearly complete item (03).

WEIGHT gives *item weight* to the nearest gram for all items less than 2000g, and to the nearest 50 g for heavier items. Items analyzed in the field were not weighed.

MORPHO refers to the morpho-use of mostly generic nonflaked lithic tools.. The term morpho-use in the DAP language refers to a grouping of tools into a particular morphological/functional type. There is a total of 51 values available for this attribute.

MORPHOB refers to the *morpho-use b*, an attribute which, in this case, particularly focuses on metates. There is a total of 24 values available for this attribute.

BLANKTYP indicates the *blank type* of a particular artifact. The blank type describes the natural form of the stone, before it was selected for use, as well as the nature of the basic modification used to produce the artifact. There is a total of ten values available for this attribute.

SURFACE refers to the *number and relative position of ground surfaces* on the artifact. There is a total of nine values available for this attribute.

LENGTH1-2 describes the maximum *length* of the individual use surface(s). Length was determined, in order of importance, by 1) the long dimension (presumably of the use surface), 2) the primary striation direction, and 3) arbitrary decisions (Orth 1981). Length is measured in centimeters. In the case of two use surfaces on a single artifact, the length was recorded for both surfaces.

WIDTH1-2 describes the maximum *width* of the individual use surface(s). Width was determined, in order of importance, by 1) the short dimension (presumably of the use surface) and 2) being perpendicular to the length (Orth 1981). Width is measured in centimeters.

DEPTH1-2 describes the maximum *depth* of the ground surface below the lateral margins (Orth 1981). Depth is measured in millimeters. It was recorded up to two times for any given artifact.

OUTLINE1-2 describes the *outline shape of the use surface*. The is a total of eight values for this attribute. It was recorded up to two times for any given artifact.

LNGCAV1-2 refers to the *longitudinal concavity* of the artifact. There is a total of nine values for this attribute. It is important note that the use of the word regular in the definitions means deepest point of arc in middle 1/3 or arc breadth in Orth s (1981) section on Intensive Metate Analysis. It was recorded up to two times for any given artifact.

LATCAV1-2 refers to the *lateral concavity* of the artifact. There is a total of seven values for this attribute. The use of the term regular is the same as described above. It was recorded up to two times for any given artifact.

OUTLINE1-2 refers to the *outline* of the artifact. We presume that this means the shape of the object as it is viewed in plan view or looking down on the ground facet. A total of eight values is available for this attribute.

MARGIN1-2 refers to a metate s *lateral margin*. In this case, the term margin appears to mean the area to the sides of the use surface (Orth 1981). A total of six values is available for this attribute.

ENDA1-2 refers one of the two longitudinal *ends* or margins of the artifact. We presume that this attribute derives its meaning from Orth s 1981 study which states that the A margins are: 1) the wider end if both are present 2) the only end if broken 3) arbitrary. A total of eight values is available for this attribute.

ENDB1-2 refers to the longitudinal end opposing end A (Orth 1981). This attribute utilizes the same values as those described in ENDA1-2.

TEXTURE1-2 refers to the *texture of the use surface* (Orth 1981). A total of ten values is available for this attribute.

TOTSURF records the *total surface area*, in square centimeters, of the metate. This value is only available for whole or reconstructible metates.

COBJECTID indicates the *object number* assigned to the particular record. This is used with the ARGUS database to keep track of the record s location at the Anasazi Heritage Center (AHC). This attribute is useful when requesting specific information on the object, and is necessary for the AHC to locate an artifact to be viewed.

CSITEID The specific *site number* from which the record was taken.

CACCNID The *accession number* that the record is a part of at the Anasazi Heritage Center. The first part of this number denotes the year in which the record was accessioned. (78.1 = accessioned in 1978).

CDEPT indicates the *tool department* that the record pertains to (NFL=nonflaked lithic, FL=flaked lithic, etc.).

FAUNAL DATA CLASS (Fauna10.dbf, Wbone20.dbf)

Faunal (Fauna10.dbf)

STCO is the *State/County*. the designation of the state and county of the site the artifact was recovered.

SITE is the individual number assigned to the archaeological *site* at which the artifact was recovered.

FS is the *field specimen* number assigned to a particular artifact.

CATNO is the *catalog number* that was assigned by the lab technician. Culturally modified bone artifacts received the first catalog numbers within individual FS numbers. Each worked piece of bone received a separate catalog number. Catalog numbers were then assigned according to taxonomy. For example, all bone fragments placed into the category of large mammal were given the same catalog number.

PL is the designation of *point provenience* when applicable

MODIFY or *modification* is an attribute designed to separate worked and unworked bone, as well as bone with nonhuman modification (weathering, rodent or carnivore gnawing, etc.).

TAXON1 refers to the *type of animal* identified. Researchers generated a lengthy list of species. Each species received a separate code.

CERTAIN, or *certainty*, is the degree of confidence that the technicians felt the taxonomical designation was correct. This attribute was generally used when a bone appeared to "compare favorably" to a taxon, but not without some doubt.

SIDE This attribute was used to describe the side of the body that the bone came from. Some bones, however, are not different laterally. This attribute is very important for researchers developing Minimum Number of Individual (MNI) estimations.

TYPE This is the kind of bone that an artifact (element) appears to be.

ITEMNO or *item number* was used when more than one complete element of exactly the same type of animal and position occurs, they were placed into a single record. For example, if two complete skulls of a mule deer were found, they would be coded on to the same line or record. IT IS VERY IMPORTANT FOR RESEARCHERS TO NOTE THAT SINGLE ENTRIES CAN STAND FOR MANY INDIVIDUAL BONE ARTIFACTS.

COMPLETE This attribute describes the completeness of the bone.

PROXIM or *proximity* is used to record the proximity of a bone fragment of the complete element. This generally meant a descriptive word such as dorsal, ventral, distal or proximal. This is determined in relation to a plane bisecting the element parallel to the ground (Neusius and Canaday 1985).

AXIAL or *axiality* describes whether a bone fragment is from the front of back of a bone.

LATERAL or *laterality* describes where a bone fragment is from, in relation to the median plane bisecting the element.

STRUCT or *structure* is another way of describing the portion of the bone remaining. Osteological training is likely needed to use this attribute in any analysis.

BREAKS or *breakage*. This attribute is used to determine if bone were broken prehistorically, or due to site formation processes.

CUTS This attribute was used to note the presence of cut marks that resulted from butchering practices. Cut marks from tool making are not categorized by this attribute.

BURNING This records how much and what part of a bone is burned.

AGE With some specimens it was possible to infer the age of the animal at death. Most commonly, technicians were able to note that a bone was from an immature animal, but of indeterminate age.

COMMENT This attribute was for any other observations deemed important by the analyst.

HOLD The attribute was used to place a "hold" on certain specimens for further identification or study.

SSTYPE or *special specimen type*, refers to bones that were collected by special methods such as bulk soil samples.

SSNO A unique number assigned to the special specimens.

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Worked Bone (Wbone20.dbf)

COLLECT: This attribute describes the manner in which the artifact was collected.

CATNO (*Catalog number*) as above

PL as above

TAXON as above

CONDTN (*Condition*) this attribute notes the physical condition of the artifact

COMPLETE (*Completeness*) relatively self-explanatory, this is how complete the bone tool is

LENGTH A measurement of the total length of tool

FLENGTH A measurement of the length in millimeters of the tool s functional edge or projection

WIDTH A measurement of the total width of tool

FWIDTH A measurement of the width in millimeters of a tool's functional edge or projection

THERMAL This attribute describes if a tool is thermally altered by exposure to fire or intense heat

BLANKTYP *Blank type* describes what kind of bone the tool was manufactured from.

PRODEVAL *Production stage evaluation* is an indication of how much work was put into the manufacture of the tool and range from minimally shaped to well shaped.

TOOLBNE *Tool-bone correlation* was used to examine if tools were regularly made with a single kind of bone, with corresponding ends used for particular functions. For example, the use of tibias for awls seems to always use the distal portion of the bone as a handle.

ADHESNS or c*ultural adhesions*. This describes if any pigment, resin, or other substance is still present of the bone tool.

MORPHO The *morpho-use* attribute represents the most common typological designation of the bone tool. This is the researcher s best guess on what a tool was used for by the ancient inhabitants. More specifically, this is where technicians would determine if the tool was an awl, a pin, spatula, beamer, bead, pendants, or discs. Over 70 different kinds of morpho-use categories were developed during the DAP.

SECTION *Functional portion: section*. This represents the relative modification amount used to describe the morphology of the functional portion of the bone tool.

MODIFY *Functional portion: technological modification*. This attribute describes how modified the functional portion of the tool is. This may be unmodified to completely shaped.

HANDSEC *Handle portion: section*. This describes the morphology of the handle portion of the tool.

HANDMOD *Handle portion: modification* reflects how modified the handle portion of the tool is.

SPECIAL *Specialized treatment* describes if the artifact has been drilled, incised, grooved, or otherwise treated.

LTVERT *Light Vertical Force*: The force attributes are taken directly from the nonflaked lithic attribute. In bone tools, this attribute describes pitted or pecked surfaces.

MEDVERT *Medium Vertical Force* describes crushing or small-scale destruction of the bone tool surface.

HEAVERT *Heavy Vertical Force* describes the presence of actual flaking on the bone or other kinds of breakage.

LTHORIZ *Light Horizontal Force* describes the presence of light polish without striations visible with less that 10X magnification

MDHORIZ *Medium Horizontal Force* describes the presence of striations and smoothing observable with low power magnification

HEHORIZ *Heavy Horizontal Force* describes distinct striations visible to the naked eye.

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BOTANICAL DATA CLASS (Corn10.dbf, Macro10.dbf, Polln10.dbf)

Corn (Corn10.dbf)

STCO indicates *State/County*. The Smithsonian state and county designations were condensed into a single digit. Several values for this attribute include geographic areas other than county designations due t the inclusion of some non-DAP data in the Corn file. San Juan county is given two values because sites equal more than 9999. There are nine values for this attribute.

SITE gives the site number from which a particular record was taken. *Site numbers* are assigned sequentially within each county and are expressed in four digits. If the site number is five digits or more, the state/county code value will imply that you should increase the number by 10,000. Site number 0000 is used to label botanical data for which the site location is unknown. This applies only to a small number of isolated finds that were collected during surveys prior to 1980 and for which survey records are not complete enough to determine the location of the find.

FS the *field specimen number* assigned to a particular record, is used to label all artifacts and artifact data from an individual provenience. These are generally unsystematically assigned so that the number itself carries no contextual information with two exceptions. FS 1 labels materials from a site for which there is no other provenience information. Survey collections are labeled with FS numbers greater than 90,000, and FS 90,001 is reserved for non-intensive or intensive collections that represent the site as a whole.

CATNO is the catalog item number designated for a specific record.

PL describes the *point location number* assigned to a particular record. These are assigned in the field to label subdivisions of FS s. PL s are generally, but not necessarily associated with structure floors or occupational surfaces. A zero recorded on the data line indicates no PL number was assigned to the record.

PART refers to the *part* of the corn plant that is represented by the record. There is a range of four possible values for this attribute describing the ear, kernel, cupule, and cob.

CULTNUM is a number assigned to a record that defines its specific cultigen type.

COMPLETE refers to the completeness of the record (i.e. whether a complete or fragmentary record was collected).

CHARRED refers to the degree of *charredness* of the record. Three values are available for this attribute defining the record as not charred, partially charred or completely charred.

ACTUAL refers to the *actual number* of rows of kernels present on an ear of corn from a specific record.

ESTIMATE refers to the *estimated number* of rows of kernels present on an ear of corn from a particular record. This number was assigned to a record when the actual number could not be determined due to the completeness of the record.

PATTERN refers to any pattern the cupules present on a particular record may exhibit.

XSECT refers to the shape a cross section of cob from a particular record may exhibit (i.e. either flattened oval or round).

SHAPE refers to the *shape* a cob from a particular record may exhibit (i.e. ends tapered, straight, or flared butt).

LENGTH refers to the *length* of a cob from a particular record measured in millimeters.

DIAMETER refers to the *diameter* of a cob from a particular record measured in millimeters

CUPWDTH refers to the width of a cupule from a particular record measured in millimeters.

GLUMWDTH refers to the width of a glume from a particular record measured in millimeters.

KERNEL refers to the presence of *kernels* on a cob from a particular record. A value of 03 denotes that no kernels were present on the cob, 01 denotes the whole kernel is present, and 02 that only the base of the kernel is left on the cob.

EROSION refers to the amount of erosion present on the glumes from a particular record. Three possible values for this attribute define whether partial, complete, or no erosion has occurred.

WHOLDIAM refers to the *whole diameter* of a cob including its kernels from a particular record measured in millimeters.

MPN refers to the *modeling period* represented by a particular record.

SPN a range of nine possible values for this attribute denotes the *subphase* a particular recovered record belongs to.

