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The Dolores Project Cultural Resources Mitigation Design

by

Ruthann Knudson, Steven E. James, Allen E. Kane,
William D. Lipe, and Timothy A. Kohler

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Under the supervision of
David A. Breternitz, Senior Principal Investigator

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EDITOR'S PREFACE

Work on committing to paper the concepts and approaches utilized by the Dolores Archaeological Program in the form of a mitigation design began in 1980, although much of the basis for the text dates back to the beginning of the program in 1978. After preliminary submission and Bureau of Reclamation review, the mitigation design evolved into a form very similar to this chapter and was submitted to the Bureau of Reclamation again in June 1981. The present chapter is a slightly modified version of the design as submitted in 1981. The basic differences between this chapter and the 1981 version are that this chapter has undergone some minor editing to bring it in line with current DAP and Bureau of Reclamation Technical Publication Branch publication style, and that the research design has been abridged. The research design that originally formed a major section of the mitigation design was identical to that published by the Bureau of Reclamation (Kane et al. 1983). Since the full text of the research design was already in print when the contents of this volume were assembled, it was decided that only the most relevant parts of the research design would be repinted here.

The Dolores Archaeological Program has accomplished much since the last revision of the mitigation design in 1981, but since this mitigation design represents an important step in the growth of the program, it has not been updated to reflect those changes. Perhaps the most significant development since the submission of the design is that modeling of cultural process called for in the mitigation design has been done (Lipe et al. 1983). Fieldwork has also been completed and will be reported in later reports from the DAP. Finally, the temporal and functional

assignment of sites in this chapter will differ in some details from that in other chapters in this volume. The assignments reported here were made early in the history of the DAP, and those in later reports are based on both better information and on refined analytic techniques and systematics. Since many decisions about selection of sites for investigation were based on the assignments as reported in this chapter, these tables have not been modified.

INTRODUCTION

Purpose of This Design

The Dolores Project is a major Federal water reclamation project in southwestern Colorado, just north of Mesa Verde National Park (Breternitz et al. 1980; Madden and Weakly 1980). The Reservoir Salvage Act of 1960 as amended (16 U.S.C. 469) requires that operations such as the Dolores Project, which is being constructed in an area known to be rich in prehistoric and historic resources, recover and preserve the information held in those resources before construction damages or destroys them. The National Historic Preservation Act of 1966 as amended (16 U.S.C. 470) requires that cultural resources determined to have national, state, or local significance and potentially affected by Federal development be evaluated as to their eligibility for nomination to the National Register of Historic Places. It further stipulates that the President's Advisory Council on Historic Preservation be given the opportunity to comment on the effect of any such federal construction on registered or National Register-eligible properties.

In 1978 the Bureau of Reclamation entered into a Memorandum of Agreement with the Advisory Council on Historic Preservation (with agreement of the Colorado State Historical Preservation Officer) to develop a cultural resources data recovery program as part of the Dolores Project. The memorandum states in general terms that implementation of such an undertaking would satisfactorily mitigate any adverse impacts of the water project.

"Mitigation" means to moderate in force or intensity, to alleviate. Thus, when dealing with the impact of an earth-disturbing project on

archaeological and historic resources, a program must be developed to alleviate somehow or mitigate the destructive impact of the proposed construction. In a large water development project such as the Dolores Project, avoidance or preservation of cultural resources in place is not feasible. The needs for national economic development and the specific requirements of dam and distribution system construction are controlling factors in determining where and what the project will be; these factors further determine the cultural resource within the primary impact zone that will be adversely affected. Given that mitigation of the adversity is desired, physical investigation is left as the only viable mitigative management tool. Thus, the focus of the DAP (Dolores Archaeological Program) is investigation, or "the conservation of information through adequate study of the resources before they are destroyed" (McMillan et al. 1977:29). It is primarily the recovery of data, or things, not preservation of properties or cultural patterns in place.

As it has developed, the DAP is perceived to fulfill three major functions: design, planning, and performance as each relates to data recovery, analysis, and reporting.

Responsibility for the conceptual design of the program rests with the contractor (the University of Colorado), though Bureau of Reclamation approval is required prior to any implementation. This function includes the design of (1) an overall structure of research to insure validity and reliability in program effort and results (this chapter); (2) supporting documentation and effort including multiple explanatory models of Dolores culture history and process, with implications that are amenable to testing with program data; (3) midlevel analysis of certain data

categories (e.g., ceramics, lithics); and (4) individual researcher's synthetic studies that address specific integrative or problem-solving questions important in overall DAP data recovery. These latter are statements of theoretical and general methodological approaches and are the basis on which program plans are developed.

Program planning is a function shared between the Bureau of Reclamation and the contractor. The contractor advises the Bureau of Reclamation about work efforts appropriate to fulfill the approved research designs integral to the mitigation design, and then the Bureau of Reclamation through the annual program budget process determines the required contractor field, laboratory, and reporting work levels commensurate with its available funds, construction schedule, and mitigative responsibilities. The planning documents are (1) project-wide annual work and study management plans, (2) manuals and guides for various tasks groups within the program, and (3) specific semi-annual or otherwise periodic time-personel-task management plans within those task groups.

Performance is the responsibility of the contractor. The products of the performance function include recovered materials, field and laboratory records, and descriptive, analytical, and synthetic reports. These three kinds of reports are subject to review and acceptance by the Bureau of Reclamation.

The "Dolores Project Cultural Resources Mitigation Design" presented here is the general outline of program conceptual management, and serves as a basis for planning work that satisfies scholarly research and public interest considerations (cf. Struever 1971; Binford 1972; Cowgill 1975:267; Schiffer and Gumerman 1977:129-133; Vivian 1977). It is the

contractor's design of a work effort that will be sufficient to meet those needs, but is no more than is necessary to fulfill Bureau of Reclamation responsibilities. It is not a plan that specifies how much work effort is legally "adequate"--those determinations are the responsibility of the Bureau of Reclamation. Rather, it is a suggested method by which the contractor can assist the Bureau of Reclamation in making those judgments, by making options of effort and results more explicit. It has been developed in complement to three years of cultural data recovery at Dolores, that recovery effort having provided a substantial understanding of the parameters of the data base within which mitigation-oriented investigations are operating. It is an outline of a strategy of judging the representativeness and statistical adequacy of data recovery programs. If successful, it should serve as a model for other such programs, large or small, and hopefully will generate constructive review from the concerned preservation and development communities.

The Dolores Archaeological Program as a Mitigative Data Recovery Program

The Resource Base

The DAP has defined its resource base as stated by McMillan et al. (1977:27):

> The resource base is the totality of information sources that can be used to understand past human activities. This base includes not only cultural remains such as artifacts, structures, features, activity areas, and so forth, but any parts of the natural and cultural environments that were either used or modified by people in the past or which can aid in understanding the basic relationship between people and the environment in the past. Another element of the resource exists at the level of spatial relationships--between materials at a site, among sites, and between sites and aspects of the natural environment. The resource base, then, is not just the sum of specimens and sites, but includes networks of interrelationships that potentially can contribute another magnitude of information.

Thus, the focus of DAP effort is on the recovery of culturally significant information as it is embodied in certain edaphic contexts, or "sites," but not on the excavation of a certain number of sites in and of themselves.

Types of Dolores Archaeological Program culturally significant resources. The DAP builds on the Airlie House concept of sites, isolated finds, artifacts, associated ecofacts, architecture, and contextual networks (McMillan et al. 1977) as being the property-oriented component of the Dolores cultural information base that requires geographically specific investigations. In addition, we are concerned about preservation or recovery of information from written documents and oral traditions about local ethnographic and historic cultural patterns, and from the modern environment that provides comparative data about the world to which prehistoric and historic people adapted.

DAP temporal dimensions. Interpretation of temporally sensitive artifacts, absolute (tree-ring) dated contexts, and stratigraphic relationships indicates that the cultural resources within the project area range in age from some 7000-8000 years ago to the present. The pre-Pueblo Period (before A.D. 600) is represented by Archaic (or Desert) Tradition projectile points recovered by survey crews and by sites assigned to the Late Archaic Great Cut Phase (2000 B.C.-A.D. 500). The succeeding Anasazi Tradition (representing occupation during the Pueblo period, A.D. 600-1200) is segregated into the Sagehen (A.D. 600-850), McPhee (A.D. 850-975) and Sundial (A.D. 1050-1200) Phases with no documented occupation between A.D. 975 and 1050 Phases. The Anasazi occupation was intensive, with an apparent population peak occurring at A.D. 875, and resulted in formation of the bulk of the Dolores archaeological record. The record for the next temporal interval, the

post-Pueblo Period (A.D. 1200-1870) is scanty; however, there are remains representing Shoshonean and protohistoric peoples. The Historic period begins about A.D. 1870 with the arrival of Euroamerican settlers in the area.

Dolores Archaeological Program spatial dimensions. The dispersed lands to be affected by project construction and development have been designated as individual project features or impact areas; these require differential mitigative attention because of variation in size and shape, the magnitude and type of construction and development, concurrence with concentrations of archaeological and historical materials, and potential of the individual resources for contributing to the accepted designs, analyses, and work programs of the contractor. Three readily definable spatial divisions of the project are the centralized impact areas (the damsite, pool area, borrow areas, wildlife areas, recreation areas, and access roads), the takeline (the boundary of lands to be acquired and managed as part of the water reclamation project), and the distribution system (the lands outside the takeline directly impacted or secondarily affected by distribution canals and laterals, secondary reservoirs, and other features).

The project impact areas are not geographically coincident with the culturally and geographically significant areas within which our research questions are appropriately structured. The DAP staff have developed spatial systematics that are comparable to accepted prehistoric cultural geography formulations. The Dolores Project area corresponds to a portion of the Yellowjacket District of the Mesa Verde Region of the Northern San Juan Area (Gillespie 1976; Nickens 1977). The Escalante Sector is a spatial division of the Yellowjacket District and encompasses a portion of the river canyon downstream from the town of Dolores and high lands on

both sides of the canyon with easy access to the river system (fig. 1). The sector encompasses all lands within the project takeline and is intended to be the primary focus of study for the program. The sector is divided into smaller administrative units (localities) to provide a reference system and to facilitate the study of small-scale spatial patterning. An adequate design for project mitigation must focus on recovery of information from the construction-determined impact areas in consideration of each area's representation of the data populations in the broader context of archaeological significance.

The Broad Conceptual Design of the Dolores Archaeological Program Mitigation Program

The general research design. The DAP research design is a set of general scientific questions about human behavior that may be addressed by the data recovered from the Dolores Project area. It is a logical structure of inquiry and an outline of investigative validity within which to focus our efforts. It was developed with some understanding of the Dolores data base, but prior to having available detailed information about that base as known from extensive survey data and/or significant excavation evidence. Ideally, any data recovery program such as the DAP is initiated only after intensive survey and description of the resource base and subsequent development of general research strategy and specific testable hypotheses. However, that critical preliminary work was not completed for the Dolores Project until the third field season and, in the meantime, field and laboratory data recovery activities had to progress. The general research structure consequently was designed in 1979 to insure the use of a behavioral paradigm throughout all stages of DAP information collection (cf. Binford 1972:137-138).

The long-range goal is to obtain a sample of information with which to answer a selection of these behavioral questions. More specific explanatory models of those questions whose answering is possible given our 1981 knowledge of Dolores data dimensions now need to be developed following the "rules" of the general research design, but are a second methodological level beyond that document (cf. Redman 1973; Asch 1975:187-189; Morris 1975:195; on use of feedback in multistage archaeological research).

In lieu of the second-level explanatory models, but with the research and midlevel analytical designs in hand, the specification of the input data needed for answering general DAP research questions has been operationalized. Sequential and hierarchical data structures appropriate to insure analytical validity given our research structure have been developed and provide the basic guidance for the recovery and recording of field and laboratory data, and for selecting and designing special studies. The links between research topics and specific data sets are discussed in various DAP documents (e.g., midlevel research designs) and are manifested in the data recording forms and the computerized data bases.

The full text of the research design (Kane et al. 1983) was published in the first collection of DAP reports. The presentation of the research design in this chapter consists of excerpts from the full document.

The implementation design. The implementation design is presented following the research design and is a statement of procedure for evaluating the scientific reliability and adequacy of our investigations in the context of our overall research structure. It is a definition of concepts and terms used in our selection and quantification of the amount

of work effort needed and our confidence in the representativeness of the results of that work.