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<u>Macrobotanical (Macro10.dbf)</u>

STCO indicates *State/County*. The Smithsonian state and county designations were condensed into a single digit. Several values for this attribute include geographic areas other than county designations due to the inclusion of some non-DAP data in the Macrobotanical file. San Juan county is given two values because sites equal more than 9999. There are nine values for this attribute.

SITE gives the site number from which a particular record was taken. *Site numbers* are assigned sequentially within each county and are expressed in four digits. If the site number is five digits or more, the state/county code value will imply that you should increase the number by 10,000. Site number 0000 is used to label botanical data for which the site location is unknown. This applies only to a small number of isolated finds that were collected during surveys prior to 1980 and for which survey records are not complete enough to determine the location of the find.

FS the *field specimen number* assigned to a particular record, is used to label all artifacts and artifact data from an individual provenience. These are generally unsystematically assigned so that the number itself carries no contextual information with two exceptions. FS 1 labels materials from a site for which there is no other provenience information. Survey collections are labeled with FS numbers greater than 90,000, and FS 90,001 is reserved for non-intensive or intensive collections that represent the site as a whole.

CATNO is the catalog item number designated for a specific record.

PL describes the *point location number* assigned to a particular record. These are assigned in the field to label subdivisions of FS s. PL s are generally, but not necessarily associated with structure floors or occupational surfaces. A zero recorded on the data line indicates no PL number was assigned to the record.

PROCESS refers to the *process* by which a record was recovered as well as to the degree in which the record was submitted to a particular process (i.e. by flotation, screening, or rehydration and whether the record represents the first, second, or third time a record was subjected to a process).

CONF refers to the confidence rating assigned to each record.

PARTS refers to the *parts* of the plant that are represented by the record. There is a range of thirty-two possible values for this attribute (i.e. fruit, seed, cone, petals, resin, whole plant, bark, etc.).

CHARRED refers to the degree of *charredness* of a particular record. A range of five values describes whether the record is not charred, completely charred, partially charred, indeterminate, or not applicable.

DAMAGE refers to the type of damage sustained by a particular record. A range of ten values describes if the record has been damaged due to erosion, predation, distortion, or a combination of these.

QUANT describes the quantity of a specific record.

COMMNT1 refers to a range of fifty possible values that provide the analyst an opportunity to add comments regarding specific record (i.e. whether the record is measurable, photogenic, contains modern contamination, whether the record has been worked or modified, etc.)

COMMNT2 like comment1, this refers to a range of fifty possible values that provide the analyst an additional opportunity to comment about a specific record.

SSTYPE *Special specimen type* is a attribute that has been standardized for all DAP data files.

Only five Special specimen types are applicable to the Macrobotanical files. These include *CF, Dendro, BS or waterscreen, worked veg,* and *coprolite*.

SSNO *Special specimen number* is assigned sequentially within each special specimen type within each site.

TAXON refers to a range of 172 values that define the particular taxonomic group to which a particular record belongs (i.e. Amaranthus, Boraginaceae, Cactaceae, etc.).

WHOLE is a recomputed value based on the plant part data used as a rough measure of how whole the specimen was.

FRAG is similar to WHOLE , but is an indicator that the specimen is only a fragment.

TAXON1 is a recomputation of TAXON, so that plant data for taxa are output alphabetically.

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<u>Pollen (Polln10.dbf)</u>

STCO indicates *State/County*. The Smithsonian state and county designations were condensed into a single digit. Several values for this attribute include geographic areas other than county designations due to the inclusion of some non-DAP data in the Pollen file. San Juan county is given two values because sites equal more than 9999. There are nine values for this attribute.

SITE gives the site number from which a particular record was taken. *Site numbers* are assigned sequentially within each county and are expressed in four digits. If the site number is five digits or more, the state/county code value will imply that you should increase the number by 10,000. Site number 0000 is used to label botanical data for which the site location is unknown. This applies only to a small number of isolated finds that were collected during surveys prior to 1980 and for which survey records are not complete enough to determine the location of the find.

FS the *field specimen number* assigned to a particular record, is used to label all artifacts and artifact data from an individual provenience. These are generally unsystematically assigned so that the number itself carries no contextual information with two exceptions.

FS 1 labels materials from a site for which there is no other provenience information. Survey collections are labeled with FS numbers greater than 90,000, and FS 90,001 is reserved for non-intensive or intensive collections that represent the site as a whole.

FAMILY Refers to the particular biological *family* a botanical sample belongs to.

GENUS Refers to the specific *genus* a botanical sample belongs to .

SPECIES Refers to the *species* of a particular botanical sample.

COUNT This value refers to the specific *pollen count* of a particular sample.

POLLNO This is the sample number, represented by a range of values, assigned to a particular *pollen sample*.

TAXON This refers to the species of a particular pollen sample.

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ORNAMENTS, RARE ROCKS, AND MISCELLANEOUS (Ornmt10.dbf, Rarerox.dbf, Misc10.dbf)

Ornaments (Ornmt10.dbf)

STCO *State/County* gives the state and county designation in which a particular artifact was found.

SITE *Site numbers* give an individual number to the archaeological site from which a particular artifact was recovered.

FS The *field specimen* number was assigned sequentially within each site to a particular artifact.

CATNO A *catalog number* was assigned to each artifact to aid in pulling artifacts at a later date for further study from the Anasazi Heritage Center.

PL The *point location* describes the point provenience for a particular artifact when applicable.

MATERIAL *Material class* describes a range of seven types of materials that ornaments were made of, such as turquoise, shell, bone, ceramic.

SPEFID *Specific identification* is a range of seventeen specific minerals that ornaments are made of, such as turquoise, jet, bone, shell, local stone;

FORM *Form* is a range of nine different forms of ornaments, such as a bead, pendant, tube or bracelet.

SHAPE is a range of thirty-one ornament shapes, such as disc, tubular, bilobed, and rectangle.

MODIFY *modification* is a range of eight different types of modifications made to ornaments, such as ground, polished, drilled, and incised.

DESIGN is a range of three possible design types no more specific information given.

BURNING indicates whether an item was burned and the degree of burning that occurred.

CONDITION indicates whether the ornament was in a partial or whole condition.

LENGTH indicates the length in millimeters of the whole ornament. Partial ornaments were not given a measurement.

WIDTH indicates the width in millimeters of the whole ornament. Partial ornaments were not given a measurement.

THICK indicates two different thickness of ornaments no further information given.

ITEMNO or *item number*.

FORM 1 two additional forms of ornaments no additional information.

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Rare Rocks (Rarerox.dbf)

STCO *State/County* gives the state and county designation in which a particular artifact was found.

SITE *Site numbers* give an individual number to the archaeological site from which a particular artifact was recovered.

FS The *field specimen* number was assigned sequentially within each site to a particular artifact.

CATNO A *catalog number* was assigned to each artifact to aid in pulling artifacts at a later date for further study from the Anasazi Heritage Center.

PL The *point location* describes the point provenience for a particular artifact when applicable.

FILENO *file number* is a range of three assignments including unknown, miscellaneous and nonflaked lithic

ID This attribute refers to the *material description* of the object. There is a total of 49 values available for this attribute, which mainly includes minerals such as coal, quartz, sulfur, and turquoise; however, it also encompasses categories such as fossil, mollusk, and organic matter.

FORM The *form* attribute actually describes two aspects of an object: how it was altered or shaped and a simple morphological descriptor. The various values of this attribute are coded with three digits. The first digit codes for the first aspect given above. This digit codes for three values: (1) culturally altered, (2) naturally altered, and (3) indeterminate. The remaining two digits yield the second aspect, and include such values as (01) ornament fragment, (05) bead, and (58) dendritic crystal.

LENGTH The *length* is defined in terms of millimeters. No descriptions of how this dimension was determined are available.

WIDTH The *width* is defined in terms of millimeters. No descriptions of how this dimension was determined are available.

THICK The *thickness* is defined in terms of millimeters. No descriptions of how this dimension was determined are available.

WEIGHT The *weight* is defined in terms of grams.

COLOR The *color* of the object. We have been unable to determine how color was coded for this data file.

STREAK This is the color of the *streak* made by the object on a surface of unglazed porcelain. Apparently, the method for expressing the value of this attribute is supposed to be the same as COLOR. However, none of these values are expressed in the data file.

HARDNESS This attribute describes the *hardness* of an object. Apparently, this attribute was described in terms of the Mohs scale described for minerals, with a total of nine values available. However, none of these values are expressed in the data file.

SSTYPE This attribute is the *special specimen type*. No values of this attribute were found and none are expressed in the data file.

SSNO This attribute is the *special specimen number*. No values of this attribute were found and none are expressed in the data file.

NEWID While no definition for this attribute could be found, it seems likely that it may be the same as the *new material description* in the miscellaneous data. Essentially, this attribute is the same as the ID given above maintaining the same numeric values for text, but extended to include other categories of material such as (1) human skeletal bone and (91)eggshell.

FORMA This attribute, *Form A,* is the first aspect of *form* described above for the FORM attribute. This single digit basically codes for items that are culturally altered, naturally altered, or indeterminate.

FORMB This attribute, *Form B*, is the second aspect of *form* described above for the FORM attribute. Up to two digits codes for morphologic descriptors.

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<u>Miscellaneous (Misc10.dbf)</u>

STCO *State/County* gives the state and county designation in which a particular artifact was recovered.

SITE *Site numbers* give an individual number to the archaeological site from which a particular artifact was recovered.

FS The *field specimen* number was assigned sequentially within each site to a particular artifact.

CATNO A *catalog number* was assigned to each artifact to aid in pulling artifacts at a later date for further study from the Anasazi Heritage Center.

PL The *point location* describes the point provenience for a particular artifact when applicable.

MATER This attribute defines the *material type* values available for the objects in this data class. There is a total of 11 values in this attribute.

ID *Identification* defines a range of 99 items, such as bone, hair, feather, eggshell and minerals

SSTYPE This attribute is the *special specimen type*. No values of this attribute were found for the miscellaneous data file; however, there are some of these values given for certain records in the data. Taken from other data classes, the values for SSTYPE in this data file may this data file may be: (9) bulk soil samples, (84) reconstructible human bone, (86) reconstructible vegetal, and (88) coprolite.

SSNO This attribute is the *special specimen number*.

NEWID This is the *new material description*. Essentially, this attribute is the same as the ID given above, but extended to include other categories of material such as (1) human skeletal bone and (91) eggshell.

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DATING, SAMPLES, AND SEDIMENTS DATA CLASS ATTRIBUTES (Date10.dbf, Sampl10.dbf, Seds10.dbf)

Dating (Date10.dbf)

STCO This gives the *state* and *county* designation in which a particular sample was taken.

SITE This value represents the *site number* from which a particular sample was taken.

FS This value represents the *field specimen* number assigned to a particular sample. FS numbers are utilized to label samples and artifacts from an individual provenience.

SAMPTYP The range of values for this attribute describe the type of the sample that was taken (i.e. archaeomagnetic, radiocarbon, dendrochronological).

SAMPNO This is the unique value ascribed to a specific sample.

EDATE The e*arly date* refers to date reflected by the interior rings of a dendrochronological sample.

EFACT or e*arly factor*, is represented by a range of values from 00-31. These values reflect factors affecting the interior, or early date, of a dendrochronological sample.

LDATE is the *late date*, or the date acquired from the exterior rings of a dendrochronological sample.

LFACT The l*ate factor* has a range of values from 0-31 that represent the factors describing the condition/position of exterior rings affecting late date of a dendrochronological sample.

OFACT or *other factor,* is presented as a range of values from 0-8 describing the possible botanical source of the sample.

CCONF The confidence attribute is a range of values from 0-2 discussing the relative confidence in the date of a particular sample. 0 represents the lowest confidence and 2 the highest.

OCONF This attribute is a range of values from 0-2 that discusses other confidence of a particular sample.

C1 *Code 1* is a category which is represented by a range of values from 0-4 that make various statements about the dendrochronological or archaeomagnetic sample of a specific record.

C2 *Code 2* is a category that discusses the estimated length of a dendrochronological sample. This attribute is represented by a range of numbers from 1-9 that helps to quantify this length in meters.

C3 *Code 3* is a category that is represented by a range of values from 1-9 that refers to the estimated diameter of a dendrochronological sample in centimeters.

C4 *Code 4* is a category represented by a range of values from 1-9 that describes the kind of

structure the timber of a specific dendrochronological sample was taken from.
C5 This attribute codes for *Column 5*. No values are recorded in this column.
C6 This attribute codes for *Column 6*. No values are recorded in this column.
C7 This attribute codes for *Column 7*. No values are recorded in this column.
C8 This attribute codes for *Column 8*. No values are recorded in this column.
C9 This attribute codes for *Column 9*. No values are recorded in this column.
C10 This attribute codes for *Column 10*. No values are recorded in this column.
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<u>Samples (Sampl10.dbf)</u>

STCO This is the *state* and *county* designation from which the sample was taken.
SITE This is the *site number* from which a particular sample was taken.
SAMTYPE *Sample Type* is a range of values from 1-99 describing the type of sample collected for that particular record (e.g. archaeomagnetic, pollen core, bulk soil etc.).
SAMPNO *Sample Number* is a specific number assigned to each sample.
FS This the *field specimen* number assigned to a particular sample that references the provenience from which a sample was collected.
ASSOC1 *Association 1* refers to a particular feature or point location with which the sample may be associated.
ASSOCNO or *Association number*, is the number of the feature or point location.
ASSOC2 is a second feature or point location association for the sample.
COBJECTID This is the *Center s object ID,* a unique number that the Center assigns to every object. It is derived from a string of numbers: accession number + site number + three letter code referring to department + FS + CATNO + PL. An example of such a number is 78.1.5MT2151.NFL.402.2.42. *This is a critical number for requesting objects from the Center s curator*.
CSITEID This is the standard Smithsonian Site Number. An example of such a number would be 5MT2151 where the first 5 represents Colorado (alphabetically the fifth state),

MT is a two-letter county name abbreviation (in this case, Montezuma County), and the number of the site listed in the order in which it was recorded (this would be the 2151st site recorded in the county).

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Sediments (Seds10.dbf)

STCO This gives the *state* and *county* designation in which a particular sample was taken.

SITE This describes the *site number* from which a particular sample was taken.

FS This represents the *field specimen number* assigned to a particular sample. FS numbers are utilized to label samples and artifacts from an individual provenience.

SSTYPE This describes the *special specimen type*. Only three values for this attribute are recorded: material source sample (4), monolith (7), and bulk soil-sediment (9). However, only the latter two appear to have been used.

RUNNUM This represents the *run number*. These numbers were assigned consecutively during lab analysis.

COLOR This is a three-digit code which keys for *Munsell color*. The first digit represents hue as follows: (1)10R page, (2) 2.5 R page, (3) 5YR page, (4) 7.5YR page, (5) 10YR page, (6) 2.5Y page, (7) 5Y page, (8) gley page, (9) other. The second digit is the value number as read from the Munsell horizontal scale. The third digit is the chroma number as read from the Munsell vertical scale.

LOSS This indicates the *percent loss on ignition* as represented with three digits. A decimal will always be assumed between the second and third digit.

PHOS This describes the *edit spot phosphate value* as represented with one digit. The phosphate values are qualitatively ranked from (1) no phosphate to (6) high phosphate.

HCL This attribute qualitatively describes the *hydrochloric acid reaction* of the sample as represented by three possible values: (1) no reaction, (2) minimal reaction, and (3) violent reaction.

PH This attribute describes the *pH* of the sample with two digits; a decimal is assumed between the two digits.

PHI5 This attribute describes *phi at 5%*. Phi or ϕ is a logarithmic scale used to describe grain size. This attribute s values are described with five digits. The first digit will show the number s sign either (+) for positive or (-) for negative. Assume a decimal between the first three and last two digits.

PHI16 This attribute describes *phi at 16%*. This attribute s values are described with five digits as the above.

PHI25 This attribute describes *phi at 25%*. This attribute s values are described with five digits as the above.

PHI50 This attribute describes *phi at 50%*. This attribute s values are described with five digits as the above.

PHI75 This attribute describes *phi at 75%* This attribute s values are described with five digits as the above.

PHI84 This attribute describes *phi at 84%*. This attribute s values are described with five digits as the above.

PHI95 This attribute describes *phi at 95%*. This attribute s values are described with five digits as the above.

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PHOTO DATA CLASS (Photo01.dbf)

ROLLNUM The number of the roll of film on which the photo is found.
EXPONUM The exposure number of the photograph as it is found on its roll.
VALUE One of three values indicating the intended use of the photograph:

Minimal use
Internal use only
Potential publication use

THEME One of six values indicating the general theme of the photograph:

Not applicable
Survey
Excavation in progress
Excavation completed
Bipod
Laboratory

STCO If the photograph pertains to a site, the state and county that the site is in.
SITE If the photograph pertains to a site, the value corresponding to the site.
SCAREA Area in the photograph that the scale is located. Blank indicates no scale.
PURSUT keys for the *purpose* or the *study unit number*. *Purpose* is only used when the value

laboratory (9) under the attribute THEME has been used to describe the negative and when the subject of the negative is an artifact or a group of artifacts. There is a total of 53 values for *purpose*. For all other values of theme, this attribute keys for the *study unit type* (see the provenience data class attribute descriptions).

FSSUNUM is the *FS number* or the *study unit number*. The value descriptions here are also dependent on the values keyed in THEME. If laboratory has been selected under this attribute, then the values represented here indicate the *FS number* of the object. All other values under THEME key for the *study unit number* (see the provenience data class attribute definitions).

MATSURT is the *material identification class* or the *surface type*. The value descriptions here are also dependent on the values keyed in THEME. If laboratory has been selected under this attribute, then the values represented here indicate the *material identification class* of the object. All other values under THEME key for the *surface type* (see the provenience data class attribute definitions).

CATSURN is the *catalog item number* or the *surface number*. The value descriptions here are also dependent on the values keyed in THEME. If laboratory has been selected under this attribute, then the values represented here indicate the *catalog item number* of the object. All other values under THEME key for the *surface number* (see the provenience data class attribute definitions).

SSFETYPE is the *special specimen type* or the *feature type*. The value descriptions here are also dependent on the values keyed in THEME. If laboratory has been selected under this attribute, then the values represented here indicate the *special specimen type* of the object. All other values under THEME key for the *feature type* (see the provenience data class attribute definitions).

SSFENUM is the *special specimen number* or the *feature number*. The value descriptions here are also dependent on the values keyed in THEME. If laboratory has been selected under this attribute, then the values represented here indicate the *special specimen number* of the object. All other values under THEME key for the *feature number* (see the provenience data class attribute definitions).

CCODE: One of ten values describing the general subject matter of the photograph:

Spatial-temporal
Field specimen
Surface
Feature
Special Specimen
Natural History
Point Location
Miscellaneous
Study Unit
Vertical Surface

OTYPE The specific subject matter of the photograph. The nature of this attribute s values change from record to record according to the value of the CCODE.

Spatial-temporal: OTYPE is one of nine values:

- Activity area
- Use area
- Household cluster
- Interhousehold cluster
- Residential cluster
- Community cluster
- Episode
- Element
- Other

Field specimen: OTYPE is a range of numbers from 000001 to 999999 from consecutive site series

Surface: OTYPE is a range of numbers from 01 to 99 from FS form format-Surface Type

Feature: OTYPE is a range of numbers from 01 to 99 from FS form format-Feature Type

Special Specimen: OTYPE is a range of numbers from 01 to 99 from FS form format-Special Specimen Type

Natural History: OTYPE is one of 14 values:

- Not applicable
- Botanical study; other
- Botanical study; plant community
- Botanical study; experimental garden
- Botanical study; corn
- Geology; soils
- Geology; bedrock
- Geology; marsh
- Geology; drainage
- Geology; landform
- Geology; material source
- Geology; other
- Faunal study
- Other

Point Location: OTYPE is a range of numbers from 01 to 99 from FS form format-Material Identification Class.

Miscellaneous: OTYPE is one of 21 values:

- Not applicable
- Headquarters
- Fill/assemblage position/type
- Map
- Off-project site
- Group
- Locality
- Aerial photograph
- Painting/drawing
- Diagram/chart/graph

Book
Laboratory work
Office work/meetings
Presentations/exhibits
Transportation
Construction
Field work
Tours
Other DAP activities
Portraits
Experimental archaeology

ONUM: The nature of this attribute s values change from record to record according to the value of the CCODE and OTYPE attributes.

Spatial-temporal: ONUM is a range of numbers from 0000 to 9999
Field specimen: ONUM is not used
Surface: ONUM is a range of numbers from 0001 to 9999 from the consecutive study unit series
Feature: ONUM is a range of numbers from 0001 to 9999 from the consecutive site series
Special Specimen: ONUM is a range of numbers from 0001 to 9999 from the consecutive site sample series
Natural History: ONUM is always 0000
Point Location: ONUM is a range of numbers from 0001 to 9999 from the consecutive surface series.
Miscellaneous: ONUM is 0000 except where the OTYPE value is one of the following:

Fill/assemblage: ONUM has the format xx/yy where xx and position/type yy range from 00 to 99 and correspond to fill position/assemblage type from the FS form format
Locality: ONUM is a range of numbers from 0000 to 9999 from the FS format
Aerial photograph: ONUM is a range of numbers from 0000 to 9999 from the FS format-see locality
Field work: ONUM is one of eight specific values:

heavy equipment
photography
excavation
surface collection
special studies/sampling
survey
mapping
bipod

Portraits: ONUM is the subject's initials
Experimental archaeology: ONUM is one of two specific values:

ceramics
archaeomag

Study Unit: ONUM is a range of numbers, 000000 to 999999, from the consecutive site study unit type series

Vertical Surface: ONUM is 0000 except where the OTYPE value corresponds to a stratigraphic profile, in which case the ONUM is a range of numbers from 0000 to 9999 from the site stratigraphy description

MAP DATA CLASS (Map10.dbf)

STCO represents the state and county location of the mapped object. The Dolores Archaeological Program took place entirely within Montezuma and Dolores counties in Colorado.

SITE represents the number given to the site where the object being mapped was located.

SSTYPE represents a special specimen type. Although there are 35 different types listed for this attributes, the overwhelming number of the maps fall into a single code (111). No further information.

MAPNUM represents an ordinal number given to identify each map according to the order in which it was created, within the excavation of particular sites.

COPY tells whether a map is an original map (o) or how many revisions it has undergone.

TAXON One of the more important attributes, taxon represents what type of map is being described. Maps have been broken down into 47 taxon each representing a different type of map or map emphasis. These range from large-scale geologic and vegetation maps to small-scale cartographic interpretations of particular objects.

AREA represents a subsection within a larger excavation area. (see Provenience)

SUTYPE represents a value for a particular study unit type that has been mapped.

SUNUM represent the sequential number of a particular study unit type being mapped.

SUFAP represents a description of a particular study unit fill type being mapped. (see Provenience)

ORIGIN tells whether the map was created in the field (1), in reports (2) or is of unknown origin (0).

STORAGE represents where a map is actually located within the records. Maps are stored in four locations as a map file (1), an archaeological form or surface description form (2), as a sit stratification description form (3) or in the archaeologist s field notes.

COL1 No data for this.

COL2 No data for this.

COL3 No data for this.

COL4 No data for this.

COL5 No data for this.

COL6 No data for this.

NUMCOPY is information for the Anasazi Heritage Center s ARGUS database to help locate a particular object. NUMCOPY represents an ordinal number given to each map similar to the MAPNUM.

CODE is more information from the AHC ARGUS system, no information available.