GENERAL RESEARCH DESIGN

Introduction

The Dolores Archaeological Program Research Design (Kane et al. 1983) consists of a general method discussion, followed by separate presentation of the five problem domains:

Problem Domain 1: Economy and Adaptation

Problem Domain 2: Paleodemography

Problem Domain 3: Social Organization

Problem Domain 4: Extraregional Relationships

Problem Domain 5: Cultural Process

The first four problem domains focus on synchronic description of prehistoric culture for each of the temporal units recognized in the DAP study area. The goal of Problem Domain 5 is the production of diachronic syntheses and explanation of patterns resulting from work in the other four problem domains.

In the full research design (Kane et al. 1983) each problem domain contains both discussions of general orientation and presentation of specific research questions. Many of these major questions are elaborated upon in the form of subquestions. In this chapter the specific questions have been omitted and only the general discussions are presented.

General Methodological Considerations

The Cultural Resources Mitigation Program of the Dolores Project provides unprecedented opportunities for enhancing public and scientific values through the large-scale interpretation of national heritage resources. The research design of the DAP recognizes the obligation to

the public and to the scientific community to abide by a lucid, sound, replicable, and consistent set of methodological guidelines for the interpretation of data recovered in project operations. Important byproducts of this orientation are a thoroughly documented record of project investigations and a rich and diverse data base, both of which could be useful to future anthropological research in the Southwest.

General methodological considerations incorporated into this research design consist of a set of logical rules or research steps that structure the approach to each of the questions posed in each problem domain, along with some specific research activities for managing uncertainty and for improving the quality of inferences based on sample populations of data.

The set of logical rules is designed to lead each researcher through an identical process of theoretical development, library research, hypothesis formulation and testing, progressive inference (extrapolation, interpolation or patterning), and summarization. These rules apply to each question posed in the problem domains that follow.

1. Based on ethnographic, archaeological, and other scientific literature, identify models or logical constructs that may be used to describe the attributes or process under study. What are the relevant ways of organizing concepts? What are the data requirements of these models? What criteria are suggested for identifying the relevant attributes or concepts in the archaeological record?
2. Within the Escalante Sector, which of these models or constructs may be useful for describing the process or attribute under study? What specifically are the criteria for identifying the relevant data or concepts in the archaeological record in this area?

3. Express these models as hypotheses, and define test implications. Generally, we are speaking about multiple models or parametric models and, thus, sets or ranges of test implications.
4. Test the hypotheses on excavation data, identify which sets of test implications are satisfied, note the variability, and refine the model accordingly. However, some hypotheses are uniquely regional and can be tested using the following steps.
5. Develop test implications that are appropriate to regional level analysis, and extrapolate to survey site data. Identify which sets of test implications are satisfied, and note the variability.
6. Based on probability sampling and statistical inference, extrapolate to the unsurveyed portion of the Escalante Sector, and note the level of uncertainty.
7. Synthesize the results of study at the excavation site, survey site and regional levels, explicitly incorporating the uncertainty associated with each level of interpretation or inference. From this, produce a regional description of the attribute or process under study.

Researchers at the DAP recognize that many aspects of archaeological research, particularly those that aspire to regional interpretations, are attended by uncertainty. Some of this uncertainty is inherent in the nature of the work, and some is structural within the methodology (perception and inference). In order to manage uncertainty, we have incorporated into the research program specific activities to control or quantify variability, probability, and levels of confidence in our investigation. We recognize that we are dealing with incomplete data, and

will propose studies to examine the recovery of information in excavation sites and survey sites.

Structural uncertainty (related to sequential inference and variability in the perception of archaeological remains) will be addressed explicitly. We hope to control perception by rigorously establishing criteria for identifying objects, assemblages, processes and concepts in the archaeological record. We hope to control inference by the strict application of axioms of probability theory, and possibly through the use of Bayesian statistics. Wherever appropriate and relevant, objective or subjective expressions of the level of confidence or a probability distribution will be attached to observations and interpretations of data. To the extent possible, all analytical approaches will include assessments of variability and systematic treatment of uncertainy.

Sampling studies will be proposed to enhance our understanding of the representativeness of data that we collect. Many inferences will be based on the study of sample populations. We will propose a set of studies and experiments to increase the representativeness of sample populations to the sampling universe and to enhance the recovery of data important to the research design. Tentatively, we envision sampling studies or experiments to illuminate the study of occupation surfaces, surface recovery on survey sites, and regional site sampling. In addition, we have put into use a convention for probability sampling of all data on excavation sites, with the intent of providing a uniform basis for inference and extrapolation in the several problem domains.

Another inherent source of uncertainty is physical disturbance in the archaeological record. In addition to recording and accounting for

disturbance in our field studies, we will propose studies to examine the causes and effects of disturbance in the sites we dig.

Problem Domain I: Economy and Adaptation

General Logic

Within each temporal unit, what were the available resources? Which ones were used by prehistoric peoples? How did they use (technically) each resource? How were these individual resource-use techniques combined to form subsistence systems and what were the basic social organizational attributes of these systems? The intent here is to describe the paleoenvironment and its prehistoric human usage, as well as to provide input to Problem Domains 2 through 5.

Problem Domain 2: Paleodemography

General Logic

How many people lived in the Escalante Sector in each temporal unit? How many people were associated with each household, with interhousehold groups, and with each site? What were the characteristics of this population (age, sex, health)? How were they distributed? How do these population estimates and distributions compare with the theoretical maximum limits to the number of people that might have lived in the area at different times?

The main tasks here are estimation of a vanished population in several past temporal units, and compilation of sufficient data (demographic and other) for use in a simulation of population growth and distribution. To estimate the prehistoric population, three kinds of estimation methods will be used:

1. Habitation studies.
2. Resource-based studies (carrying capacity).
3. Time-rate studies (rate of accumulation of archaeological evidence over time).

For each of these estimation methods, alternative approaches and models will be explored. Characteristic steps in the development of each alternative approach or model for a population estimation method are as follows:

1. Based on a review of literature, selection of one or more ethnographic or other-archaeological models of the process or attribute under study (e.g., household size, resource use, artifact discard, population growth).
2. Examination of excavation data, based on established criteria for identifying or interpreting the archaeological evidence in relation to the concepts required by the models.
3. Extrapolation to survey data and unsurveyed portions of the Escalante Sector, based on several alternative indicator attributes (e.g., site size and site type, artifact distributions and densities, etc.), as well as on statistical methods.
4. Based on the above steps, estimation of total population at a site during a temporal unit. Concurrrently, development and use of a technique to distribute this total population over the span of a temporal unit, to allow for an estimate of momentary population at any point during a temporal unit.

Ancillary to each approach to population estimation is the choice and refinement of methods to provide chronological controls to define occupation episodes that may be assigned to specific temporal units.

The characteristics of the population in each temporal unit will be estimated on the basis of human skeletal remains and statistical inference. Currently planned mitigation activities are not expected to yield a large number of skeletons. In the absence of sufficient direct evidence (human bones) a very conservative approach will be used for estimating demographic characteristics (such as age and sex composition, and health). Most of the interpretive demographic data developed on the basis of limited direct evidence will not be generalized beyond the hamlet or site level.

The studies of population distribution will rely on momentary population estimates and chronological controls for each occupation site. Optimally, for each occupation site encountered in the Escalante Sector, a time, spatial dimension, range of total population and a level of confidence in the estimate will be developed. These data will be used as direct inputs to demographic simulations planned for Problem Domain 5.

Problem Domain 3: Social Organization

Because of the broad range of information encompassed by this problem domain, we have chosen to divide it into the following subdomains: Social Organization, Economic Social Organization, Political Organization, Ideological/Ceremonial Organization. Settlement patterning, originally a component of this study area, is no longer considered a separate area of inquiry, but rather as a type of evidence on which the subdomains of this problem domain and other problem domains draw. The divisions listed above were derived largely out of convenience; however, the separation follows traditional lines of anthropological inquiry. We fully recognize that

these divisions are artificial, and probably do not parallel cognized divisions of the culture under study.

Essentially, research in each subdomain will pursue independent, though not unrelated, lines of evidence. Social Organization (Subdomain 1) has as its major focus the identification of groups--those units that structure the social relations of the society. We are assuming here that the Anasazi culture was a kin-based society. The structure identified in this subdomain, therefore, is expected to serve, as does the kinship system, as the basis of organization for all of the activities of the society.

The subdomains addressing the economic and political aspects of social organization, on the other hand, are functional divisions. The units participating in these types of activities, therefore, can be expected to be subsets of the social groupings identified by Subdomain 1. Similarly, Ideological/Ceremonial Organization (Subdomain 4) must ultimately be related to these groups. This division, however, is neither a structural nor a functional one. Rather, ideology as reflected in the archaeological record through ceremonialism, is seen as a pervading mechanism for social integration, sanction of authority, and possibly, for the organization of certain economic pursuits.

Because the four subdomains pursue distinct lines of evidence, research in each subdomain can be pursued concurrently. Political Organization (Subdomain 3), though, is based largely on the analysis of patterns derived from more primary data by the other three subdomains. Consequently, the full range of research into this aspect of social organization must await some preliminary work in the other areas. Similarly, certain questions in other subdomains cannot be completed until

there is input from research in other problem domains. Notably, questions relating to group size in Subdomain 1, and to the means of production in Subdomain 2 are dependent upon prior work in Problem Domains 2 and 1, respectively.

Problem Domain 3, Subdomain 1: Social Organization

Service (1962:17) divides the structure of social organization into groups, the small social units into which societies are divided; and statuses, "named social positions which are assigned conventional attributes and roles that regulate or influence the conduct of interpersonal relations." Thus defined, a status network is highly emic and would appear largely unrecoverable archaeologically. But it is important to keep in mind that status networks "regulate and influence" interpersonal relations through sets of rules of conduct. Such sets of rules should produce patterned behaviors, at least some of which should have archaeologically recoverable material correlates.

Generally speaking, however, it is the groups aspect of social structure which will be more readily and completely identifiable archaeologically. Service further divides groups into those which are residential and those which are "a nonresidential association that has some corporate functions or purposes" (Service 1962:13), the latter of which he terms "sodalities."

If we turn from this brief sketch of the structure of human social organization to a consideration of its function, we might accept the following as a working definition. Social organization comprises those aspects of culture which serve as "the extrasomatic means of articulating individuals one with another into cohesive groups capable of efficiently maintaining themselves and of manipulating technology" (Binford 1962:219).

This maintenance of the group involves both biological continuance and such social factors as socialization and enculturation of children. As for effectiveness, White (1959:103) describes the effectiveness of a social unit as arising from the group's size and its solidarity, "the strength and intensity of the ties, the social relations, between the individuals who compose the group." These two competing forces, inversely related to each other, ultimately determine the nature of a society's social organization. The size of social groups, the degree of integration of the groups, and the changes in these two factors through time are potentially informative about the effectiveness of social units and about the response of social units to various stresses.

The three major areas of concern in this subdomain, therefore, are the delimitation of groups, both residential and nonresidential; the identification of archaeologically recoverable information about the status network; and the study of group solidarity or integration.

The identification of groups at all hierarchical levels--from the socioeconomic household to the largest ethnically self-conscious entity--should be the central concern of the social organization subdomain. Architectural evidence should be especially important at the household, interhousehold cluster, and village levels of social groupings. Stylistic evidence would be equally important at these levels and supremely important at the locality, sector, and district levels. Settlement pattern data would be critically important to any understanding of the relationship between various hierarchical levels of residential groups and perhaps to the definition of nonresidential associations as well. The network of statuses in a society would, as noted above, be much more

difficult to recover archaeologically. Such macrolevel status positions as men versus women or various age grades may well show evidence of differential rules of behavior in terms of division of labor, styles of personal adornment, mortuary treatment, but the microlevels are less given to material correlates. An example of a possible line of evidence which might be productive in studies of finer status distinctions would be differential distribution of animal carcass parts which might imply specific rules of food sharing tied to specific kin relationships, but such inferences would be tenuous at best.

Unlike boundaries of groups and the named positions of the status network, both of which are discrete units having direct material culture correlates, the integration of social groups is a relative attribute which must be inferred from less direct material evidence. There is no one best material culture measure of increased or decreased intensity of social relations; the most suitable measure will vary with the nature of the available data and with the exact questions about integration which are being asked. Some measures of integration which have been used include degree of sharing of stylistic elements, standardization in the manufacturing or construction techniques, and physical proximity or access to specific physical facilities.