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Appendix III: CD-ROM Directory Structure

- Archives/
    - Arc_list.txt
    - Data_arc/
        - Oldfiles.txt
        - Ceram10.arc
        - Corn10.arc
        - Date10.arc
        - Debtg.arc
        - Fauna10.arc
        - Featlnk.arc
        - Flt10.arc
        - Haft10.arc
        - Macro10.arc
        - Map10.arc
        - Micwr10.arc
        - Misc10.arc
        - Nflt10.arc
        - Photo01.arc
        - Polln10.arc
        - Prov10.arc
        - Sampl10.arc
        - Survey1.arc
        - Ts_arc/
            - Tsbot4.arc
            - Tscer4a.arc
            - Tscer4b.arc
            - Tscer4c.arc
            - Tsdat3.arc
            - Tsdeb4.arc
            - Tsfau4.arc
            - Tsflt4.arc
            - Tshft3.arc
            - Tsmis4.arc
            - Tsmwr3.arc
            - Tsnfl4.arc
            - Tsprv4.arc
    - spsshead/
        - Spssread.txt
        - Spbot.sps
        - Spcer10.sps
        - Spcorn.sps

Spdate.sps
Spfau82.sps
Spfelnk.sps
Spfld80.sps
Spflt80.sps
Sphaft.sps
Spmap.sps
Spmicwr.sps
Spmisc.sps
Spnfl80.sps
Sppho82.sps
Sppolln.sps
Spprov.sps
Spsampl.sps
Spsurv.sps
Spec_sps/
    Specspss.txt
    Cberic3.arc
    Fsprob.arc
    Ftmni.arc
    Ftprobc.arc
    Ftprobd.arc
    Ftprobf.arc
    Ftprobn.arc
    Shannon.arc
    Spmni.arc
    Spssall.arc
Ts_heads/
    Tsreadme.txt
    Sptsbot.sps
    Sptscer.sps
    Sptsdat.sps
    Sptsfau.sps
    Sptsfld.sps
    Sptsflt.sps
    Sptshft.sps
    Sptsmis.sps
    Sptsmwr.sps
    Sptsnfl.sps
    Sptsprv.sps
    Sptssam.sps
    Sptswbs.sps

```
Data_dict/
    Botanicl/
        Corn.txt
        Macro.txt
        Polln.txt
    Ceram/
        Ceram.txt
    Fauna/
        Fauna.txt
    Featlnk/
        Featlnk.txt
    Flaklith/
        Flaktool.txt
        Micwr.txt
    Map/
        Map.txt
    Nfl/
        Haft.txt
        Nfl.txt
    Ormisc/
        Misc.txt
    Photo/
        (See Photo chapter)
    Prov/
        Prov.txt
    Sampl/
        Date.txt
        Sampl.txt
    Tempspat/
        Ts.txt
    Valuemap.txt

Dbf_dir/
LKP_read.txt
    ceram/
        CERAM10.dbf
        Cerm_lkp/
            color.dbf
            compact.bbf
            cover.dbf
            cultcat.dbf
            firing.dbf
            form.dbf
```

Because of the nature of some of our data conversions, there are index files (.NDX) that accompany some of the .DBF data files. We have not listed these files in order to save some space in this directory.

modcnt.dbf
pnttype.dbf
sphandl.dbf
sstype.dbf
stco.dbf
temper.dbf
tradtype.dbf
ware.dbf

corn/
- CORN10.dbf
- Corn_lkp/
  - charred.dbf
  - complete.dbf
  - erosion.dbf
  - kernel.dbf
  - mpnew.dbf
  - part.dbf
  - shape.dbf
  - spn.dbf
  - stco.dbf
  - xsect.dbf

date/
- DATE10.dbf
- Date_lkp/
  - c1.dbf
  - c2.dbf
  - c3.dbf
  - c4.dbf
  - cconf.dbf
  - efact.dbf
  - lfact.dbf
  - newvar.dbf
  - oconf.dbf
  - ofact.dbf
  - samptyp.dbf
  - stco.dbf

debtg/
- DEBTG10.dbf
- Dbtg_lkp/
  - stco.dbf

fauna/
- FAUNA10.dbf
- Faun_lkp/

age.dbf
axial.dbf
breaks.dbf
burning.dbf
certain.dbf
comment.dbf
complete.dbf
cuts.dbf
lateral.dbf
modify.dbf
proxim.dbf
side.dbf
sstype.dbf
stco.dbf
struct.dbf
taxon.dbf
taxon1.dbf
taxon1r.dbf
type.dbf

featlnk/

FEATLNK.dbf

Flnk_lkp/

collect.dbf
fefat.dbf
fetype.dbf
mater1.dbf
mater3.dbf
plan.dbf
profile.dbf
stco.dbf
sufap.dbf
sufat.dbf
susurf.dbf
sutype.dbf
bot_lkp/
charred.dbf
commnt1.dbf
commnt2.dbf
conf.dbf
damage.dbf
parts.dbf
process.dbf
sstype.dbf

stco.dbf
taxon.dbf
taxon1.dbf

flt/
FLT10a.dbf
FLT10b.dbf
Flt_lkp/
adhsns.dbf
condtn.dbf
core.dbf
dorsal.dbf
edgedir.dbf
edgepla.dbf
grain.dbf
lithmat.dbf
lithmata.dbf
morpho.dbf
morphoa.dbf
morphod.dbf
spefid.dbf
spefida.dbf
spefidb.dbf
spefidc.dbf
stco.dbf
ventral.dbf
haft/
HAFT10.dbf
Haft_lkp/
blan.dbf
mater.dbf
morpho.dbf
prodbit.dbf
prodbut.dbf
prodhaf.dbf
stco.dbf
usebit.dbf
usebutt.dbf
macro/
MACRO10.dbf
Macr_lkp/
charred.dbf
commnt1.dbf

commnt2.dbf
conf.dbf
damage.dbf
parts.dbf
process.dbf
sstype.dbf
stco.dbf
taxon.dbf
taxon1.dbf

map/
- MAP10.dbf
- Map_lkp/
  - col1.dbf
  - col2.dbf
  - col3.dbf
  - col4.dbf
  - copy.dbf
  - origin.dbf
  - stco.dbf
  - storage.dbf
  - taxon.dbf

misc/
- MISC10.dbf
- Misc_lkp/
  - id.dbf
  - mater.dbf
  - stco.dbf

nfl/
- NFLT10.dbf
- Nflt_lkp/
  - adhesns.dbf
  - blanka.dbf
  - blanktyp.dbf
  - conditn.dbf
  - grainsz.dbf
  - heavert.dbf
  - hehoriz.dbf
  - lthoriz.dbf
  - ltvert.dbf
  - matera.dbf
  - materb.dbf
  - material.dbf
  - mdhoriz.dbf

    - medvert.dbf
    - morpho.dbf
    - morphoa.dbf
    - morphod.dbf
    - prodeval.dbf
    - stco.dbf
- photo/
  - PHOTO01.dbf
- pjpall/
  - PJPALL.dbf
- polln/
  - POLLN10.dbf
  - Poln_lkp/
    - stco.dbf
    - taxon.dbf
- prov/
  - PROV10.dbf
  - Prov_lkp/
    - collect.dbf
    - fefat.dbf
    - fetype.dbf
    - stco.dbf
    - sufap.dbf
    - sufat.dbf
    - susurf.dbf
    - sutype.dbf
- Tempspcl/
  - TSCER4.dbf
  - TSFLT4.dbf
  - TSNFL4.dbf
  - TSPRV4.dbf
  - TS_lkp/
    - aat.dbf
    - ccn.dbf
    - eef.dbf
    - fefat.dbf
    - fetype.dbf
    - flag.dbf
    - mpn.dbf
    - mpn1.dbf
    - mpnew.dbf
    - pn.dbf
    - sittype.dbf

Four examples of Temporal-spatial files are offered here. We are aware of 15 different TS files. Files for botanical materials, worked bone, dating, debitage, projectile points, flaked lithic production, hafted tools, miscellaneous items, microwear, and samples are not included here because they require so much memory. These other files are curated at the Anasazi Heritage Center. The faunal TS file (TSFAU4) is used in the Fauna Tutorial.

spn.dbf	To use the lookups with
st1.dbf	the TS data files select the
stco.dbf	needed lookup files from
sufap.dbf	both the TS_lkp directory
sufat.dbf	and the _lkp directory that
susurf.dbf	pertains to the non-TS
sutype.dbf	permutation of the data file
tn.dbf	that the TS file is based on
tsrely.dbf	(e.g., Tscer4 links to the TS_lkp
tsrely2.dbf	files here and the Cerm_lkp files
uat.dbf	in the Ceram folder.)

Tutorial/

- Botanical Tutorial
- Ceramic Tutorial
- Fauna Tutorial
- Map Tutorial
- Photo Tutorial
- Provenience Tutorial
- Samples Tutorial

Appendix IV: Summaries of the Dolores Archaeological Program Volumes

compiled by Richard H. Wilshusen

A total of 13 volumes were published as part of the Dolores Archaeological Program reports. Each of the volumes is briefly summarized below with an annotated bibliographic entry and a listing of the main chapters in the volume. The volumes are listed in the order they were published, beginning in 1983 and ending in 1988.

Dolores Archaeological Program: Field Investigations and Analysis - 1978.
David A. Breternitz. November 1983. 274 pages. Reports on lithic materials, ceramic materials, pollen, archaeomagnetic results as appendices after site reports as appropriate. Index.

The report of the 1978 field investigations is the very first volume in the Dolores Archaeological Program series and it is both useful and flawed by being first. It has important (though preliminary) information on the general strategy for field investigations and the temporal-spatial systematics for Dolores archaeology. The research design for the project and a phase scheme for this area are detailed for the first time. Site reports for several small, anomalous sites one Archaic camp, a late Basketmaker III hamlet, and a possible Pueblo I field house are also in the volume. Early reports on the archaeomagnetic, magnetometer, and archaeoastronomy programs conclude the volume. The volume is primarily useful for early definitions of the Dolores terminology and systematics. It is limited by the fact that much of the intensive archaeological survey had not yet been completed and by a lack of previous investigations in this locale.

Chapter 1. Introduction to field investigations and analysis, by Allen E. Kane.
Chapter 2. The Dolores Archaeological Program research design, by Allen E. Kane, William D. Lipe, Ruthann Knudson, Timothy A. Kohler, Steven E. James, Patrick Hogan, and Lynne Sebastian.
Chapter 3. The Sagehen Flats archaeological locality, by Allen E. Kane.
Chapter 4. Excavations at Sheep Skull Camp (Site 5MT2202), a multiple-occupation site, by Sarah H. Schlanger.
Chapter 5. Excavation at Sagehill Hamlet (Site 5MT2198), a Basketmaker III-Pueblo I habitation site, by Nancy J. Hewitt.
Chapter 6. Excavations at Little House (Site 5MT2191), a Pueblo I-Pueblo II field house, by Nancy J. Hewitt.
Chapter 7. The Dolores Archaeological Program magnetic reconnaissance survey program: field operations, by J. Holly Hathaway.
Chapter 8. Magnetometer results, by Robert J. Huggins and John Weymouth.
Chapter 9. An archaeoastronomical reconnaissance of the Dolores Archaeological Program area, by John A. Eddy and Allen E. Kane.

Dolores Archaeological Program: Synthetic Report 1978-1981.
David A. Breternitz. June 1984. 280 pages. Appendices. Index.

The *Synthetic Report 1978-81* was an interim report of the Dolores Archaeological Program that was in some ways more an administrative, than a research, report. It has some important, though short, chapters on historic studies, probability sampling, experimental gardens, and activity area analyses.

Identifying food processing activities: use of the ethnographic resource base, by Judith L. Southward.
Information retrieval on a microlevel of inquiry: bulk soil analysis from food processing activity areas in two habitation units, by Meredith H. Matthews.
Chapter 6. Summary and conclusions, by Christine K. Robinson and Allen E. Kane.
Appendices on paleodemography, biotic remains, ceramic data, lithics, human skeletal remains, and modeling Dolores area culture change, A.D. 650-950.

Dolores Archaeological Program: Studies in Environmental Archaeology.
Compiled by Kenneth Lee Petersen, Vickie L. Clay, Meredith H. Matthews,
and Sarah W. Neusius. August 1985. 274 pages. Two appendices and index.

This is the first of two DAP volumes devoted to environmental studies. The studies range from modern vegetation studies to paleoenvironmental reconstructions for the A.D. 200-1920 period. The report provides general introductions to the DAP studies of fauna, botany, geology, and climate, and is especially useful for understanding the geological setting of the study area. Though there is important introductory and overview information here, most readers will find the later volume on *Settlement and Environment* more useful because it offers the conclusions of the DAP research on faunal and botanical resources and prehistoric climate.

Chapter 1. Introduction (to botanical resources), by Meredith H. Matthews.
Chapter 2. Vegetation reconnaissance and plants recovered during the 1978 excavations, by Robert A. Bye, Jr.
Chapter 3. Contemporary vegetation reconnaissance and forecasting the potential natural vegetation of the Dolores Project area, by Bruce F. Benz.
Chapter 4. Natural vegetation of the Dolores Project area, ca. 1920, by Kenneth Lee Petersen.
Chapter 5. The experimental gardens in retrospect, by Kenneth Lee Petersen.
Chapter 6. Botanical studies: nature and status of the data base, by Meredith H. Matthews.
Chapter 7. Introduction (to zoological resources), by Sarah W. Neusius.
Chapter 8. Past faunal distribution and abundance within the Escalante sector, by Sarah W. Neusius.
Chapter 9. Faunal resource use: perspectives from the ethnographic record, by Sarah W. Neusius.
Chapter 10. The Dolores Archaeological Program faunal data base, by Sarah W. Neusius.
Chapter 11. Introduction (to geological resources), by Vickie L. Clay.
Chapter 12. Bedrock geology, quarternary stratigraphy, and geomorphology, by Frank C. Leonhardy and Vickie L. Clay.
Chapter 13. Soils, by Frank C. Leonhardy and Vickie L. Clay.
Chapter 14. Surficial geological investigations - 1980, by Vance T. Holliday and Lucy A. Piety.
Chapter 15. Review of 1979 and 1980 geological consultant reports, by Vickie L. Clay.
Chapter 16. Introduction (to studies of the prehistoric environment of the DAP), by Kenneth L. Petersen.
Chapter 17. Packrat and porcupine midden collection at Beaver Trap Shelter (Site 5MT4654), by

Steven D. Emslie.
Chapter 18. The macrobotanical assemblage from Beaver Trap Shelter (Site 5MT4654), by Kenneth Lee Petersen.
Chapter 19. Late Holocene plant records from the Dolores River area, Montezuma county, Colorado, by Thomas R. Van Devender.
Chapter 20. Climatic reconstruction for the Dolores Project area, by Kenneth Lee Petersen.
Chapter 21. The history of the marsh in Sagehen Flats: the sedimentary record, by Vickie L. Clay.
Chapter 22. The history of the marsh in Sagehen Flats: the pollen record, by Kenneth Lee Petersen.
Chapter 23. Summary of paleoenvironmental studies, by Kenneth Lee Petersen.
Chapter 24. Summary and conclusions, by Kenneth Lee Petersen, Vickie L. Clay, Meredith H. Matthews, and Sarah W. Neusius.

Dolores Archaeological Program: Anasazi Communities at Dolores: Early Small Settlements in the Dolores River Canyon and Western Sagehen Flats Area.
Compiled by Timothy A. Kohler, William D. Lipe, and Allen E. Kane. May 1986. 913 pages. Appendices on dating and interregional exchange, temporal summary, perishable artifacts, lithic artifacts and worked bone, sediment samples, pollen, archaeomagnetic dating, human remains, magnetometer, and material culture tables at end of site report chapters as appropriate. Index.

This volume reports on the intensive excavations at six relatively small habitation sites, which primarily date to Basketmaker III or Pueblo I. The sites range in size from very small to large hamlets. Pozo Hamlet, a late Basketmaker III pithouse with four associated surface structures, is the smallest and Prince Hamlet, which has a late Pueblo I occupation consisting of two pitstructures and a roomblock with 20 rooms, is the largest. Site excavations are thoroughly described and there are standard output tables detailing the associated artifacts. There is also a report of 18 sites tested in the Grass Mesa locality.

Chapter 1. Introduction to the early small settlements in the Dolores River Canyon and Western Sagehen Flats Area, by Timothy A. Kohler.
Chapter 2. Grass Mesa archaeological locality overview, 1979, by Timothy A. Kohler.
Chapter 3. The Grass Mesa locality testing program, 1979-1980, by G. Timothy Gross. (Descriptions of sites 5MT4650 [Hanging Rock Hamlet], 5MT4789 [Cougar Springs Cave], 5MT4789 [Quasimodo Cave], 5MT2174 [Dos Cuartos House], 5MT4651 [Calmate Shelter], DTA Site [5MT5361], as well as sites 5MT2160, 2165, 2166, 2169, 2170, 2173, 2175, 2211, 2212, 2213, 2216, and 2381).
Chapter 4. Excavations at LeMoc Shelter (Site 5MT2151), a multiple-occupation Anasazi site, by Patrick Hogan.
Chapter 5. Excavations at Prince Hamlet (Site 5MT2161), a Pueblo I habitation site, by Lynne Sebastian.
Chapter 6. Excavations at Hamlet de la Olla (Site 5MT2181), a multiple-occupation Anasazi site,

by Mary C. Etzkorn.
Chapter 7. Excavations at Kin Tl iish (Site 5MT2336), a multiple-occupation site, by Karen M. Dohm and Melissa Gould.
Chapter 8. Excavations at Pozo Hamlet (Site 5MT4613), a Basketmaker III-Pueblo I habitation, by G. Charles Nelson.
Chapter 9. Excavations at Poco Tiempo Hamlet (5MT2378), a Basketmaker III habitation. Joel M. Brisbin.

Dolores Archaeological Program: Research Designs and Initial Survey Results.
Compiled by Allen E. Kane, William D. Lipe, Timothy A. Kohler, and Christine K. Robinson.
June 1986. 475 pages. Numerous appendices for survey and rock art chapters. Index.

The general research design for the DAP identified archaeological questions that could be answered by the Dolores investigations and provided a standardized excavation design for these investigations. There were five problem domains that were identified: 1) economy and adaptation, 2) paleodemography, 3) social organization, 4) extraregional relationships, and 5) cultural process. These domains demanded that the many different sites within the mitigation area be excavated with different intensities of documentation, and the volume explains the tracking system used by the DAP to allot different investigation resources to specific sites. The *Research Designs and Initial Survey Results* volume explains the details of the research design and offers preliminary survey results for portions of the research area.

Chapter 1. The mitigation design, midlevel research designs, and surveys in program context, by Allen E. Kane.
Chapter 2. The Dolores Project cultural resources mitigation design, by Ruthann Knudson, Steven E. James, Allen E. Kane, William D. Lipe, and Timothy A. Kohler.
Chapter 3. Survey Group midlevel research design, by Janet D. Orcutt.
Chapter 4. Additive Technologies Group midlevel research design, by Eric Blinman.
Chapter 5. Reductive Technologies Group midlevel research design, by Carl J. Phagan.
Chapter 6. Environmental Archaeology Group midlevel research design, by Kenneth L. Petersen, Vickie L. Clay, Meredith H. Matthews, and Sarah W. Neusius.
Chapter 7. Cultural resources survey of Dolores Project central impact areas: Borrow areas A, B, and E, Great Cut Dike and Pumping Plant, McPhee Dam site, and McPhee Dam site access road, Part II, by Douglas A. Goulding and Janet D. Orcutt.
Chapter 8. Archaeological survey of the McPhee Reservoir, by Janet D. Orcutt and Douglas A. Goulding.
Chapter 9. 1979 and 1980 probability survey of Cline Crest, Grass Mesa, Beaver Point, Trimble Point, and Hoppe Point localities, by Sarah H. Schlanger and Patrick L. Harden.
Chapter 10. 1982 probabilistic sampling survey of Windy Ruin and Yellowjacket Crest localities, by Sarah H. Schlanger.

Dolores Archaeological Program: Anasazi Communities at Dolores: Early Anasazi Sites in the Sagehen Flats Area. Compiled by Allen E. Kane and G. Timothy Gross. July 1986. 985 pages. Appendices for geologic, magnetometer, archaeomagnetic, lithic, faunal analysis, ceramic, pollen, human remains, and macrobotanical reports after each site report, as appropriate. Index.

The Sagehen Flats area of Dolores was one of the first dam construction borrow areas that had to be excavated at Dolores, and in a sense these investigations defined the excavation and recording styles that characterized the whole project. Nine sites are reported in this volume and two of the sites became site types for two of the DAP subphases: Tres Bobos (5MT4545) was a critical site for understanding the mid-to-late Basketmaker III occupation and Dos Casas (5MT2193) was a similarly important site for the early Pueblo I occupation of the area. Seven of the sites are hamlets and two are field houses. All date between A.D. 625 and A.D. 950.

Chapter 1. Dolores Archaeological Program investigations at early Anasazi sites in the Sagehen Flats area: An introduction, by Allen E. Kane, G. Timothy Gross, and Nancy J. Hewitt.
Chapter 2. The 1979 testing program, by Nancy J. Hewitt.
Chapter 3. Excavations at Tres Bobos Hamlet (Site 5MT4545), a Basketmaker III habitation, by Joel M. Brisbin and Mark Varien.
Chapter 4. Excavations at Apricot Hamlet (Site 5MT2858), a Basketmaker III/Pueblo I habitation site, by John L. Montgomery.
Chapter 5. Excavations at Aldea Sierritas (Site 5MT2854), a Basketmaker III/Pueblo I habitation, by Kristin A. Kuckelman.
Chapter 6. Excavations at Prairie Dog Hamlet (Site 5MT4614), a Basketmaker III-Pueblo I habitation site, by Richard W. Yarnell.
Chapter 7. Excavations at Casa Bodega Hamlet (Site 5MT2194), a Pueblo I habitation site, by Gary A. Brown.
Chapter 8. Excavations at Dos Casas Hamlet (Site 5MT2193), a Basketmaker III/Pueblo I habitation site, by Joel M. Brisbin, Alice M. Emerson, and Sarah H. Schlanger.
Chapter 9. Excavations at Windy Wheat (Site 5MT4644), a Pueblo I habitation, by Joel M. Brisbin.
Chapter 10. Excavations at Cascade House (Site 5MT4512), a Pueblo I field house, by Richard H. Wilshusen.
Chapter 11. Excavations at Casa Roca (Site 5MT2203), a Pueblo I/Pueblo II field house, by Joel M. Brisbin.

Dolores Archaeological Program: Anasazi Communities at Dolores: Middle Canyon Area. Compiled by Allen E. Kane and Christine K. Robinson. September 1986. Two volumes, 1154 pages. Appendices on physiographic setting, lithic artifacts, faunal remains, macrobotanical remains, human remains, pollen, and material culture tables after site reports as appropriate. Index.

The two volumes of the Middle Canyon area gather the excavation reports for four Pueblo I sites on the east side of the Dolores River. Two of the sites Rio Vista and House Creek are important villages that were tested to provide comparative material for the more extensively excavated McPhee and Grass Mesa Villages. Rio Vista is a four roomblock village that was investigated with an extensive probabilistic sample and a limited amount of judgmental sampling. House Creek was similar in size, but sampled in a very different manner. A single roomblock and pitstructure were completely excavated and a small portion of the largest roomblock saw limited testing. The final two sites reported in the volume, Periman Hamlet and Singing Shelter, are a 18-room-Pueblo I hamlet and a Pueblo I great kiva. Singing Shelter is distinguished by being the largest Pueblo I great kiva on record, with a surface area of approximately 850 sq m.

Chapter 1. An introduction to Dolores Archaeological Program investigations in the Middle Canyon area, by Christine K. Robinson.
Chapter 2. Excavations at Periman Hamlet (Site 5MT4671), Area 1, a Pueblo I habitation, by Richard H. Wilshusen.
Chapter 3. Excavations at Rio Vista Village (Site 5MT2182), a multicomponent Pueblo I village, compiled by Richard H. Wilshusen.

Section 1. Introduction to Rio Vista Village, by Richard H. Wilshusen.
Section 2. Excavations in Area 1 at Rio Vista Village, by Ross C. Fields and G. Charles Nelson.
Section 3. Excavations in Area 2 at Rio Vista Village, by Richard H. Wilshusen.
Section 4. Excavations in Area 3 at Rio Vista Village, by Richard H. Wilshusen and Mark D. Varien.
Section 5. Investigations in Areas 4 and 6 at Rio Vista Village, by Richard H. Wilshusen.
Section 6. Rio Vista Village Site synthesis, by Richard H. Wilshusen.

Chapter 4. Excavations at House Creek Village (Site 5MT2320), a Pueblo I habitation, by Christine K. Robinson and Joel M. Brisbin.
Chapter 5. Excavations at Singing Shelter (Site 5MT4683), a multicomponent site, by G. Charles Nelson and Allen E. Kane.
Chapter 6. Climate, population, and resource supply in the Middle Canyon area, by Janet D. Orcutt. Also appendices on agricultural, wild plant, and animal productivity.
Chapter 7. Ceramic data and interpretations: the Middle Canyon sites, by Eric Blinman and C. Dean Wilson.
Chapter 8. Analysis of Reductive Technology data from the Middle Canyon Area, by Thomas H. Hruby.

Dolores Archaeological Program: Final Synthetic Report.
Compiled by David A. Breternitz, Christine K. Robinson, and G. Timothy Gross.
December 1986. 900 pages. Appendices for dating results, site report abstracts, annotated bibliography, and Dolores Anasazi resource mix. Index.

If one could own only one of the Dolores volumes, the *Final Synthetic Report* would not be a bad choice for that single volume. It reviews the research design and offers key summaries by the reductive technologies (lithic tools, debris, and groundstone), additive technologies (ceramic sherds and woven vegetal items), and environmental group leaders. There is a fine summary of the prehistory of the area by Al Kane and innovative treatments of the cost of doing business in Dolores and exchange and interaction. Finally, there is a fitting point and counterpoint series of chapters by Kane and Lipe debating the merits and demerits of the two explanatory models used by researchers at Dolores. These models a least cost economic model and a social power model are now seen as flawed in many of their assumptions, but they provide interesting filters for the Dolores data. The volume is thick reading in places, and it is clear that having to write conclusions at the immediate end of the project left little time to ponder all the data generated by this immense project. The volume is a good beginning point for someone wanting to use the Dolores data.

Chapter 1. Overview of the Dolores Archaeological Program, by Christine K. Robinson, G. Timothy Gross, and David A. Breternitz.
Chapter 2. Additive Technologies Group final report, by Eric Blinman.
Chapter 3. Reductive technologies, by Carl J. Phagan.
Chapter 4. Environmental archaeology, by Kenneth Lee Petersen, Meredith H. Matthews, and Sarah W. Neusius.
Chapter 5. Prehistory of the Dolores River Valley, by Allen E. Kane.
Chapter 6. Modeling Dolores Area cultural dynamics, by William D. Lipe.
Chapter 7. Resource studies, by Kenneth Lee Petersen.
Chapter 8. Population studies, by Sarah H. Schlanger.
Chapter 9. Anasazi spreadsheets: the cost of doing agricultural business in prehistoric Dolores, by Timothy A. Kohler, Janet D. Orcutt, Eric Blinman, and Kenneth Lee Petersen.
Chapter 10. Settlement behavior modeling synthesis, by Janet D. Orcutt.
Chapter 11. Technology: lithic tools, by Carl J. Phagan.
Chapter 12. Technology: ceramic containers, by Eric Blinman.
Chapter 13. Technology: facilities, by G. Timothy Gross.
Chapter 14. Social organization and cultural process in Dolores Anasazi communities, A.D. 600-900, by Allen E. Kane.
Chapter 15. Exchange and interaction in the Dolores area, by Eric Blinman.
Chapter 16. Evaluations of the models with Dolores area data, by William D. Lipe and Allen E. Kane.