Though strongly inferential, the evidence for degree of integration is probably more direct than the evidence for means of integration. An increase of group integration was undoubtedly one of the latent functions of many groups and activities in Anasazi life, but these groups and activities had manifest functions (most of them involving other problem domains or subdomains) which would have been perceived as the primary or sole functions of the groups or activities in question. And more

important, those manifest functions would have left most or all of the recoverable material culture remains. Only by analogy with manifest and latent functions of ethnographically known groups and activities can we approach the question of means of integration.

The three major areas of concern identified above--social groups, the status network, and the integration of social units--may be used to structure sets of specific questions to be pursued within the DAP research design. This list of questions should not by any means be considered exhaustive; rather it should be considered as setting out general lines of inquiry and suggesting a number of potentially fruitful specific problem areas.

Problem Domain 3, Subdomain 2: Economic Social Organization

Economic social organization comprises the social relations of production, distribution, and consumption. Although closely allied with Problem Domain 1, Subdomain 2 is distinct in emphasizing the interplay of information and materials that move goods through the society rather than the technological factors related to that flow. In general, the goal of research is to identify the units of production, distribution, and consumption for each major class of material goods, and to relate those units to the social groupings that organize the Anasazi culture.

Unlike the other subdomains of social organization, this subdomain will derive its basic data from the lowest order of the spatial hierarchy, the activity locus. Initially, the objective is to reconstruct which activities were performed and where they were habitually carried out. Secondly, the number of participants and the status of those performing the task must be inferred. Finally, each task group and each locus of

activity must be tied to the spatial correlates of the social groupings identified in Subdomain 1.

An additional concern is how to best classify material goods for analysis. Precisely, what constitutes a "major class of material goods" will clearly vary with the specific study, but in general, the focus in classification will be on the process of consumption. Were the materials consumed as food, fuel, building materials, or as the raw materials for a particular industry? Further division of these categories might then be made based upon the character of the materials themselves. Other distinctions that might prove useful are between perishable and durable goods, materials available locally and those that are exotic, materials that are perennially available and those cyclically available, and between goods produced for consumption and those for exchange.

At the level of the activity locus, primary evidence will be those attributes of artifacts related to function, and those that denote some particular social status. Proximity to a particular resource and botanical and zoological remains will also be considered as evidence. Analysis at higher spatial divisions will probably be more synthetic, with a greater reliance on contextual association, differential distribution, and variability. It is anticipated that this will involve a variable battery of statistical tests, locational analysis techniques, and simulation models. The goal is to move from the reconstruction of particular activity patterns to the systems of organization that regulate production, distribution, and consumption at every level of society.

Problem Domain 3, Subdomain 3: Political Organization

Political organization refers to the presence of and to the activities of a central authority or leadership operating within the community social structure. Leadership may constitute a formal group with its own internal structure and conventions or may exist informally as part of the status network of the community.

Specific lines of inquiry into the areas of model formulation and excavation evidence might be applied to specific research in the area of political organization in the following ways:

Model formulation. Modern Pueblo ethnographies and works on social organization of Anasazi and prehistoric Southwestern cultures should be consulted. As modern Pueblo political organization probably does not parallel leadership structure in early Anasazi periods, other works dealing with Formative cultures should also be considered.

Archaeological evidence. At the regional level, the applicability of geographic models such as central place, nodes and networks, and nearest neighbor should be evaluated in determining whether the regional data base has spatial order. Evidence of ordering might be used to infer political organization; description of such regional organizations can be in the form of a "best fit" model generated through evaluation and reformulation of ethnographic archaeological models. Hence rigorous settlement pattern studies and a regional sampling design are critical in conducting research into regional political systems. The researcher should be aware of possible site types and architectural edifices associated with regional political groups or activities such as boundary markers, towers, regional communications networks, and redistribution centers.

At the community and intracommunity levels, recognition and description of status networks are critical aspects of political or leadership research. Status groups in the archaeological record can perhaps most easily be defined by the evaluation of the quantity and quality of material culture associated with individuals, households, and interhousehold groups; estimations of domestic and other social space may be a profitable course of evidence as well. High status groups or political groups within the community may occupy dominant or centralized locations within the community cluster. The researcher should also be aware of possible specialized structures and features that may be associated with political activities. Leaders may have possession of unique artifacts, which may have served as symbols of their authority.

Problem Domain 3, Subdomain 4: Ideology and Ceremony

The ideology of the peoples in the cultures under study is approachable in the archaeological record only through its material manifestations. Most of these manifestations are traditionally called ceremonial by archaeologists--probably a fair appellation, but rather uninformative, since in modern Pueblo societies religion pervades all aspects of life. The operation of religion has been divided into three categories by Rappaport (1971): ultimate sacred propositions, ritual, and religious experience. The ultimate sacred propositions, or dogma, as well as the religious experiences by the performance of ritual are difficult to define archaeologically. However, ritual is the socially enacted aspect of religion, and a behavior set which leaves archaeological traces.

How can we define these ritual or ceremonial aspects of culture in the Escalante Sector? One attractive approach is to identify patterns of religious behavior documented among modern Southwestern Indian groups,

particularly the Pueblo peoples who are generally believed to be the living descendants of the Anasazi. Indeed, analogy with these groups suggests a long list of materials and facilities also thought to be present prehistorically in the Escalante Sector. Minimally this list includes structures such as kivas, great kivas, and perhaps small rooms in surface structures serving as meeting places for sodalities (Dozier 1965:45-46). Hill (1970:23) and Smith (1952:154-165) have suggested lists of test implications for identifying kivas. Other facilities and features which can be identified as being of at least partly ritual function include plazas, pictographs, petroglyphs, sipapus, tri-wall structures, and both human and animal burials. Individual artifacts which by ethnographic analogy might be assumed to have ritual significance include quartz pebbles (lightning stones), "killed" ceramic vessels, kiva jars, grave goods, Corn-Mother Goddesses, figurines, fetishes, remains of exotic animals such as parrots, medicine bundle collections, pipes, and evidence for religious-experience-inducing materials such as *Datura*.

Problem Domain 4: Extraregional Relationships

General Logic

Given that nearly all human societies, whether based on hunting and gathering economies or complex industrial technologies, have a culturally structured way of interaction with "foreigners," how is this operational in the study area? Given both the area's neighbors and a broader sphere of Mesoamerican influence, with whom did the Dolores people interact? By what mechanisms (e.g., political domination, population migration, economic interchange, perhaps including spouse exchange) did they interact, and how intensively? How were these interactions integrated

into broader area-wide social, economic, political, and/or ideological systems in any one temporal unit? Why was one mechanism used rather than another, one group dealt with more extensively than another?

There is an initial problem of defining sociopolitical units of interaction. Because the interactions within the Dolores Project, particularly within the Escalante Sector, are dealt with in Problem Domain 3, analysis will focus on the interactions with neighbors or distant social entities who are external to the Escalante Sector.

In order to define the presence of "foreign" or "exotic" data within the project area, assuming that data reflect patterns of foreign interaction that can be delineated on the basis of archaeological information, the ethnographic and social science literature must first be searched to develop hypothetical models of such interaction mechanisms. Test implications of each of these models--the artifactual and contextual data and patterning that are associated with each mechanism--should then be outlined from the literature. Finally, the Dolores data should be searched to define the presence or absence of similar data--to test the presence or absence of evidence of similar mechanisms operative in the Dolores data, within any one temporal unit. To understand the relationship of Dolores people to external communities, the archaeological records from those communities also need to be searched for data that are of Dolores origin--foreign to those foreigners--and then both the external and internal information can be used as the ultimate basis for evaluating the mechanisms of Dolores interactions. Finally, the systemic organization of these mechanisms within the Dolores sociopolitical structure needs to be evaluated, and the intensities of interaction with any one neighbor, or

distant contact, in order to fully understand foreign interactions of the Dolores communities.

Problem Domain 5: Cultural Process

General Logic

Given the diachronic framework of assigned cultural periods and calendar dates for the Dolores archaeological data, what patterns of diachronic archaeological variation/identity occur at Dolores? How does this time-sensitive patterning reflect cultural process, including both change and stability? Based on extant scientific models of cultural process (based on environmental, demographic, and intergroup and intra-group social systems), and developing further models of the archaeological manifestations that might be expected for these various models, how can we best explain why the Dolores cultural systems developed or were maintained over time? Given our identification of periods of change in the cultural systems reflected in the archaeological record, how can we best explain these at Dolores? Based on the Dolores analysis, what general implications can be drawn for explaining how and why human domestication of food resources has developed.

IMPLEMENTATION DESIGN

Introduction

The Dolores area cultural resource base includes a range of organizational and distributional information about prehistoric and historic human cultural systems, and the DAP is directed toward recovering a representative and adequate (but no more than sufficient) sample of that information. This section of the mitigation design presents a strategy for determining the levels of DAP effort appropriate to the investigation directions, as they are outlined in the research design and will be developed in second-level explanatory models and test implications.

As a first step, we have developed a terminology that more explicitly distinguishes several levels of fieldwork intensity in the Dolores investigations; these levels are termed "tracks." Further, we have developed a technique for reducing the effect of variations in site size and complexity when either accounting for work effort or when partitioning a sampling population (to provide a stronger base for sample comparability). This is important in dealing with archaeological properties that range from small lithic scatters to 3 ha community complexes.

An assessment of the coverage of the data-base variability is based in part on a qualitative professional judgment as to the representativeness of the resource sample. We are particularly concerned about temporal distribution and reflections of past sociocultural organization among the DAP resources, since these are key parameters of our research design and must serve as a basis for data-sampling stratification. Thus, an ordering of the identified resource inventory

within a temporal-functional matrix is presented here as a basis for long-range assessment and planning.

Finally, an approach to an explicitly quantitiative evaluation of resource-base parameters and related sample size adequacy is outlined. This is directed more toward assessing appropriate levels of field data recovery, but is also applicable to evaluating necessary efforts in laboratory analysis and reporting. It is designed as a method both to support planning, and for assessing the sufficiency of achieved effort once the Dolores Project is complete and the archaeological resource is no longer available in place. It is a design of strategy, not a detailed plan of appropriate statistics and sample applications--those are again second-level efforts based on the acceptability of the general approach.

Measures of Effort

The terms "intensive" and "nonintensive" mitigative effort have been used in various ways at the DAP (e.g., Kane 1983:5-11) and require definition as they are applied to program activities. In general they are used in the same manner as elsewhere in American archaeology (e.g., Redman [1973:64]), to indicate the thoroughness of investigations. Intensive survey of an area indicates nearly 100-percent reconnaissance coverage; intensive investigation of an archaeological site is well controlled excavation and data recovery from that site; intensive analysis of an artifact assemblage refers to detailed attribute description and study of that collection. "Nonintensive" effort is at the other end of a continuum of activity. It includes identifiation, without detailed mapping, of a site sample within a survey unit, or the registration of an artifact

assemblage with only minimal description of its identifying characteristics.

Field Investigations

To facilitate communication about levels of field recovery effort at the DAP, we have developed the following terminology of "tracks" to identify relative positions along this continuum of effort intensity. We have designated four tracks, numbered from 4 to 1 to reflect nonintensive to intensive work.

Track 4. This is the least intensive level of effort of in situ DAP data recovery, and is limited to reconnaissance of cultural and environmental properties. However, within this track there is still much variability of effort. For instance, site reconnaissance may involve onsite Redy Mapper or plane table mapping of dimensions and features, aerial photography and mapping, and/or magnetometer mapping. Environmental Track 4 investigations include a survey to identify the distribution of biotic and abiotic resources. In historic studies, this track should also include the first level search for reliable informants with new data to provide information about the historic traditions of the project area.

Track 3. This is a more intensive level of surficial examination of in situ cultural data, and is based on completion of Track 4 work at some level of effort. It involves more detailed recording of historic architectural information to National Architectural and Engineering Record (HABS, HAER) standards, and/or more detailed maps of the surface of archaeological sites. It usually involves collection of artifacts and ecofacts from site surfaces, with mapping of collection points. Collection may be random, be based a probability sample, or be an

intensive recovery of all portable materials. Environmental Track 3 effort can involve live trapping of fauna, and/or more intensive collection of floral and geological samples for later laboratory analysis.