Dolores Archaeological Program: Supporting Studies: Settlement and Environment.
Compiled by Kenneth Lee Petersen and Janet D. Orcutt. March 1987. 709 pages. Index.

The first half of the volume is largely focused on paleoclimatic and vegetation reconstructions. By estimating relative changes in summer precipitation, warmth, droughts, and cold air drainage and combining this information with knowledge of other abiotic and biotic local resources, it was possible to estimate changes in prehistoric agricultural potential and productivity. The second half of the volume is a hodge-podge of special faunal, geological, and botanical studies, a massive summary of the physical anthropology studies, and various settlement pattern studies. This is an important volume in the Dolores series, but because of the variety of views in this series of studies, it is sometimes difficult to find a unifying theme to the studies.

Chapter 1. Introduction to environmental archaeology and settlement studies, by Kenneth Lee Petersen and Janet D. Orcutt.
Chapter 2. Vegetation classification for the Dolores Project area, southwestern Colorado and southwestern Utah, by Kenneth Lee Petersen.
Chapter 3. Modern surface transect of pollen samples, by Kenneth Lee Petersen and Linda J. Scott.
Chapter 4. Vegetation reconstruction, by Kenneth Lee Petersen.
Chapter 5. Summer warmth: a critical factor for the Dolores Anasazi, by Kenneth Lee Petersen.
Chapter 6. Summer precipitation: an important factor in the Dolores Project area, by Kenneth Lee Petersen.
Chapter 7. Reconstruction of droughts for the Dolores Project area using tree-ring studies, by Kenneth Lee Petersen.
Chapter 8. Prehistoric agricultural potential in the Dolores Project area, by Kenneth Lee Petersen.
Chapter 9. High resolution mapping of soils near McPhee Village and Periman Hamlet, by Vickie L. Clay and Kenneth Lee Petersen.
Chapter 10. Agricultural potential classification in the Dolores Project area, by Kenneth Lee Petersen.
Chapter 11. Sediment and chemical analyses of Soil Conservation Service designated soils, by Kenneth W. Decker and Kenneth Lee Petersen.
Chapter 12. Implications of Anasazi impact on the landscape, by Kenneth Lee Petersen, Vickie L. Clay, Meredith H. Matthews, and Sarah W. Neusius.
Chapter 13. Characteristics and archaeological implications of cold air drainage in the Dolores Project area, by Kenneth Lee Petersen and Vickie L. Clay.
Chapter 14. Tree-ring transfer functions for estimating corn production, by Kenneth Lee Petersen.
Chapter 15. Concluding remarks on prehistoric agricultural potential in the Dolores Project area, by Kenneth Lee Petersen.
Chapter 16. Analysis of the *Phaseolus* remains from the Dolores Project area, by Kenneth Lee Petersen.
Chapter 17. Cottontail procurement among Dolores Anasazi, by Patricia Robins Flint and Sarah W. Neusius.
Chapter 18. Domestic dog in the Dolores Archaeological Program faunal assemblage, by Cherie Clark, Timothy W. Canaday, and Kenneth Lee Petersen.
Chapter 19. A partial musk ox skeleton from Grass Mesa, by Vickie L. Clay, Timothy W. Canaday, and Sarah W. Neusius.
Chapter 20. The physical anthropology and mortuary practice of the Dolores Anasazi: an early Pueblo population in local and regional context, by Ann Wiener Stodder.
Chapter 21. Geological sources of unusual minerals and rocks of the Dolores Project area, by

Stephen P. Keane and Vickie L. Clay.
Chapter 22. Developing and testing a model of functional site types, by Sarah H. Schlanger and Janet D. Orcutt.
Chapter 23. Population measurement, size, and change, A.D. 600-1175, by Sarah H. Schlanger.
Chapter 24. Changes in aggregation and spacing, A.D. 600-1175, by Janet D. Orcutt.
Chapter 25. Modeling prehistoric agricultural ecology in the Dolores area, by Janet D. Orcutt.
Chapter 26. Surface collected assemblage variation for A.D. 840-920 Anasazi Tradition habitation sites, by Douglas A. Goulding.

Dolores Archaeological Program: Anasazi Communities at Dolores: McPhee Village.
Compiled by A.E. Kane and C.K. Robinson. February 1988. Two volumes, 1397 pages.
Appendices for material culture tables, human remains, faunal remains,
macrobotanical remains, lithic artifacts, pollen, bulk soil analyses,
and vegetal remains included on microfiche at back of volume. Index.

McPhee Village is hands-down the largest village in the DAP area. With at least 21 separate roomblocks and a primary occupation lasting fifty years or less (A.D. 830-880) McPhee provided a difficult archaeological target. As with other large Pueblo I villages the habitation area is more akin to a modern trailer court than to a multistory apartment complex. Because the roomblocks within the village were originally recorded as separate sites, it is difficult to keep one s focus on the village setting. However, the village must have been an impressive settlement in A.D. 850, when it may have had a population of more than 500 people. Extensive excavations were conducted at a number of pueblo roomblocks within the village, most notably McPhee Pueblo, Masa Negra Pueblo, Aldea Alfareros, and Weasel Hamlet. The chapters at the end of the volume discuss the evidence for resource depletion, economic intensification, and possible specialization. McPhee provides the most extensive look at a Pueblo I village currently available.

Chapter 1. McPhee Community Cluster introduction, by Allen E. Kane.
Chapter 2. Excavations at McPhee Pueblo (Site 5MT4475), a Pueblo I and early Pueblo II multicomponent village, by Joel M. Brisbin, Allen E. Kane, and James N. Morris.
Chapter 3. Excavations at Masa Negra Pueblo (5MT4477), a Pueblo I/Pueblo II habitation, by Kristin A. Kuckelman.
Chapter 4. Excavations at Aldea Alfareros (Site 5MT4479), a Pueblo I habitation site, by James H. Kleidon.
Chapter 5. Excavations at Weasel Pueblo (Site 5MT5106), a Pueblo I-Pueblo III multiple-occupation site, by James N. Morris.
Chapter 6. Excavations at Pueblo de las Golondrinas (Site 5MT5107), a multiple-occupation Pueblo I site, by Joel M. Brisbin.
Chapter 7. Excavations at Golondrinas Oriental (Site 5MT5108), a Pueblo I hamlet, by Kristin A. Kuckelman.
Chapter 8. Excavations at Rabbitbrush Pueblo (Site 5MT4480), a Pueblo I habitation, by Kristin A. Kuckelman and Raymond G. Harriman.

Chapter 9. Aspects of agricultural production and intensification at the McPhee Community Cluster, by Janet D. Orcutt.
Chapter 10. Geoarchaeology of McPhee Village, by Vickie L. Clay.
Chapter 11. McPhee Community Cluster macrobotanical data base: testing the concept of agricultural intensification, by Meredith H. Matthews.
Chapter 12. Pollen analysis for Sites 5MT4475, 5MT4477, 5MT4479, 5MT5106, 5MT5107, and 5MT5108, McPhee Village, by Linda J. Scott.
Chapter 13. Faunal exploitation during the McPhee phase: evidence from the McPhee Community Cluster, Sarah W. Neusius.
Chapter 14. Ceramic data and interpretations: the McPhee Community Cluster, by Eric Blinman and C. Dean Wilson.
Chapter 15. Reductive technologies at McPhee Village, by Carl J. Phagan and Thomas H. Hruby.

Dolores Archaeological Program: Anasazi Communities at Dolores: Grass Mesa Village.
Compiled by William D. Lipe, James N. Morris, and Timothy A. Kohler.
June 1988. Two volumes, 1316 pages. Appendices for material culture tables and dating samples included on microfiche at back of volume 2. Glossary of terms. Index.

Grass Mesa Village was the second large village that was extensively investigated by the DAP. It is on a high point overlooking the juncture of Beaver Creek and the Dolores River and was excavated with a combination of probability and judgmental sampling. Grass Mesa Village, though not the largest of the villages in the Dolores area, had the highest density of structures and artifacts of the four villages investigated by the DAP. This situation created difficulties in understanding the contemporaneity of surface structures and pitstructures. The long occupation and frequent rebuilding, the superposition of pitstructures, heavy disturbance by pot-hunting, the erosion of structural remains, and the heavy reliance on a testing program rather than extensive horizontal stripping all contributed to the difficulty of understanding the site. In spite of these difficulties, the site provided the best evidence of village formation with Grass Mesa beginning as a large hamlet dating to approximately A.D. 750-800, an early Pueblo I great kiva, and a multi-roomblock village dating to approximately A.D. 825-885. In addition, the abandonment of Grass Mesa Village provided a striking contrast to the rest of the project area. As Grass Mesa ended the village which had been centered around multihousehold pitstructure-roomblock plazas was reconfigured into a village of possibly one hundred small pithouses. The final occupation of the site, the Grass Mesa subphase, has in recent years been revised to be a shorter, more intense, occupation that concluded by approximately A.D. 890 or so.

Chapter 1. Introduction, by William D. Lipe and Timothy A. Kohler.
Chapter 2. Surface investigations at Grass Mesa Village, by Timothy A. Kohler.
Chapter 3. The probability sample at Grass Mesa Village, by Timothy A. Kohler.
Chapter 4. Excavations in Areas 1 and 2, by Mark D. Varien.
Chapter 5. Excavations in Area 3, by Cory Dale Breternitz and James N. Morris.
Chapter 6. Excavations in Area 4, by James N. Morris, Richard V. N. Ahlstrom, and Karen M.

Dohm.
Chapter 7. Excavations in Area 5, by Ricky R. Lightfoot, Alice M. Emerson, and Eric Blinman.
Chapter 8. Excavations in Area 6, by James N. Morris.
Chapter 9. Excavations in Area 7, by Karen M. Dohm.
Chapter 10. Excavations in Area 8, by James N. Morris.
Chapter 11. Evaluation of an agricultural intensification model, by Janet D. Orcutt.
Chapter 12. Geoarchaeology, by Vickie L. Clay.
Chapter 13. Ceramic data and interpretations, by Eric Blinman and C. Dean Wilson.
Chapter 14. Lithic assemblage variability, Carl J. Phagan.
Chapter 15. Faunal remains: implications for Dolores Anasazi adaptations, by Sarah W. Neusius.
Chapter 16. The macrobotanical data base: applications in testing two models of socioeconomic change, by Meredith H. Matthews.
Chapter 17. Pollen analysis, by Linda J. Scott.
Chapter 18. Synthesis, by William D. Lipe, Mark D. Varien, James N. Morris, Ricky R. Lightfoot, and Timothy A. Kohler.

Dolores Archaeological Program: Supporting Studies: Additive and Reductive Technologies.
Compiled by Eric Blinman, Carl J. Phagan, and Richard H. Wilshusen.
August 1988. 716 pages. Archaeomagnetic paleoplots on microfiche at back of volume. Index.

This volume synthesizes the material culture studies basically the pots, rocks, structures, and dating evidence of the Dolores Program. The lithic studies focus on projectile points, changes in subsistence tools, microwear analyses of flaked stone artifacts, and changes in stone and bone tool kits. The ceramic studies include sourcing studies of local clays, definitions of non-Mesa Verde type ceramics, local ceramic production and exchange prior to A.D. 800, production and exchange of smudged and glaze painted pottery, vessel form and function, and the use of fugitive red pigment. The chapters on chronometric analyses examine ceramic calibration and archaeomagnetic dating. The final chapters summarize studies of architectural change, household social organization as witnessed in architecture, structural abandonment, protokivas, and a reexamination of the notion of the pithouse to protokiva transition.

Chapter 1. Material culture, dating, and architecture, by Eric Blinman, Carl J. Phagan, and Richard H. Wilshusen.
Chapter 2. Projectile point analysis, part I: production of statistical type and subtypes, by Carl J. Phagan.
Chapter 3. Projectile point analysis, part I: comparison of statistical and intuitive typologies, by Carl J. Phagan.
Chapter 4. Nonflaked lithic tool use: food preparation, by Carl J. Phagan.
Chapter 5. Functional analysis of selected flaked lithic assemblages from the Dolores River Valley: a low-power microwear approach, by Phillip D. Neusius.
Chapter 6. Dolores Anasazi household and interhousehold cluster toolkits: technological organization in the transition from hamlets to villages, by Thomas H. Hruby.