Track 2. This is a less than intensive subsurface examination of in situ cultural data, and is based on completion of Tracks 4 and 3 work at various levels of effort. It is a test excavation program, which may be based on random or probability sampling or on purposive selection, and may involve collecting and recording varying amounts of the materials encountered during earth removal. Blading is usually considered to be a Track 2 activity (cf. Binford 1972:158). Environmental Track 2 effort includes activities such as development of a comparative garden both to provide a collection of plant materials for comparison with archaeological materials and to assess plant and soil productivity in specific areas. It would also involve laboratory analysis of packrat middens or stratigraphic columns collected outside of archaeological sites.

Track 1. This is the most intensive and thorough investigation of in situ cultural data, the excavation and recovery of an archaeological property, and is based on completion of Tracks 4 through 2 work at various levels of effort. However, within any one site the intensity of excavation may vary from the recovery of every square centimeter of a relatively small site, with detailed records of all materials, features, and contexts, to the excavation that recovers no more than perhaps 20 percent of a large, complex site.

Thus, in planning fieldwork efforts for any specific area or site, the relative intensity of the effort must be taken into consideration and can be more explicitly quantified in terms of "tracks."

Laboratory Activities

Laboratory analysis is also recognized as being conducted at three general levels of intensity or complexity, though these are less formally labeled than those for fieldwork. The least complex analysis of artifacts and ecofacts in the laboratory is termed "preliminary," and is basic item identification (registration number, provenience, material, name) with some descriptive data. For instance, preliminary analysis of DAP flaked lithic tools includes a notation of their weight, rock type, and inferred manufacturing stage, but not a detailed description of their edge morphology; it is a delineation of population parameters from which reliable samples may be drawn.

A second and more thorough level of analysis is termed "intensive," and this usually involves samples of specific classes of artifacts that are described and analyzed in great partitive detail. An intensive analysis of flaked lithic tools involves a sample of those tools, described in terms of their attributes of facial and edge shape, plan and side view, and damage. This intensively studied sample may be characterized as forming the basis for modeling the details of a total population of flaked lithic tools in a cost-effective way.

Finally, synthetic studies of multiple data sets are directed to answering specific research design and midlevel analytical questions. Synthetic studies are the highest level of "intensity" or complexity of laboratory analysis at Dolores.

Full Site Equivalent

As was stated previously, Dolores Project archaeologial sites vary greatly in their relative size and complexity. Some evaluation of that variability needs to be taken into account in planning fieldwork efforts,

as well as in developing any sampling design intended to result in reliable representation of the total cultural resource base. Thus the concept of FSE (full site equivalent) has been developed, with rules based on previous DAP excavation experience.

The FSE is an expression of excavation effort in 10-person crew-weeks, and for any given site is the number of such crew weeks that we estimate it would take to retrieve, through Track 1 excavation, the full information content of the site. For nonarchitectural sites the FSE estimates are based on size. We assume that a site with a surface area of 2000 m^2 or less requires two crew-weeks for full excavation (FSE = 2), that a site of 2000-5000 m^2 requires three crew-weeks for full excavation, and that larger sites require an additional crew-week for each additional 5000 m^2 (e.g., a site of 30000 m^2 = 8 FSE). The complexity of architectural sites is such that the rule of thumb is 10 crew-weeks per FSE to excavate the first incorporated "household cluster" (predicted to be present on the basis of surface architecture, site size, and site layout [Kane 1983]) and 5 FSE for each additional cluster. Given these standard measures for Track 1 full site excavation, work estimates for partial Track 1 effort or for some amount of survey or testing at Tracks 2 through 4 levels can be derived for planning and budget development. In addition, the use of FSE values in describing a sampling population of DAP sites provides an equivalency factor that helps minimize sampling biases.

Modeling the Dolores Archaeological Program Resource Base

The focus of the DAP is the recovery of information appropriate to addressing questions about human cultural history and proceeds from information embodied in artifacts, features, sites, and ecofacts, to the

need to sample or select data from each of these populations. A basic organizational "frame" (using Binford's [1972:140] term as it refers to the structure of a sampling population) for this information is a matrix of sites ordered by time and function with a control for space (cf. Binford 1972:146-147). The DAP research directions are focused within such a temporal and sociocultural structure, and it is incumbent upon the program to acquire a data set that is representative of that structural variability as it is displayed across the impacted resource. Based on data from several years of archaeological inventory in the centralized impact areas of the Dolores Project, complemented by data from intensive excavations, a significant set of DAP site information can be organized within such a matrix that is appropriate for long-term program management.

Tables 1-10 list all identified prehistoric and early historic components within the Dolores Project pool area (project lands below 2111 m elevation), ordered by inferred temporal period and site function with an estimate of component FSE. Table 11 is a summary of tables 1-10. Multicomponent sites are referenced within each appropriate temporal class, with FSE asssignments referring only to the relative representation of that component within the total site. Field descriptions of each site have included notations of size, artifact classes and densities, surface features, inferred depth, and past disturbance. From this information senior project archaeologists have derived secondary descriptive data, based on comparisons with excavation information.

Temporal assignments have been made on the basis of site layout, architectural style, and diagnostic ceramic and lithic artifact designs or forms; temporal units are defined for the DAP by Kane (1983) and are

Table 1. Temporal-functional matrix of indeterminate (no sherds), possibly Archaic, sites within the Dolores Project pool area (Page 1 of 2)

Site #	Function	Locality	Comments	FSE
2163	?/limited activity	Grass Mesa	level lithic scatter	4
2172	processing/limited activity	Grass Mesa	talus scatter material	4
2173	processing/limited activity	Grass Mesa	large talus scatter	6
2180	quarry processing/limited activity	Periman	lithic/source	4
2208	processing/limited activity	Trimble Point	lithics	3
2240		Grass Mesa	analogy (5MT2207) hand & toe holds	1
2324	?/limited activity	House Creek	lithics	2
2325a	?/limited activity	House Creek	lithics	1
2326	camp/seasonal	House Creek	lithic/architecture	10
2330	?/limited activity	House Creek	lithics	2
2335	processing/limited activity	Dolores	lithic scatter on talus	4
4018	?/limited activity	Trimble Point		2
4596	?/limited activity	Dolores		2
4656	art/limited activity	Periman	pictographs	3
4658	?/limited activity	Periman		3
*4661	?/seasonal	Periman		6
*4687	processing/limited activity	Sagehen	biscuit mano	6

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Some sites here (more than 50 percent) probably represent missing limited activity sites of a later temporal period.

42 sites with 188 FSE, $\overline{X}$ FSE = 4.48, $\overline{S}$ FSE = 2.74

Table 1. Temporal-functional matrix of indeterminate (no sherds), possibly Archaic, sites within the Dolores Project pool area (Page 2 of 2)

Site #	Function	Locality	Comments	FSE
*4688	processing/limited activity	Sagehen	lithics	8
4689	processing/limited activity	Sagehen	lithics	8
4690	processing/limited activity	Sagehen	lithics	3
4757	?/limited activity	Periman	no artifacts	4
4760	quarry/limited activity	Dolores	lithics	10
4761	processing/limited activity	Periman	hammerstones	4
4764	?/limited activity	House Creek	debitage	3
4766	processing/limited activity	Dolores	debitage	4
4769	quarry processing/limited activity	Periman	raw materials	8
4772	?/limited activity	House Creek		3
4778	?/limited activity	House Creek	lithic	2
4785	maintenance/limited activity	Grass Mesa	awl grooves	2
4786	?/limited activity	House Creek	lithic	2
4790	processing/limited activity	House Creek	flakes	6
4796	quarry processing/limited activity	House Creek	raw materials	10
4801	?/limited activity	House Creek	debitage	4
5089	?/habitation	Grass Mesa		12
5096	?/limited activity	Periman	raw materials	4
5097	?/seasonal	Trimble Point	lithics	6
5099	?/seasonal	Trimble Point	lithics	8
5101	processing/limited activity	Dolores	flakes	3
5102	?/seasonal	Periman	stone circle	4
5382	?/limited activity	Dolores		2
5384	?/limited activity	Dolores		2
5385	?/limited activity	Dolores	lithic	3

Table 2. Temporal-functional matrix of Anasazi (indeterminate phase) sites within the Dolores Project pool area (Page 1 of 2)

Site #	Function	Locality	Comments	FSE
2171	?/limited activity	Grass Mesa	1 Chapin sherd/23 lithics	3
2314	processing stone/limited activity	Periman	ground stone	4
4491	art processing/limited activity	Periman	rock art	8
4681	?/seasonal	Sagehen	architecture	4
*4687	?/seasonal	Sagehen		4
4694	storage/limited activity	Periman	architecture	3
4731	?/limited activity	Dolores	analogy	5
4745	?/limited activity	Dolores	ceramic	5
4791	processing/limited activity	Grass Mesa	manos	8
4783	?/limited activity	Trimble Point	1 sherd	4
4763	storage/limited activity	Sagehen	excavated	1
4753	?/limited activity	Periman	ceramic	5
4755	processing/limited activity	Periman	ceramic	5
4759	quarry processing/limited activity	Periman	ceramic	3
4762	?/limited activity	House Creek	architecture	3
4767	?/limited activity	Periman	architecture	3
4776	?/limited activity	House Creek	ceramic	4

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

All sites should be assignable to an Anasazi subphase (missing limited loci part of settlement pattern). Therefore temporal assignment should be the major goal of investigations.

28 sites with 107 FSE, $\overline{X}$ FSE = 3.82 $\overline{S}$ FSE = 1.63

Table 2. Temporal-functional matrix of Anasazi (indeterminate phase) sites within the Dolores Project pool area (Page 2 of 2)

Site #	Function	Locality	Comments	FSE
4777	?/limited activity	Periman	rock art	5
4779	processing/communication	Periman	excavated	4
4780	shrine/limited activity	House Creek	architecture	3
4798	?/limited activity	House Creek	ceramic	2
4800	maintenance/limited activity	House Creek	awl sharpening grooves	1
5091	?/limited activity	Grass Mesa	ceramic	5
5092	?/limited activity	Periman	sherd	3
5094	?/limited activity	Periman	ceramic	3
5116	processing/limited activity	Sagehen	ceramic	2
5117	?/limited activity	Sagehen	1 sherd	3
5361	?/limited activity	Grass Mesa	sherd	4

Table 3. Temporal-functional matrix of Archaic/Basketmaker II sites within the Dolores Project pool area

Site #	Function	Locality	Comments	FSE
*2183	camp/seasonal	Periman	projectile point	4
*2202	small camp/seasonal	Sagehen	excavated	4
*2235	small camp/seasonal	Sagehen	excavated	2
*2236	small camp/seasonal	Sagehen	excavated	2
*2243	camp/seasonal	Sagehen	lithic	4
*2246	camp/seasonal	Sagehen	lithic	4
*4615	camp/seasonal	Dolores	projectile point	6
*4616	camp/seasonal	Dolores	grinding stone	2
*4678	camp/seasonal	Sagehen	projectile point	8
*4789	?/limited activity	Grass Mesa	excavated	1
4797	camp/seasonal	Grass Mesa	excavated	8
*4682	?/seasonal	Sagehen	projectile point	3
5098	?/limited activity	Periman	basin metate	2
*5118	?/seasonal	Sagehen	biscuit mano	1

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Assignments are made on positive evidence: diagnostic projectile points, one-hand "biscuit" manos or basin grinding stone.

Site universe will probably be augmented based on investigation of "indeterminate" sites. This is a conservative listing.

Number of sites and FSE are too high; should be 7-8 sites, 10-15 FSE. The zero habitation number reflects transitory occupation.

14 sites with 51 FSE, $\bar{X}$ FSE = 3.64 $\bar{S}$ FSE = 2.31

Table 4. Temporal-functional matrix of Sagehen Phase, Tres Bobos (A.D. 600-700) Subphase sites within the Dolores Project pool area

Site #	Function	Locality	Comments	FSE
2165	small/habitation	Grass Mesa	ceramic, architectural	10
2166	small/habitation	Grass Mesa	ceramic, architectural	10
2170	small/habitation	Grass Mesa	ceramic	10
2201	small(?)/habitation	Sagehen	ceramic	10
2212	small(?)/habitation	Grass Mesa	ceramic	10
*2213	small(?)/habitation	Grass Mesa	ceramic, projectile point	10
2232	small(?)/habitation	Periman	ceramic, architectural	10
4684	small/habitation	Periman	excavated	14
4691	small/habitation	Periman	ceramic	10
4723	small/habitation	Periman	ceramic	14

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Mean and standard deviation reflect small hamlet pattern with no field houses, etc. Some indeterminate sites may be reassigned here.

10 sites with 108 FSE, $\bar{X}$ FSE = 10.8 $\bar{S}$ FSE = 1.69

Table 5. Temporal-functional matrix of Sagehen Phase, Sagehill (A.D. 700-760) Subphase sites within the Dolores Project pool area

Site #	Function	Locality	Comments	FSE
*2151	unit hamlet/habitation	Grass Mesa	excavated	4
2178	processing(?)/limited activity	Periman	projectile point	4
2186	small/habitation	Periman	ceramic/architectural/ geologic	10
*2236	unit hamlet/habitation	Sagehen	excavated	10
*2246	?/limited activity	Sagehen	ceramic/lithic/geologic	3
*4524	small/habitation	Sagehen	ceramic/architecture	10
4546	small/habitation	Sagehen	ceramic/architecture	10
*4683	small/habitation	House Creek	analogy	10
4787	small/habitation	Grass Mesa	ceramic/architecture	15
*5118	?/limited activity	Sagehen	projectile point	1

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Should be similar to Tres Bobos (uniformly sized hamlets- conservative settlement pattern--no seasonal sites). Assignment of limited activity sites here is guesswork.

10 sites with 77 FSE, $\overline{X}$ FSE = 7.7 $\overline{S}$ FSE = 4.40

Table 6. Temporal-functional matrix of Sagehen Phase, Dos Casas (A.D. 760-850) Subphase sites within the Dolores Project pool area (Page 1 of 2)

Site #	Function	Locality	Comments	FSE
*0023	small/habitation (3)	Grass Mesa	suspected earlier component	50
*2151	small/habitation	Grass Mesa	excavated	8
*2161	small/habitation	Grass Mesa	suspected earlier component	8
*2181	small/habitation	Periman	excavated	16
*2182	small/habitation (3)	Periman	excavated	50
2189	small/habitation	Dolores	suspected 2-3 household clusters	16
*2202	processing/limited activity	Sagehen	excavated	3
2204	small/habitation	Sagehen	ceramics/lithics/ architecture	10
2210	small/habitation	House Creek	ceramics/architecture	16
2211	small/habitation	Grass Mesa	1 moccassin sherd/ architecture	15
*2216	small/habitation	Grass Mesa	architecture/analogy	10
2217	small/habitation	House Creek	ceramics/architecture	16
2224	small/habitation	Sagehen	ceramics	16

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Higher mean FSE reflects larger habitations; higher standard deviation reflects diversity in site type.

45 sites with 680 FSE, $\overline{X}$ FSE = 15.1 $\overline{S}$ FSE = 8.94

Table 6. Temporal-functional matrix of Sagehen Phase, Dos Casas (A.D. 760-850) Subphase sites within the Dolores Project pool area (Page 2 of 2)

Site #	Function	Locality	Comments	FSE
2225	small/habitation	Sagehen	ceramics/architecture	16
2226	small/habitation	House Creek	ceramics/architecture	12
*2236	unit/habitation	Sagehen	excavated	10
*2241	processing/limited activity	Sagehen	excavated	2
*2243	processing/limited activity	Sagehen	ceramics	4
2315	small/habitation	House Creek	ceramics/architecture	16
*2336	small/habitation	Dolores	suspected earlier component	8
2337	small/habitation	House Creek	ceramics/architecture	16
2338	small/habitation	House Creek	ceramics/architecture	16
4492	small/habitation	Dolores	ceramics/architecture	16
4494	small/habitation	Dolores	ceramics/architecture	16
4495	small/habitation	Dolores	ceramics/architecture	12
4507	small/habitation	Dolores	ceramics/architecture	16
4508	small/habitation	Dolores	ceramics/architecture	20
4514	small/habitation	Sagehen	ceramics/architecture	12
4595	small/habitation	Dolores	ceramics/architecture	20
4613	small/habitation	Dolores	ceramics/architecture	12
*4615	small/habitation	Dolores	ceramics/architecture	12
4617	small/habitation	Dolores	ceramics/architecture	12
*4623	small/habitation	Periman	ceramics/architecture	20
4624	small/habitation	Periman	ceramics/architecture	16
4651	small/habitation	Grass Mesa	ceramics/architecture	10
*4682	?/limited activity	Sagehen	ceramic/architecture	3
*4683	small/habitation	House Creek	architecture	20
4685	small/habitation	Periman	ceramic/architecture	20
4686	small/habitation	Periman	ceramic/architecture	20
4693	small/habitation	Periman	ceramic	16
4727	small/habitation	Dolores	ceramics/architecture	16
5087	small/habitation	Grass Mesa	ceramics/architecture	12
5090	small/habitation	Periman	ceramic/architecture	16
5093	small/habitation	Periman	ceramic/architecture	12
5154	small/habitation	Periman	ceramic/architecture	16

Table 7. Temporal-functional matrix of McPhee Phase, Periman (A.D. 850-900) Subphase sites within the Dolores Project pool area (Page 1 of 3)

Site #	Function	Locality	Comments	FSE
*0023	village/habitation	Grass Mesa	excavated	1500
2160	field house/seasonal	Grass Mesa	no architecture/ceramic	4
*2161	large/habitation	Grass Mesa	excavated	30
2169	small/habitation	Grass Mesa	ceramic/architectural	10
2174	field house/seasonal	Grass Mesa	excavated	2
2175	field house/seasonal	Grass Mesa	analogy	4
*2181	field house/seasonal	Periman	excavated	2
*2182	village/habitation	Periman	excavated	200
*2183	field house(?)/seasonal	Periman	architecture	4
2184	small/habitation	Periman	architecture	15
2191	field house/seasonal	Sagehen	excavated	4
2196	small/habitation	Periman	ceramic/architecture	20
*2202	processing/limited activity	Sagehen	excavated	3
2207	??/trail	Grass Mesa	analogy/hand & toe holds general settlement pattern	.5
2229	small/habitation	Sagehen	ceramic	20

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Higher mean and standard deviation reflect extreme complexity of settlement pattern--but Grass Mesa creates bias.

49 sites with 2876.5 FSE, $\overline{X}$ FSE = 58.7 $\overline{S}$ FSE = 22.9

Table 7. Temporal-functional matrix of McPhee Phase, Periman (A.D. 850-900) Subphase sites within the Dolores Project pool area (Page 2 of 3)

Site #	Function	Locality	Comments	FSE
2234	seasonal/?	Sagehen	ceramic/architecture	3
*2246	?/limited activity	Sagehen	ceramic/lithic/architecture geology	3
2318	large/habitation	Periman	ceramic/architecture	60
2323	small/habitation	House Creek	ceramic/architecture	20
*2336	village/habitation	Dolores	architecture suggests McPhee crescent	68
*4475	village/habitation	Periman	excavated	100
*4476	large/habitation	Periman	ceramic/analogy	30
*4477	large/habitation	Periman	excavated	66
*4478	small/habitation	Periman	ceramic/analogy	16
4479	small/habitation	Periman	excavated	14
4480	village/habitation	Periman	excavated	60
4482	village/habitation	Periman	architecture/analogy	50
4493	small/habitation	Dolores	ceramic/architecture	20
4512	field house/seasonal	Sagehen	excavated	8
4515	field house/seasonal	Sagehen	ceramic/architecture	6
4525	field house/seasonal	Sagehen	ceramic/architecture	6
*4616	small/habitation	Dolores	ceramic/architecture	20
4621	large/habitation	Periman	architecture/analogy	30
4622	large/habitation	Periman	architecture/analogy	30
*4623	small/habitation	Periman	architecture/analogy	12
4650	large/habitation	Grass Mesa	excavated	30
4671	large/habitation	Periman	excavated	40
*4678	?/limited activity	Sagehen	ceramics	2
*4692	village/habitation	Periman	ceramic/architecture	72
4725	village/habitation	Sagehen	excavated	66
4784	field house/seasonal	House Creek	architecture	4

Table 7. Temporal-functional matrix of McPhee Phase, Periman (A.D. 850-900) Subphase sites within the Dolores Project pool area (Page 3 of 3)

Site #	Function	Locality	Comments	FSE
4793	large/habitation	Periman	ceramic/architecture	40
5103	small/habitation	Periman	ceramic/architecture	16
5104	small/habitation	Periman	ceramic/architecture	16
5105	small/habitation	Periman	ceramic/architecture	16
5106	village/habitation	Periman	ceramic/architecture	40
5107	village/habitation	Periman	ceramic/architecture	44
5108	large/habitation	Periman	ceramic/architecture	30
5121	small/habitation	Periman	ceramic/architecture	20

Table 8. Temporal-functional matrix of McPhee Phase, Cline (A.D. 900-970) Subphase sites within the Dolores Project pool area

Site #	Function	Locality	Comments	FSE
2203	field house/seasonal	Sagehen	ceramic	3
*4475	village/habitation	Periman	excavated	150
*4476	large/habitation	Periman	ceramic/architecture	30
*4477	large/habitation	Periman	excavated	40
*4544	?/limited activity	Sagehen	ceramic	2
4625	small/habitation	Periman	ceramic/architecture	16
4654	storage/limited activity	Periman	ceramic/architecture	5
*4661	storage/limited activity	Periman	architecture	2
4663	storage/limited activity	Periman	architecture	3
*4692	village/habitation	Periman	ceramic	4
4693	small/habitation	Periman	ceramic	16
4799	storage/limited activity	House Creek	architecture	1
5095	small/habitation	Periman	ceramic	16
5105	small/habitation	Periman	ceramic/architecture	16
5106	small/habitation	Periman	ceramic/architecture	16
5107	small/habitation	Periman	ceramic/architecture	16
5108	small/habitation	Periman	ceramic/architecture	16

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

17 sites with 352 FSE, $\bar{X}$ FSE = 20.7 $\bar{S}$ FSE = 35.0

Table 9. Temporal-functional matrix of Sundial (A.D. 1050-1200) Phase sites within the Dolores Project pool area

Site #	Function	Locality	Comments	FSE
2190	(?)seasonal	Dolores	2 late sherds, sandstone blocks on talus	6
*2151	(field house camp)/seasonal	Grass Mesa	excavated	4
2188	processing/limited activity	Grass Mesa	1 corrugated sherd/ small shelter	3
*2213	processing/limited activity	Grass Mesa	1 corrugated sherd	.5
*2216	camp/seasonal	Grass Mesa	2 corrugated sherds/analogy	2
*2235	small/habitation	Sagehen	excavated	8
2237	processing/limited activity	Sagehen	ceramic	2
*2241	?/seasonal	Sagehen	excavated	3
*2182	tower/seasonal	Periman	excavated/architecture	2
2219	tower/seasonal	Periman	architecture	4
2215	small/habitation	House Creek	excavated/architecture	10
2332	?/limited activity	House Creek	ceramic	4
*4524	?/limited activity	Sagehen	ceramic	1
*4544	?/limited activity	Sagehen	ceramic	2
4729	small/habitation	Dolores	ceramic/architecture	16
*4789	storage/limited activity	Grass Mesa	excavated	1
*4678	?/limited activity	Sagehen	ceramic	2
*4688	?/limited activity	Sagehen	ceramic	4
5112	?/limited activity	Sagehen	ceramic	6
5094	processing/limited activity	Periman	ceramic/geologic	3
*4683	?/seasonal	House Creek	ceramic/architecture	2
4774	tower/seasonal	House Creek	architecture	3
4792	?/limited activity	House Creek	ceramic	3
4794	?/limited activity	House Creek	ceramic/architecture	4
5383	?/limited activity	Dolores	ceramic	4

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Lower mean and standard deviation reflect return to simple settlement pattern.

25 sites with 99.5 FSE, $\bar{X}$ FSE = 3.98 $\bar{S}$ FSE = 3.31

Table 10. Temporal-functional matrix of Shoshonean-Early Historic (A.D. 1800-1870) sites within the Dolores Project pool area

Site #	Function	Locality	Comments	FSE
2164	seasonal/camp	Grass Mesa	written record	2

Table 11. Summary of tables 1-10, temporal-functional matrix of prehistoric sites within the Dolores Project pool area (Page 1 of 2)

Temporal		Site Function: limited activity				seasonal				habitation				Total			
		N		FSE		N		FSE		N		FSE		N		FSE	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Indeter, no ceramics		39	93/40	174	93/49	3	7/8	14	7/9	0	0/0	0	0/0	42	100/17	188	100/4
Indeter, w/ ceramics		26	93/27	95	92/27	2	7/5	8	8/5	0	0/0	0	0/0	28	100/12	103	100/2
Archaic or BMII		2	14/2	3	6/1	12	86/32	48	94/32	0	0/0	0	0/0	14	100/6	51	100/1
SAGEHEN	Tres Bobos	0	0/0	0	0/0	0	0/0	0	0/0	10	100/9	108	100/3	10	100/4	108	100/2
	Sagehill	3	30/3	8	10/2	0	0/0	0	0/0	7	7/7	69	90/2	10	100/4	77	100/0
	Dos Casas	4	9/4	12	2/3	0	0/0	0	0/0	41	91/39	668	98/17	45	100/19	680	100/15
	Subtotal	(7)	(11)/(7)	(20)	(2)/(6)	(0)	0/0	(0)	0/0	(58)	(89)/(55)	(845)	(98)/(21)	(65)	(100)/(27)	(865)	(100)/(19)

NOTES: Percentages are expressed as $\frac{\text{N row percent}}{\text{N column percent}}$

FSE - Full Site Equivalent.
Indeter - Indeterminate.
w/ - With.
Hist - Historic.