Chapter 7. Identification of non-Mesa Verde ceramics in Dolores Archaeological Program collections, by C. Dean Wilson and Eric Blinman.
Chapter 8. Clay resources and resource use, by C. Dean Wilson, Vickie L. Clay, and Eric Blinman.
Chapter 9. Overview of A.D. 600-800 ceramic production and exchange in Dolores Project area, by Eric Blinman and C. Dean Wilson.
Chapter 10. An evaluation of individual migration as an explanation for the presence of smudged ceramics in Dolores Project area, by C. Dean Wilson.
Chapter 11. Glaze painted ceramics in Dolores Archaeological Program collections, by Robert M.R. Waterworth.
Chapter 12. Ceramic vessels and vessel assemblages in Dolores Archaeological Program collections, by Eric Blinman.
Chapter 13. Occurrence of fugitive red in ceramic collections, by Mary P. Errickson.
Chapter 14. Sources of confounding variability in archaeological collections, by Timothy A. Kohler, Carl J. Phagan, and Eric Blinman.
Chapter 15. Justification and procedures for ceramic dating, Eric Blinman.
Chapter 16. Archaeomagnetic dating results, by J. Holly Hathaway.
Chapter 17. An introduction to architectural supporting studies, by Richard H. Wilshusen.
Chapter 18. Architectural trends in prehistoric Anasazi site during A.D. 600 to 1200, by Richard H. Wilshusen.
Chapter 19. Household archaeology and social systematics, by Richard H. Wilshusen.
Chapter 20. Sipapus, ceremonial vaults, and foot drums (or, a resounding argument for protokivas), by Richard H. Wilshusen.
Chapter 21. Abandonment of structures, Richard H. Wilshusen.
Chapter 22. The pitstructure to pueblo transition: an alternative to McGuire and Schiffer s explanation, Richard H. Wilshusen.

Dolores Archaeological Program: Aceramic and Late Occupations at Dolores.
Compiled by G. Timothy Gross and Allen E. Kane. October 1988. 411 pages.
Appendices for material culture tables or reports on geology, magnetometer, botanical remains, lithic analysis, ceramic analysis, faunal remains, human remains, and pollen after site reports as appropriate. Index.

This volume is the last published in the DAP series, and it is something of a stew of all the reports that remained to be published. It brings together ten small site reports ranging from the limited number of small late Pueblo habitations and Archaic sites to two protohistoric burial sites. The final chapters are short, but important, examinations of the patterning of the late Pueblo pottery in the project area.

Chapter 1. Other archaeology of the Dolores River Valley: an introduction to aceramic and late sites, by G. Timothy Gross.
Chapter 2. Excavations at Marshview Hamlet (Site 5MT2235), a Pueblo III habitation site, by

Richard H. Wilshusen.

Chapter 3. Excavations at Pinyon House (Site 5MT4751), a Pueblo II habitation or seasonal house, by Kristin A. Kuckelman.

Chapter 4. Excavations at Paintbrush House (Site 5MT2729), a Pueblo II seasonal site, by James H. Kleidon.

Chapter 5. Excavations at Sundance Hamlet (Site 5MT2215), a late Pueblo II-early Pueblo III habitation site, by Raymond G. Harriman.

Chapter 6. Investigations at Site 5MT2731, an aceramic site, with emphasis on Casa de Nada, an Archaic and Anasazi multiple-occupation area, by Allen E. Kane, James H. Kleidon, and Mark A. Stiger.

Chapter 7. Excavations at Ridge Line Camp (Site 5MT2242), an Archaic-Anasazi limited activity site, by Judith A. Southward.

Chapter 8. Excavations at Cougar Springs Cave (Site 5MT4797), a Basketmaker II seasonal site, by G. Timothy Gross.

Chapter 9. Excavations at Faraway House (Site 5MT4763), a Pueblo I/Pueblo II limited activity site, by James H. Kleidon.

Chapter 10. Excavations at Star Bead Shelter (Site 5MT5380), a protohistoric burial site, by Mark J. Hovezak.

Chapter 11. Excavations at Los Atavios (Site 5MT5399), a protohistoric/historic burial, by Mark L. Chenault.

Chapter 12. Pueblo II and Pueblo III ceramic patterns within the Dolores Project area, by C. Dean Wilson and Eric Blinman.

Chapter 13. Ceramic evidence of post-Anasazi occupation in the Dolores Project area, by Mary P. Errickson and C. Dean Wilson.

Appendix V: Summaries of Temporal-Spatial Assignments and Excavation Totals for Dolores Archaeological Program Sites

Compiled by Christine G. Ward

SITE NUMBER	SITE NAME	TRADITION	PHASE	SUBPHASE	PERIOD (A.D.)	SITE TYPE/SUBTYPE	NO. OF FS's	% OF FS's TROWEL/ SCREEN
5MT23	Grass Mesa	Anasazi	Sagehen	Sagehill	600-840	Habitation/small hamlet	71	91.5
				Dos Casas	720-840	Habitation/small hamlet, village	167	93.4
				Unknown	720-840	Habitation/unknown	0	0
			Late Sagehen/ Early McPhee	Unknown	720-980	Habitation/unknown	22	95.5
			McPhee	Periman	820-900	Habitation/small hamlet, village	1164	90
				Grass Mesa	880-920	Habitation/village	759	91.3
				Unknown	720-920	Habitation/unknown	10	70
						SITE TOTAL	**2193**	**90.5**
5MT2151	LeMoc Shelter	Anasazi	Sagehen	Sagehill	720-760	Habitation/small hamlet	9	100
				Dos Casas	800-840	Habitation/small hamlet	121	79.3
			McPhee	Periman	840-880	Habitation/small hamlet	73	89
				Grass Mesa	880-900	Seasonal locus/field house	76	46.1
					940-980	Limited activity/unknown	67	82.1
			Sundial	Marshview	980-1025	Limited activity/unknown	109	65.1
						SITE TOTAL	**455**	**72.7**

5MT2160		Anasazi	McPhee	unknown	720-840	Seasonal locus/field house	14	0
5MT2161	Prince Hamlet	Anasazi	Sagehen	Dos Casas	780-840	Habitation/small hamlet	14	100
			McPhee	Periman	840-900	Habitation/large hamlet	415	56.6
			Sundial	unknown	980-1175	Limited activity/unknown	0	0
						SITE TOTAL	**429**	**58.4**
5MT2162	Lone Pine Hamlet	Anasazi	Sagehen	Tres Bobos	700-720	Habitation/small hamlet	7	71.4
				Sagehill	720-760	Habitation/small hamlet	2	0
			Sundial	Marshview	1025-1175	Seasonal locus/field house	2	0
						SITE TOTAL	**11**	**45.5**
5MT2165		Anasazi	Sagehen	Dos Casas	800-840	Habitation/small hamlet	2	0
5MT2166		Anasazi	Sagehen	Sagehill	660-700	Habitation/small hamlet	27	0
5MT2169		Anasazi	McPhee	Periman	720-800	Habitation/small hamlet	53	0
5MT2170		Anasazi	Sagehen	Tres Bobos	720-800	Habitation/small hamlet	22	0
5MT2173		Archaic	Great Cut	n.a.	pre-600	Limited activity/unknown	2	0
5MT2174	Los Cuartos House	Anasazi	Sagehen	Dos Casas	820-840	Seasonal locus/field house	7	42
5MT2175		Anasazi	Sagehen	unknown	600-1250	Limited activity/unknown	2	0
5MT2180		Anasazi	Unknown	unknown	600-1250	Limited activity/unknown	9	0

5MT2181	Hamlet de la Olla	Anasazi	Sagehen	Dos Casas	780-800	Habitation/small hamlet	43	32.6
		Anasazi	McPhee	Periman	840-920	Seasonal locus/field house	53	15.1
		Anasazi	McPhee	unknown	840-980	Limited activity/mortuary	1	100
						SITE TOTAL	**97**	**23.7**
5MT2182	Rio Vista Village	Anasazi	Sagehen	Sagehill	720-840	Habitation/small hamlet	1	100
				Dos Casas	780-860	Habitation/small, large hamlet	191	54.5
			McPhee	Periman	840-900	Habitation/village	674	77.4
				Grass Mesa	860-900	Habitation/large, small hamlet	48	85.4
						SITE TOTAL	**914**	**77**
5MT2191	Little House	Anasazi	McPhee	Periman	840-880	Seasonal locus/field house Limited activity/camp	167	31.1
5MT2192	Pheasant View Hamlet	Anasazi	Sagehen	Dos Casas	780-800	Habitation/small hamlet	320	36.2
			McPhee	unknown	800-880	Limited activity/mortuary	2	100
						SITE TOTAL	**322**	**36.6**
5MT2193	Dos Casas Hamlet	Anasazi	Sagehen	Dos Casas	760-800	Habitation/small hamlet	553	46.3
5MT2194	Casa Bodega	Anasazi	Sagehen	Sagehill	720-840	Habitation/small hamlet	308	19.5
				Dos Casas	820-860	Seasonal locus/unknown	56	48.2
						SITE TOTAL	**364**	**23.9**
5MT2198	Sagehill Hamlet	Anasazi	Sagehen	Sagehill	700-760	Habitation/small hamlet	231	21.6
5MT2199	Horse Bone Camp	Archaic	Great Cut	n.a.	pre-600	Limited activity/camp	2	100

		Anasazi	Sagehen	unknown	800-840	Limited activity/unknown	174	24.7
						SITE TOTAL	**176**	**25.6**
5MT2202	Sheep Skull Camp	Archaic	Great Cut	n.a.	pre-600	Limited activity/storage	407	13.8
		Anasazi	McPhee	unknown	920-980	Limited activity/unknown	46	0
						SITE TOTAL	**453**	**12.4**
5MT2203	Casa Roca	Anasazi	McPhee	Cline	920-940	Seasonal locus/field house	121	49.6
5MT2205	Moonlight House	Anasazi	McPhee	Periman	880-900	Seasonal locus/field house	62	22.6
5MT2211		Anasazi	Sagehen	Dos Casas	800-840	Habitation/small hamlet	3	0
5MT2212		Anasazi	Sagehen	unknown	600-800	Limited activity/unknown	1	0
			Sundial	unknown	920-1250	Limited activity/unknown	0	0
						SITE TOTAL	**1**	**0**
5MT2213		Anasazi	Sagehen	Sagehill	720-800	Seasonal locus/unknown	11	0
5MT2215	Sundance Pueblo	Anasazi	Sagehen	unknown	600-1250	Unknown/unknown	150	38
			Sundial	Escalante	1025-1100	Seasonal locus/unknown	189	43.9
						SITE TOTAL	**339**	**41.3**
5MT2216		Anasazi	Sagehen	unknown	600-920	Habitation/small hamlet	0	0
			Sundial	unknown	920-1250	Seasonal locus/unknown	0	0
						SITE TOTAL	**0**	**0**
5MT2226	Dovetail Hamlet	Anasazi	Sagehen	Dos Casas	820-860	Habitation/small hamlet	149	49.7
			McPhee	Periman	880-920	Limited activity/unknown	0	0
						SITE TOTAL	**149**	**49.7**

5MT2235	Marshview Hamlet	Archaic	Great Cut	n.a.	pre-600	Limited activity/camp	3	33.3
		Anasazi	Sundial	Marshview	1100-1175	Seasonal locus/unknown		
						Limited activity/mortuary, camp	247	10.9
						SITE TOTAL	**250**	**11.2**
5MT2236	Horsefly Hamlet	Anasazi	Sagehen	Dos Casas	760-800	Habitation/small hamlet	104	5.8
			Sundial	Marshview	980-1175	Limited activity/unknown	0	0
		Unknown	Unknown	unknown	Unknown	Limited activity/unknown	48	6.3
						SITE TOTAL	**152**	**0.1**
5MT2241	Southview House	Anasazi	Sagehen	Dos Casas	800-840	Limited activity/unknown	497	7.2
			Sundial	Marshview	1100-1175	Seasonal locus/field house	146	56.8
						SITE TOTAL	**643**	**18.5**
5MT2242	Ridgeline Camp	Archaic	Great Cut	n.a.	pre-600	Limited activity/camp	180	17.2
		Anasazi	Sagehen	Dos Casas	780-800	Limited activity/unknown	143	14
			McPhee	Cline	920-1250	Limited activity/unknown	0	0
						SITE TOTAL	**323**	**15.8**
5MT2320	House Creek Village	Anasazi	Sagehen	Dos Casas	800-860	Habitation/small, large hamlet	9	88.9
			McPhee	Periman	800-920	Habitation/village	518	52.3
						SITE TOTAL	**527**	**52.9**
5MT2322	Squawbush Hamlet	Anasazi	McPhee	Periman	820-860	Habitation/village	22	36.4
5MT2335		Anasazi	Unknown	unknown	600-1250	Limited activity/unknown	9	0
5MT2336	Kin Tl'iish	Anasazi	Sagehen	Dos Casas	780-840	Habitation/small hamlet	62	100