Table 11. Summary of tables 1-10, temporal-functional matrix of prehistoric sites within the Dolores Project pool area (Page 2 of 2)

Temporal		Site Function: Limited activity N N	%	FSE N	%	seasonal N N	%	FSE N	%	habitation N N	%	FSE N	%	Total N N	%	FSE N	%
McPHEE	Periman	4	8/4	8.5	0/2	11	22/29	47	2/32	34	69/32	2866	98/70	49	99/20		100/63
	Cline	5	30/5	13	4/4	1	6/3	3	1/2	11	65/10	346	96/09	17	101/07	362	101/8
	Subtotal	(9)	(14)/(9)	(21.5)	(01)/(6)	(12)	(18)/(32)	(50)	(34)/(02)	(45)	(68)/(42)	(3168)	(98)/(78)	(66)	(100)/(27)		(101)/(71)
Sundial		14	56/14	39.5	40/11	8	32/21	26	26/18	3	12/3	34	34/1	25	100/10	99.5	100/0
Shoshonean/ Early Hist		0	0	0	0	1	100/3	2	100/1	0	0	0	0	1	100/0	2	100/0
Total		97	40/99	353	8/99	38	16/98	148	3/99	106	44/100	4047	89/102	241		4548	

discussed briefly in the introduction to this chapter. Functional assignments have been made primarily on the basis of architectural form (either present or absent) and site layout. Functional classes (also defined by Kane 1983) include three general groups (limited, seasonal, and habitation) with more specific subclasses (limited: processing, quarry, art, maintenance, shrine, storage, trail; seasonal: tower, camp, field house; habitation: unit hamlet, small hamlet, large hamlet, village). FSE assignments have been made following the rules previously outlined.

Tables 12 through 19 are an assignment of the prehistoric components and sites along Reach I of the Dove Creek Canal to a similar temporal-functional matrix. Since that area is not within the immediate Dolores valley, temporal units from the Pecos Classification (Kidder 1927; Watson 1954) have been used. A general evaluation of the confidence of these assignments is provided for each site in tables 12 through 19 with a brief identification of the information used as the basis for making matrix assignments.

As discussed previously, there is some difference between the archaeologically (and presumed culturally) significant geographical unit in the Dolores region, and the lands impacted by the Bureau of Reclamation water project. The universe within which we are directing our research attention is the broader unit of cultural significance (using "universe" as have Binford [1972:139] and Chenhall [1975:6]). However, the target population (Chenhall 1975:5) from which we must recover data is limited to Bureau of Reclamation project lands and must serve as the sampled population (Chenhall 1975:5) for most DAP data analysis. Through sampling, a valid and reliable characterization of population parameters must be derived from the sampled population.

Table 12. Temporal-functional matrix of Archaic (prior to A.D. 500) sites within Reach 1, Dove Creek Canal, Dolores Project

Site #	Function	Sector	Rationale	Confidence	FSE
*6065	?/limited activity	Yellowjacket	projectile point	medium (60/40)	1

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Total: 1 component, 1 FSE.

Table 19. Temporal-functional matrix of Pueblo IV (A.D. 1400-1700) sites within Reach I, Dove Creek Canal, Dolores Project

Site #	Function	Sector	Rationale	Confidence	FSE
*5462	?/limited activity	Yellowjacket	ceramic	high (85/15)	1

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Total: 1 components, 1 FSE.

Grand total: 44 components, 530 FSE.

It is the qualitative evaluation of the DAP, based on several years of reconnaissance and excavation experience within the project area, that the population of prehistoric sites within the pool area (including those parts of the borrow areas, damsite, and access roads below 2111 m elevation) is an archaeologically significant grouping from which valid information about the universe of concern can be inferred. The pool area is large and continuous, appears to include most of the major elements of a prehistoric Anasazi settlement-subsistence system, and has had close to 100-percent survey coverage of its prehistoric resource base. Therefore, the temporal-functional matrix of pool-area sites is acceptable as both a target and sampling population for assessing the representativeness and reliability of the DAP data-recovery effort, supplemented with data from sites found elsewhere in the Dolores Project area to gain a regional perspective.

Strategies for Assessing Program and Sample Adequacy

> probability sampling strategies are very useful, but. . . they should never be applied naively or with a blind faith that they will guarantee "scientific" certainty to our conclusions. Often the best strategies are multistage designs with intelligent mixtures of purposive selection and probability sampling. . . .The size and complexity of the sample required depends very strongly on the kinds of questions we ask. For rather simple questions fairly small samples will serve, but for many of the questions we are asking today, especially concerning internal structure and systemic aspects of regions or sites, the sample needs to be rather large. The implication is neither that we should forget about probability sampling and rely wholly on intuition, nor that meaningful research is impossible. Rather, it is that statistical expertise can make our research more efficient. . . (Cowgill 1975:274).

The DAP is specifically designed to employ a multistage strategy of data-recovery methods, as has been recommended by Cowgill and others. Thus, the temporal-functional matrix presented above organizes the Dolores

site data in terms of our major research directions so that we can insure the broad representativeness of the recovered information. At one level "mitigation" of the damage or destruction of the Dolores cultural resource comes through the purposive selection of a cross section of the resource's organizational and distributional variability. Intensive investigation of one site from each cell within the large population frame will fulfill a requirement for "representativeness." Limitation of such selection to only one site within each cell, however, will usually be a research error; the single "representative" may be an unreliable expression of the variability present among all the members of that cell (cf. Binford 1972:147).

Evaluations of intrasite variability focus on the distribution and characteristics of archaeological data sets across the target population of sites and not on the sites themselves (cf. Bull and Snow 1980). Thus, the DAP is concerned about obtaining a statistically reliable or "adequate" sample of the variability expressed among artifacts, ecofacts, features, and cultural activity areas. We are seeking to insure that the samples of recovered data are a reliable reflection of the characteristics of the total resource base about which we are asking questions of cultural process. Thus, "adequacy" of our mitigative effort is defined as a level of confidence in our sample reliability and can be expressed as some measure or rate of uncertainty (e.g., confidence interval, probability, distribution, acceptable error rate). These are techniques for assessing the minimal sample size necessary to be confident in an extrapolation to describing a target population--it can be viewed as a statement of sufficiency. Determining the statistical techniques appropriate for making these evaluations is not a function of this design statement, but

is being addressed in second-level DAP documents and reports (e.g., Kohler and Schlanger 1980; Hackenberger and Kohler 1981).

In order to be efficient about our data base evaluation, given our research structure and a focus on diachronic questions of cultural process (why did people settle, thrive in, and desert the Dolores area?), we suggest that there are a few "indicator data sets" (table 20) whose distributions across the resource base are critical markers of the broader and more complex patterns of variability. Information about these data sets is presently available in survey and excavation data in sufficient quantities that we can preliminarily model their distribution across the entire target population, including their allocation across the temporal-functional matrix.

In his 1964 discussion of archaeological research design, Binford (1972:140-141) reviewed eight principles that should underlie the development of research designs directed toward reliable and valid sampling programs. These include clear definition of the target and samples populations and sampling units; population partitioning in many small but equal-sized units to aid in sample representativeness; independence of sampling units and sampling method; use of the same units for sampling, tabulation, and analysis; full cataloging of the population with each sampling unit listed; and accessibility of every unit drawn for the sample. With the development of the pool area temporal-functional matrix of population information, with its structure by components and notation of FSE for unit size comparability, many of the requirements for a reliable DAP sampling program have been met. Thus, the final phases of the program should be able to balance both purposive selection and rigorous sampling to recover a data base that meets the concerns of the public in the Dolores Project.

Table 20. Indicator data sets and approaches for sample identification

Data set	Approach
Ceramics and lithic tools with tightly dated contexts	Determine present sample size and temporal distribution of sample; set lowest acceptable number of data points per 100-year interval for establishing seriation
Well-dated clusters of associated features	Determine numbers and temporal-functional distriubtion of elements; assess feature clusters for contemporaneity, functional variability, preservation, and artifact/ecofact associations
Habitation floor area estimates	Examine variability per household cluster in habitation sites excavated to date; set lowest acceptable number of floors per 100-year interval to establish temporal variability
Deep, well-preserved middens	Identify sites having deep middens; assess potential for sampling typical household refuse including ecofacts; assess potential for intrasite comparison with refuse from occupation surfaces
Probability sample, intrasite	Examine temoral-functional distribution of sites investigated to date that have been collected and tested with probabilistic methods; establish minimum acceptable number of sites per matrix cell for allocation of future sites designated for probability sampling
Probability sample, survey between pool and takeline	Apply formal confidence interval approach; result is minimum sample size to determine population totals per cell with a predetermined error rate

A priority task in this direction is to develop a fieldwork plan for the remainder of the program.

SUMMARY

The total design of a mitigative recovery effort such as the DAP is complex and multistage; at the DAP it is set forth in a variety of documents, each appropriate to a specific level of investigative effort. This document, the "Dolores Project Cultural Resources Mitigation Design," is intended to be the conceptual umbrella under which other design and planning documents, and the performance of the program, are tested. It is the broadest outline of the theories and methods within which the DAP operates, and includes three major elements:

1. An introduction to the project and its resource base.
2. An outline of the research strategy, which is the structure of inquiry that is to be followed in the recovery of information important to the behavioral study of cultural history and process.
3. A statement of the methods being used to insure that the recovered data are a reliable and representive reflection of the adversely impacted cultural resource base.

The mitigation design was initially viewed as a processual document that would be modified as more information about the resource parameters became available. It would be more appropriate to see it as a firm statement of program directions and resources, and as an outline of a multistage approach to data recovery that now merits well-managed implementation.

As second level efforts, apart from but related to this document, the next stage of DAP data recovery documents will consist of the following: an assessment of minimal sample size necessary to be confident in describing a target poulation; multiple explanatory models of Dolores

culture history and process, with test implications amenable to testing with program data; and a fieldwork plan for the remainder of the program.

little cost if standard inventory survey is suplemented at selected sites with magnetometer survey, more extensive controlled surface colletion, or in some cases, by limited testing to obtain datable materials. Obtaining this increase in precision of population estimates through time and space is essential because of the evident rapidity with which some of the population changes occurred in the study area and adjacent areas. Furthermore, we need to be able to compare the rates of growth and decline among the main McPhee villages if we are to identify the role of immigration and emigration in the rise and fall of these settlements, and hence of this critical phase of Dolores prehistory in general. Consequently, the population trajectories of these villages need to be more precisely known.

Although the modeling effort focuses on identifying and assessing general cultural processes controlling Dolores area cultural stability and change, while cultural reconstruction focuses on specific cultural patterns and lifeways, the data needs of these two major kinds of synthetic studies often overlap. Consequently, it will often be possible to identify sites, and kinds of contexts within sites, which can yield data suitable for both goals.

Cultural Reconstruction

The presentation of the prehistory of the project area included in the DAP 1981 synthetic report (Kane 1981) includes identification of areas of data deficiency that must be remedied before an adequate cultural reconstruction can be completed. Most of these deficiencies can be rectified by specific excavation programs and subsequent analyses. A general need is for more complete information regarding spatial-temporal patterning; that is, we must establish whether local Dolores area patterns

are similar to or differ from regional patterns of cultural homogeneity or heterogeneity. A critical aspect of this problem is establishing patterns in the southern portion of the central study area. The DAP has not yet conducted any excavation or testing operations in the southern portion of the main pool or in McPhee Recreation Area and patterns here ar a vital e complement to our accomplished or in progress work to the north.

Another aspect is establishing patterns specifically for the Archaic Tradition, as the sites with Archaic components thus far investigated by the program have yielded little information and apparently represent seasonal use by migratory peoples. More specific data deficient areas for cultural reconstruction are listed as follows, organized by problem domains.

Problem Domain 1: "Economy and Adaptation". A vital data category for answering many of the posed questions integral to this domain is identification and amounts of resources used by the local prehistoric peoples. We have acquired a manipulable sample for most recognized periods of materials and items not subject to deterioration as a result of post-abandonment deposition and erosion; we do not have a representative sample of perishable artifacts or ecofacts.

A second deficient area is data necessary to reconstruct contemporaneous settlement patterns and specific usages of limited activity sites; for example, for the McPhee Phase, we have excavated several habitations and seasonal loci, but have not adequately investigated the limited activity component of local settlement patterns.

Problem Domain 2: "Paleodemography". In analyzing prehistoric demographic patterns in the Dolores area, program staff are primarily interested in two aspects of population studies: first, population levels studies: first, population levels and fluctuations (including absolute

numbers, comparative densities, and population movements); and second, the age, sex, and health characteristics of Dolores populations (Kane 1981). To reconstruct numbers, densities, and movements, we must have accurate and comprehensive field data regarding placement, absolute age and composition of habitation sites within the study area, and a selected sample of such information from areas peripheral to the study area. While work continues to fulfill this objective we have not as yet achieved it.

Reconstruction of age, sex, and health characteristics requires a statistically manipulable sample of human skeletal remains; we currently lack this necessary data base.

Problem Domain 3: "Social Organization". As stated by Kane (1981) we must recover a more adequate excavation sample of residence units and integrative or shared structures; we probably have recovered the desired sampling level for the Sagehen Phase within the central study area. Completion of a more comprehensive sampling program is necessary to reconstruct the more complex patterning evident during the subsequent McPhee Phase. We have presently virtually no data concerning Sundial Phase (post-A.D. 950) residence units or integrative structures, because they are confined to the south portion of the study area.

Problem Domain 4: "Extraregional Relationships". At present we do not perceive any specific data deficiencies in this domain. In order to test Travis's (1981) model of Dolores exchange systems, it is necessary to obtain a representative sample of data from the study area and a regional perspective. These needs correspond to those previously expressed to establish spatial-temporal patterning.

Problem Domain 5: "Cultural Change". Remaining data requirements needed for reconstructing prehistoric culture change are to recover

information regarding temporal patterning from the southern portion of the study area and to give a regional overview. The following questions are pertinent to this last criterion.

1. Is the initial colonization of the Dolores River valley and surrounding highlands at A.D. 600 a local or regional phenomenon? In other words, was the local influx of peoples part of a "wave" type of migration which resulted in expansion of the entire northern frontier of Anasazi settlement; or, was it part of a movement targeted on the Dolores area which left adjacent areas still unpopulated?
2. Is the local pattern of growth/aggregation in the A.D. 700s and A.D. 800s replicated in the Yellowjacket and Mesa Verde Districts outside of the Dolores area? If so, are these processes accelerated or retarded as compared to Dolores?
3. Are the local responses (for example, apparent simplification of social structure and economic strategies at Grass Mesa Village versus emigration at Rio Vista and House Creek Villages) to the early A.D. 900s stress period replicated in other areas? What responses or related phenomena are evident in the southern portion of the study area?

Completion of Work Begun in Previous Years

There are currently seven sites (Site 5MT0023, Site 5MT2182, Site 5MT2320, Site 5MT4475, Site 5MT4477, Site 5MT4480, and Site 5MT4797) that are regarded as in progress and as requiring additional work. This additional effort is necessary to acquire needed data in preparing coherent, logical site reports and to assemble useful site-specific data files.

Fieldwork Program Goals and Strategies for 1982-1983

After reviewing the areas of perceived data deficiencies, the program staff has developed the following primary goals for the fieldwork program and specific strategies for achievement. The goals are refinements and combinations of the areas of data deficiency previously identified.

Goal 1 - Recovery of Field Data Needed for Reconstruction and Explanation of Spatial Patterning

We need to acquire the data necessary to establish cultural patterns of homogeneity and heterogeneity in the southern portion of the central study area; we also need to establish such patterning in peripheral areas to formulate a regional overview. Aspects of this need include artifact and facility patterning on living surfaces, spatial patterns of residential units and integrative structures, site-environment relationships and relationship of settlement pattern units. Such data are vital for formulation and testing of the program model of culture change and for cultural reconstruction. They are also necessary to estimate population numbers and movements.

Field Strategy. We plan to implement multiple approaches to meet this requirement.

Inventory survey of project impact areas: The inventory of the House Creek recreation area and the May Canyon road alinement should add significantly to our knowledge of spatial patterning within the study area. Survey of more distant impact areas will provide data necessary for the regional overview.

Probability survey of selected areas: We propose to implement the probability survey in selected areas in 1982 and 1983 to complement the inventory survey; this operation would cover "gaps" in the inventory

survey coverage. Survey outside project area boundaries will be at no cost to the government.

Magetometer survey program: Data from magnetometer operations will be used to augment the survey data; it will be useful in establishing site layouts of residential units and integrative structures and in estimating populations.

Testing and more thorough excavation of selected units at sites within the central impact area, and similar operations at sites in peripheral impact areas: Within the central study area we plan to expand the focus of our excavations to the south and east. Specifically we plan work at Site 5MT4615 (south portion of pool) and Site 5MT4794 to expand our knowledge of the Archaic Tradition; at sites "M" and "N" (not selected, in House Creek recreation area), and Site 5MT2735 (tentative selection, in McPhee recreation area) to expand knowledge of spatial patterning during the A.D. 600-850 period; at Site 5MT2182 (main pool area), Site 5MT2320 (House Creek Recreation Area) and Site 5MT2336 (south portion of main pool area) for the A.D. 850-950 period; and at Site 2372 (Dove Creek Canal, Reach 1), Site 5MT4729 (south portion of pool), Site 5MT4683 (east portion of pool) and "A," "B," and "C" (in McPhee recreation area) for the post-A.D. 950 period.

To aid in constucting a regional overview of spatial patterning we plan excavation of four sites ("Q," "R," "X," and "Y") in the Dove Creek canal, Reach I and II impact features. The investigations will be focused on providing comparative material for the central study area data base.

Goal 2 - Household Cluster Patterning

Acquiring a more comprehensive sample of household clusters is vital

to provide information for reconstruction of prehistoric economies and composition of residence units and for estimating the trajectory of economic intensification and labor differentiation, critical variables for the model of culture change. We regard this problem as especially important for the A.D. 850-950 and post-A.D. 950 periods.

Field Strategy. A portion of remaining excavations will be focused on recovering a sample of household clusters (room suites) and associated surfaces at large McPhee Phase villages and post-A.D. 950 settlements. Sites tentatively scheduled for this part of the program are Site 5MT0023, Site 5MT2320, Site 5MT2336, Site 5MT4475, Site 5MT4477, and Site 5MT4729 (all within the pool area), "A," "B," and "C" (all in McPhee recreation area), and Site 5MT2372 (Dove Creek canal, Reach I). Pre-A.D. 850 habitation sites chosen for excavation primarily to investigate temporal or spatial patterning will also yield dates pursuant to this goal (Site 5MT2835, "M" and "N," "Q," "R," "X," and "Y").

Goal 3 - Recovery of Faunal and Botanical Remains from Cultural Deposits

This information is vital in reconstructing prehistoric economies and in establishing the relationship between the prehistoric and modern environments.

Field Strategy. To implement this portion of the master plan we propose to sample midden areas at selected habitation sites (tentatively Site 5MT0023, Site 5MT4475, Site 5MT2372, and Site 5MT2182) and to test/excavate several rock shelters that potentially contain dry deposits with good preservation characteristics (tentatively Site 5MT2216, Site 5MT4654, Site 5MT4661, Site 5MT4683, Site 5MT4774, Site 5MT4792, and Site 5MT4797).

Goal 4 - Recovery of Human Burials and Skeletal Material

This information is vital to reconstruct prehistoric demography and may yield information regarding social organization (status) necessary for model testing.

Field Strategy. In addition to proposed midden and pitstucture excavations (conducted primarily for other purposes) which may result in the recovery of this type of information, we propose to field a testing crew to augment recovery. The crew would use heavy equipment to test pitstructure fills at sites or site areas not slated for other work. Results from the magnetometer survey program will be used in scheduling these operations. We plan to limit this type of work to McPhee Phase habitations, as the potential to obtain a statistically manipulable sample is best for this period.

Goal 5 - Recovery of Residence Units and Integrative Structures

The information is vital to reconstructing social organization and in estimating role differentiation and group integration.

Field Strategy. We propose to define the spatial relationship of residential units by stripping habitation areas at several sites. We also plan to obtain a better sample of interhousehold and community-shared structures through testing and excavation. Sites tentatively selected for work with this goal in mind are Site 5MT0023, Site 5MT2320, Site 5MT4475, Site 5MT4477, Site 5MT2336, Site 5MT4480, Site 5MT4683, Site 5MT2372, and sites "A," "B," and "C". Sites primarily selected for work in order to obtain data concerning spatial and temporal patterning also may yield valuable data for this objective.

Goal 6 - Recovery of Data for Estimating Temporal Patterning

Such information is necessary for understanding cultural processes

and to evaluate individual site information in a more general perspective.

Field Strategy. We propose to implement basically the same strategy (inventory survey, probability survey, magnetometer survey, excavation within the central study area, and excavation in more distant features) proposed in fulfilling Goal 1 to obtain the desired perspective. In addition, the testing crew noted in the discussion of Goal 4 will also be directed to recover a sample of ceramics from well-bounded strata for temporal seriation, and to recover wood suitable for tree-ring samples. This portion of the program should allow some fine-scale temporal comparison within the central impact area.

Goal 7 - Completion of Data Recovery at Sites begun During Previous Years

Such work would be selective and complement other goals; data previously recovered would become more useful.

Field Strategy. The sites which we regard as incomplete are as follows: Site 5MT0023, Site 5MT2182, Site 5MT2320, Site 5MT4475, Site 5MT4477, Site 5MT4480, and Site 5MT4797. We plan some additional work at all seven sites.

Goal 8 - Completion of Probability Excavation Sample

This information is necessary to render the probability sampling program more effective in achieving project goals (estimation of site content from surface evidence, population estimates, duration of occupation estimates, etc.)

Field Strategy. We propose to complete the probability excavation sample by conducting this type of operation at Site 5MT0023, Site 5MT2182, Site 5MT4477, Site 5MT2336, and sites "X," and "Q."

Specific Details of the Fieldwork Master Plan

Consideration of the identified goals, specific sites and scheduling constraints were inputs into the "Fieldwork Master Plan"; this is presented in table A.1. The crew week (one ten-man crew for one week) breakdown by temporal categories is as follows (surveys not included):

Archaic Tradition: 4.0

Sagehen Phase (Escalante Sector): 9.5

A.D. 600-850 (other sectors): 10.5

McPhee Phase (Escalante Sector): 111.7

Sundial Phase (Escalante Sector): 16.8

Post-A.D. 950 (other sectors): 8.0

The breakdown by impact and study area is as follows (including survey):

Central study area:	143.0 crew weeks
Pool area:	120.0 crew weeks
McPhee recreation area:	10.0 crew weeks
House Creek recreation area:	13.0 crew weeks
Other impact features:	38.5 crew weeks
Dove Creek canal, Reach I (excavation):	12.5 crew weeks
Dove Creek canal, Reach II (excavation):	6.0 crew weeks
Surveys of impact features:	20.0 crew weeks
Other areas*:	3.5 crew weeks
TOTAL:	185.0 crew weeks

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*Probability survey done at no cost to government.

Introduction

For planning purposes of the contractor and the Bureau of Reclamation, the CU field director with the input of other DAP Senior Staff members has prepared this document detailing proposed fieldwork and justifications for the remainder of the project. This is admittedly a qualitative approximation based on Senior Staff perceptions of data deficiency and is not based directly on evaluation of temporal-functional matrices reflecting impact area resources. Our work with indicator data sets that would provide statistical support for fieldwork programs is incomplete. The Senior Staff is of the opinion that consideration of such quantitative evidence would not substantially change the proposed fieldwork program. Information relating to deficiencies in categories of data needed to complete the mitigation program was obtained from the DAP 1981 synthetic report (Dolores Archaeological Program 1981), the modeling overview authored by Lipe (1981), the reports by Kohler (1981) detailing the results of the probability excavation sampling program, in-house site reports summarizing incomplete investigations by the supervising crew chiefs, and briefings by the laboratory director and ADP (Automated Data Processing) task specialists regarding the status of site forms and data input.