			McPhee	Periman	820-880	Habitation/small hamlet	136	86.8
				Cline	920-980	Habitation/large hamlet	22	86.4
			Sundial	Marshview	940-1025	Limited activity/mortuary	2	100
						SITE TOTAL	**222**	**90.5**
5MT2378	Poco Tiempo Hamlet	Anasazi	Sagehen	Tres Bobos	660-760	Habitation/small hamlet	127	89.8
			Unknown	unknown	720-1250	Limited activity/mortuary	0	0
						SITE TOTAL	**127**	**89.8**
5MT2381		Anasazi	Sagehen	Sagehill	720-800	Habitation/small hamlet	3	0
5MT2729	Paintbrush House	Anasazi	Sundial	Marshview	1025-1175	Seasonal locus/unknown	130	46.9
5MT2731	Casa de Nada	Anasazi	Unknown	unknown	840-980	Limited activity/unknown	2	100
		Unknown	Unknown	unknown	pre-600 or post-1250	Limited activity/unknown Seasonal locus/unknown	225	100
						SITE TOTAL	**227**	**100**
5MT2844	Charred House	Anasazi	Sagehen	Sagehill	720-800	Limited activity/storage	26	11.5
5MT2848	Rusty Ridge Hamlet	Anasazi	Sagehen	Tres Bobos	660-720	Habitation/small hamlet	24	83.3
				Dos Casas	780-820	Habitation/small hamlet Limited activity/mortuary	81	4.9
						SITE TOTAL	**105**	**22.9**
5MT2853	Deer Hunter	Anasazi	Sagehen	Sagehill	720-760	Habitation/small hamlet	2	50

	Hamlet							
			Sagehen	Dos Casas	780-800	Habitation/small hamlet	38	10.5
			Unknown	unknown	800-840	Limited activity/mortuary	1	100
						SITE TOTAL	**41**	**14.6**
5MT2854	Aldea Sierritas	Anasazi	Sagehen	Sagehill	720-760 & 780-800	Habitation/small hamlet	567	57.1
			Sagehen	Dos Casas	800-820	Limited activity/unknown	1	100
						SITE TOTAL	**568**	**57.2**
5MT2857	Cansado Camp	Anasazi	Sagehen	Dos Casas	800-820	Habitation/large hamlet	16	0
5MT2858	Apricot Hamlet	Anasazi	Sagehen	Tres Bobos	660-700	Habitation/small hamlet	328	32.6
				Sagehill	700-720	Seasonal locus/unknown	23	100
			McPhee	Periman	800-880	Limited activity/unknown	0	0
						SITE TOTAL	**351**	**37**
	McPhee Village							
5MT4475	McPhee Pueblo	Anasazi	Sagehen	Dos Casas	820-860	Habitation/large hamlet	0	0
			McPhee	Periman	860-920	Habitation/village	746	92.6
				Cline	920-980	Habitation/village	539	82.2
						SITE TOTAL	**1285**	**88.2**
5MT4477	Masa Negra Pueblo	Anasazi	McPhee	Periman	860-920	Habitation/village	560	77.9
				Cline	920-980	Habitation/large hamlet	68	70.6
						SITE TOTAL	**628**	**77.1**
5MT4479	Aldea Alfareros	Anasazi	McPhee	Periman	860-900	Habitation/village	605	61.5

5MT4480	Paintbrush Pueblo	Anasazi	McPhee	Periman	860-920	Habitation/village	138	72.5
			Sundial	Marshview	920-1250	Seasonal locus/unknown	0	0
						SITE TOTAL	**138**	**72.5**
5MT4654	Beaver Trap Shelter	Archaic	Great Cut	n.a.	pre-600	Limited activity/unknown	6	83.3
		Anasazi	Sagehen	unknown	720-920	Limited activity/unknown	1	100
			McPhee	Periman	860-900	Habitation/village	1	100
				Cline	900-980	Habitation/village	15	80
			Sundial	unknown	1025-1175	Limited activity/camp	1	0
		Protohist.	Beaver Point	n.a.	post-1250	Limited activity/camp	17	88.2
		Historic	Historic	n.a.	post-1250	Limited activity/camp	6	66.7
						SITE TOTAL	**47**	**76.6**
5MT4684	Chindi Hamlet	Anasazi	Sagehen	Tres Bobos	660-700	Habitation/small hamlet	360	55.8
				Dos Casas	800-880	Limited activity/mortuary	3	33.3
						SITE TOTAL	**363**	**55.7**
5MT4725	Tres Chapulines Pueblo	Anasazi	McPhee	Periman	840-900	Habitation/village	72	11.1
5MT5104	Willow Flat Pueblo	Anasazi	McPhee	Periman	860-900	Habitation/village	142	31.7
5MT5106	Weasel Pueblo	Anasazi	McPhee	Periman	840-900	Habitation/village	279	87.8
			Sundial	Marshview	1025-1250	Seasonal locus/unknown	36	69.4
						SITE TOTAL	**315**	**85.7**
5MT5107	Pueblo de las	Anasazi	Sagehen	Sagehill	760-780	Habitation/small hamlet	4	75

	Golondrinas			Dos Casas	800-840	Habitation/village	17	76.5
			McPhee	Periman	840-900	Habitation/village	276	76.8
			Sundial	unknown	1025-1100	Limited activity/unknown	0	0
						SITE TOTAL	**297**	**75.8**
5MT5108	Golondrinas Oriental	Anasazi	McPhee	Periman	860-900	Habitation/village	205	84.4
			Unknown	unknown	880-1250	Limited activity/unknown	1	0
						SITE TOTAL	**206**	**84**
5MT5985	Standing Pipe Hamlet	Anasazi	McPhee	unknown	600-880	Limited activity/mortuary	1	100
			Unknown	unknown	600-840	Habitation/small hamlet	3	33.3
						SITE TOTAL	**4**	**50**
						TOTALS FOR MCPHEE VILLAGE	**4102**	**41.2**
5MT4505		Anasazi	Unknown	unknown	600-1250	Limited activity/unknown	3	0
5MT4512	Cascade House	Anasazi	Sagehen	Dos Casas	800-840	Seasonal locus/unknown	372	25
5MT4513	Lee Side Camp	Archaic	Great Cut	n.a.	pre-600	Limited activity/unknown	4	0
		Anasazi	Sagehen	unknown	600-920	Habitation/small hamlet		
						Limited activity/unknown	1	0
			Sundial	unknown	920-1250	Limited activity/unknown	0	0
						SITE TOTAL	**5**	**0**
5MT4517		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	6	0
5MT4520		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	4	0

5MT4526		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	6	0
5MT4541	Jeddito Camp	Anasazi	Sundial	Marshview	980-1175	Habitation/small hamlet	159	0
		Protohist.	Beaver Point	n.a.	post-1250	Limited activity/unknown	0	0
						SITE TOTAL	**159**	**0**
5MT4545	Tres Bobos Hamlet	Anasazi	Sagehen	Tres Bobos	600-660	Habitation/small hamlet	629	58.7
				Unknown	600-800	Limited activity/mortuary	0	0
			Sundial	Marshview	980-1025	Limited activity/unknown	0	0
						SITE TOTAL	**629**	**58.7**
5MT4613	Pozo Hamlet	Anasazi	Sagehen	Sagehill	700-720	Habitation/small hamlet	193	10.4
			McPhee	Periman	920-1250	Limited activity/unknown	1	0
						SITE TOTAL	**194**	**10.3**
5MT4614	Prairie Dog Hamlet	Anasazi	Sagehen	Sagehill	700-780	Seasonal locus/unknown Habitation/small hamlet	518	29.9
5MT4640	Sunflower Hamlet	Anasazi	Sagehen	Dos Casas	780-800	Habitation/small hamlet	35	0
5MT4642	Desecho Camp	Anasazi	Unknown	Unknown	720-880	Limited activity/unknown	36	0
5MT4644	Windy Wheat Hamlet	Anasazi	Sagehen	Sagehill	720-760	Habitation/small hamlet	53	100
				Dos Casas	780-820	Habitation/small, large hamlet	793	62.4
						SITE TOTAL	**846**	**64.8**
5MT4646		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	3	0

5MT4649	Roadside Camp	Anasazi	Sagehen	Unknown	720-880	Limited activity/unknown	8	0
5MT4650	Hanging Rock	Anasazi	Sagehen	Sagehill	720-780	Habitation/small hamlet	3	100
			McPhee	Periman	860-980	Habitation/large hamlet		
						Limited activity/unknown	156	63.5
						SITE TOTAL	**159**	**64.8**
5MT4651	Calmate Shelter	Anasazi	Sagehen	Sagehill	720-840	Habitation/small hamlet	14	0
			Sundial	Unknown	1025-1250	Seasonal locus/field house	3	0
						SITE TOTAL	**17**	**0**
5MT4671	Periman Hamlet	Anasazi	Sagehen	Dos Casas	780-840	Habitation/small hamlet	1571	41.1
			McPhee	Periman	820-880	Seasonal locus/field house	13	46.2
		Unknown	Unknown	Unknown	post-1250	Limited activity/unknown	1	100
						SITE TOTAL	**1585**	**41.1**
5MT4681	Hawk House	Anasazi	Sagehen	Unknown	720-880	Seasonal locus/field house	90	37.8
5MT4682	Climbing Cactus Camp	Archaic	Great Cut	n.a.	pre-600	Limited activity/unknown	0	0
		Anasazi	Sundial	Unknown	920-1250	Limited activity/unknown	75	0
						SITE TOTAL	**75**	**0**
5MT4683	Singing Shelter	Archaic	Great Cut	n.a.	pre-600	Limited activity/unknown	2	100
		Anasazi	Sagehen	TresBobos	600-800	Unknown/unknown	1	0
				Sagehill	720-780	Habitation/small hamlet	1	0
				Dos Casas	820-840	Habitation/small hamlet	178	97.8
			Sundial	Marshview	1025-1175	Seasonal locus/field house	48	45.8
		Protohist.	Beaver Point	n.a.	post-1250	Limited activity/unknown	0	0
						SITE TOTAL	**230**	**86.1**

5MT4690	Kangaroo Camp	Archaic	Great Cut	n.a.	pre-600	Limited activity/unknown	128	0
5MT4744		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	9	0
5MT4751	Pinyon House	Anasazi	Sundial	Marshview	1100-1175	Seasonal locus/unknown	123	22.8
5MT4760		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	8	0
5MT4763	Faraway House	Anasazi	Unknown	Unknown	720-920	Limited activity/storage	92	7.4
5MT4769		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	8	0
5MT4777		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	7	0
5MT4779	Dos Piedras Camp	Anasazi	BM III - PI	Unknown	600-980	Limited activity/unknown	58	5.2
5MT4789	Quasimodo Cave	Anasazi	Sundial	Unknown	920-1250	Limited activity/storage	56	48.2
5MT4796		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	21	0
5MT4797	Cougar Springs Cave	Archaic	Cougar Springs	n.a.	pre-600	Limited activity/unknown	108	62
5MT5094		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	3	0
5MT5096		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	7	0
5MT5361		Anasazi	Unknown	Unknown	600-1250	Limited activity/unknown	2	0
5MT5380	Star Bead Shelter	Anasazi Protohist.	Unknown Beaver Point	Unknown n.a.	600-1250 post-1250	Limited activity/unknown Limited activity/mortuary	0 10	0 80

						SITE TOTAL	**10**	**80**
5MT5399	Los Atavios	Protohist.	Beaver Point	n.a.	post-1250	Other/other	3	33.3
5MT5863	Nuthatch Hamlet	Anasazi	Sagehen	Sagehill	720-760	Habitation/small hamlet	23	82.6
				Dos Casas	820-880	Habitation/village	28	0
			McPhee	Periman	840-880	Habitation/village	27	0
						SITE TOTAL	**78**	**24.4**
5DL444	Lone Aspen Camp	Anasazi	Sagehen	Camp	600-840	Limited activity/unknown	18	100
			Unknown	unknown	800-880	Limited activity/unknown	6	83.3
		Unknown	Unknown	unknown	post-1250	Seasonal locus/unknown	20	100
						SITE TOTAL	**44**	**97.7**
5DL445		Anasazi	Unknown	unknown	600-1250	Limited activity/unknown	3	0
5DL446		Unknown	Unknown	unknown	Unknown	Limited activity/unknown	4	0
5DL452	River Rat Rockshelter	Anasazi	McPhee	unknown	920-1250	Limited activity/unknown	11	54.5
						DAP TOTAL	**20796**	**47.7**

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