Current estimates and projections indicate that at the end of the 1981 field season the DAP will have completed approximately 65-70 percent of the desired field studies. By the beginning of fiscal year 1982, we will have accomplished approximately 340 crew weeks (one ten-person crew for one week equals one crew week) of effort and justification is presented here for an additional 180 crew weeks resulting in a proposed total effort of 520 crew weeks. This total is approximately 5-6 percent of the total

tential effort (8750-10,000 FSE [full site equivalent] crew weeks) estimated for the entire project impacted resource. It is expected that the plan presented will undergo some modification based on the results of 1981 and 1982 fieldwork and analysis, agency needs, and budgetary considerations.

Field Data Needed to Complete the Program

The ultimate objective of the DAP is to preserve the information from archaeological resources impacted by the Dolores Project; these resources are a vital part of the cultural heritage of our nation, and their destruction would cause irreparable harm to knowledge of the past. The DAP Senior Staff envisions three major program contributions to fulfill the following preservation requirements:

1. A series of reports presenting the results of modeling the processes that controlled cultural stability and change during the major period of Anasazi occupation (i.e., A.D. 600-975) in the central study area.[1]

2. A series of reports presenting specific reconstructions of the prehistoric cultures of the Dolores area. These will include phase syntheses, as well as studies which address selected questions from the general research design (i.e., the nature of technological systems, of household organization, etc., at various points in time). Such studies can also form the basis for dissemination of information to the public

[1]The central study area is defined as the Dolores River canyon and surrounding highlands downstream (north) of Dolores to the damsite; Escalante Sector and Dolores area can be considered synonymous terms. The central study area includes the following project impact areas: borrow areas; the damsite and main pool area; Great Cut dike; and McPhee and House Creek recreation areas.

through displays at the Anasazi Heritage Center, through popular books and articles, and the like.

3. A comprehensive research data base including specimen collections; archived notes, maps, and other records; flexible computerized data files; and descriptive site reports detailing data contexts in a comparable manner from site to site.

Tabulation of data presented in impact area temporal-functional matrices illustrates that the overwhelming majority of the resources are temporally placed in the A.D. 800-950 periods. The program staff has therefore focused on this period (the late Sagehen and McPhee Phases in program terminology and the late Pueblo I-early Pueblo II period, using the Pecos Classification) as the most significant in terms of potential contribution to the public and professional interest. Our modeling efforts and much of our cultural reconstruction syntheses are directed at this part of the resource. Such a focus complements the archaeological base at Mesa Verde National Park where efforts have mainly addressed the post-A.D. 1000 (Pueblo II-Pueblo III) Anasazi cultures.

The recently completed synthetic report preparation effort and continued work with model development have highlighted several data deficiencies that must be remedied for successful completion of program analyses and studies. These deficient areas are as follows:

Modeling. The staff's preliminary approach to modeling cultural stability and change (Lipe 1981) postulates that the primary variables requiring cultural data are resource use (as an indicator of resource cost or availability); economic intensity; population; and social differentiation/integration.

Additional data on resource use need to be obtained from midden sampling, especially at McPhee Phase habitations, and if possible, at seasonally used loci of this phase. Such data are needed to test hypotheses regarding changes in wild plant and animal use thought to accompany population growth and economic intensification. Additional data on sizes and species of wood used for construction and fuel are also needed to determine if shifts of species selection are occurring. Such shifts are potential indicators of wood resource depletion or shifts in effort devoted to obtaining wood. Here, additional collection of wood samples from McPhee Phase habitations is recommended. Comparable data are needed from Sundial Phase sites, both in the categories of plant and animal remains from middens, and in wood use evidence from habitations. Since the Sundial Phase population appears to have been much lower than that of the McPhee Phase, Sundial Phase data will allow assessment of the degree to which changes in resource use are a function of population size and density. Sagehen data are also critical in this regard, but it is thought that existing Sagehen Phase data are as good as can be obtained, given conditions of preservation in Sagehen sites.

The postulated trajectory for economic intensification in the project area includes increasing emphasis on food storage, trade, specialization of certain economic activities, and increasing division of labor. These accompany population growth (and perhaps decreasing resource availability) during the Sagehen and McPhee Phases. Data required for this area of the model are derived from properties of artifacts, from artifactual distributions, and from analyses and comparisons of facilities and activity areas. Data needs are most critical in this last area--activity areas and facilities. What is needed is a large enough sample of living surfaces of

all temporal divisions, and a good enough geographic spread of the sample to permit comparison among areas of differing population density and resource availability. At present, we have not met this requirement for the Periman and Cline subphases of the McPhee Phase, and Sundial Phase excavations also have not been extensive enough in this regard. The Cline Subphase and Sundial Phase data are essential to permit assessment of the degree to which organizational and techological changes associated with population buildup (i.e., in late Sagehen and Periman subphases) are reversed when population declines (i.e., in the Cline Subphase and Sundial Phase).

Social structural differentiation and accompanying integration are thought to vary with population density and aggregation, as well as with degree of economic intensity. In addition to indicators of economic role differentiation noted in the preceeding paragraph, other types of structural differentiation need to be examined, including evidence of inequality or status differentiation. Characteristics of household clusters (e.g., relative size, quality of construction, number and types of features, etc.) as well as burial associations, need to be examined for evidence of status differentiation. The DAP does not yet have in hand a statistically manipulable sample of either of these types of data for the critical McPhee Phase. Again important for comparative purposes, though of lesser priority, are such data from the Sundial Phase. Given the number and characteristics of known Sundial sites in the project area, and competing demands for data from other time periods, it is questionable whether statistical adequacy can be reached in these categories, but any improvement in the quality of Sundial data of these types will nevertheless be valuable.

The population aggregation that occurred in the project area during the McPhee Phase may have been a response to economic intensification; the

resulting greater intra-community population density would have facilitated cooperation and resource distribution among included households. However, the potential for interpersonal and intergroup conflict would also have increased. It is therefore to be expected that integrative institutions and activities would have been developed or intensified. The use of "large" and "oversized" pitstructures during the McPhee Phase is suspected to record such an increase in integrative devices. Our data regarding such structures is at present not sufficient to permit adequate study of this aspect of Anasazi culture change.

Data on population size, growth, distribution, and density are obviously critical to the modeling effort. The estimates of project area population through time that are emerging suggest that the rates of population growth and decline in the early and late McPhee subphases, respectively, are too large to be accounted for entirely by changes in birth and death rates in an indigenous population. In other words, immigration and emigration may have been involved. These processes also have implications for social structure, especially in their demands on societal integrative devices. A major source of information on immigration and emigration will be a mapping of temporal and spatial population variability, both for the project area and for adjacent areas. This will permit correlation of population decrease in one part of the region with population increase in another. Completion of DAP surveys on all project features is essential, as is extension of sampling into adjacent areas (at no cost to the government). Compilation of existing survey data for areas adjacent to the Dolores River valley is also essential. Precision of the population estimates and of the temporal distribution of population can be substantially increased at relatively

21 June 1984

Albert H. Pfeifle
Contracting Officer
Bureau of Reclamation
Upper Colorado Regional Office
P.O. Box 11568
Salt Lake City, UT 84147

THROUGH: Dana Hill, COR

Dear Mr. Pfeifle:

Attached please find the final draft version of The Dolores Project Cultural Resources Mitigation Design by Ruthann Knudson, Steven E. James, Allen E. Kane, William D. Lipe, and Timothy A. Kohler, Report Number DAP-057.

We request that this report be included in the series being published by the Technical Publication Branch.

Please note that all Bureau of Reclamation comments have been incorporated in this report.

We hope that the Bureau of Reclamation finds this report to be acceptable. We would appreciate written notification within 120 days of the submission of the report.

Thank you.

Sincerely,

David A. Breternitz
Senior Principal Investigator

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Attachment

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Bureau of Reclamation

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Table A.1 DAP Master Fieldwork Plan for 1982-1983

Site or opera-tion	Temporal-functional placement	Impact feature	1982 Opera-tions* (cw)	1983 Opera-tions* (cw)	1982-1983 Total (cw)	Primary goals	Secondary goals goals
5MT0023	McPhee Phase Village	Pool	24	23	47	2,4,5, 7,8	1,3,6
5MT2182	McPhee Phase Village	Pool		8	8	3,4,7,8	1,6
5MT2216	McPhee, Sundial SL	Pool		2	2	1,3,6	
5MT2320	McPhee Phase Village	H.C.		6	6	1-7	
5MT2336	McPhee Phase Village	Pool	8	8	16	1,2,5, 6,8	
5MT2372	Post-A.D.950(?) Village	D.C. I	8		8	1,2,5,6	3,4
5MT2735†	Sagehen Phase Hamlet	McPhee	3.5		3.5	1,6	2,5
5MT4475	McPhee Phase Village Unit	Pool	7.5	10.5	18	2,4,5,7	1,3,6

See footnotes at end of table.

NOTES:
- D.C. I - Dove Creek canal, Reach I.
- D.C.II - Dove Creek canal, Reach II.
- H.C. - House Creek recreation.
- McPhee - McPhee recreation.
- S.A. - Selected areas.
- SL - Seasonal locus.
- D-N - Dolores-Norwood road.
- F.L. - Fairview laterals.
- C.L. - Cahone laterals.
- M.C. - May Canyon road.
- D.R.A. - Downstream recreation areas.
- T.C. - Towaoc Canal M & I Pipeline.
- I.S.P. - Inventory survey program.
- M.S.P. - Magnetometer survey program.
- P.S.P. - Probability survey program.
- S.I.F. - Selected impact features.
- E.O. - Executive order.
- cw - Crew week(s).

Table A.1 DAP Master Fieldwork Plan for 1982-1983--Continued

Site or operation	Temporal-functional placement	Impact feature	1982 Operations* (cw)	1983 Operations* (cw)	1982-1983 Total (cw)	Primary goals	Secondary goals goals
5MT4477	McPhee Phase Village Unit	Pool		4	4	2,5,7,8	1,6
5MT4480	McPhee Phase Village Unit	Pool		1.5	1.5	1,5,7	2
5MT4615	Archaic SL(?)	Pool		2.5	2.5	1,6	
5MT4654	McPhee, Sundial SL	Pool		1.0	1.0	3	1,6
5MT4661	McPhee, Sundial SL	Pool		1.5	1.5	3	1,6
5MT4683	McPhee, Sundial SL	Pool	4.5		4.5	1,3,5,6	
5MT4729	Sundial SL	Pool		4.5	4.5	1,6	2
5MT4774	McPhee, Sundial SL	Pool		1.5	1.5	3	1,6
5MT4792	McPhee, Sundial SL	Pool		1.5	1.5	3	1,6
5MT4797	Archaic SL	Pool	1.5		1.5	1,6,7	3
"A"§	Sundial Phase Hamlet	McPhee	2.5		2.5	1,2,5,6	
"B"§	Sundial Phase Hamlet	McPhee	2.5		2.5	1,2,5,6	
"C"§	Sundial Phase Hamlet	McPhee	1.5		1.5	1,2,5,6	
"M"§	Sagehen Phase Hamlet	H.C.		3.0	3.0	1,2,5,6	
"N"§	Sagehen Phase Hamlet	H.C.		3.0	3.0	1,2,5,6	

Table A.1 DAP Master Fieldwork Plan for 1982-1983--Continued

Site or operation	Temporal-functional placement	Impact feature	1982 Operations* (cw)	1983 Operations* (cw)	1982-1983 Total (cw)	Primary goals	Secondary goals goals
"Q"§	A.D. 600-850 Hamlet	D.C.II		3.0	3.0	1,6	2,5
"R"§	A.D. 600-850 Hamlet	D.C.II		3.0	3.0	1,6	2,5
"X"§	A.D. 600-850 Hamlet	D.C. I	2.5		2.5	1,6	2,5
"Y"§	A.D. 600-850	D.C. I	2.0		2.0	1,6	2,5
Testing Program	McPhee**	Pool	2.5	2.5	5.0	3,6	
I.S.P.	All sites	D.C.II	2.0		2.0	E.O. 11593 Requirements 1,6	
I.S.P.	All sites	D-N	1.0		1.0	E.O. 11593 Requirements 1,6	
I.S.P.	All sites	F.L.	1.0		1.0	E.O. 11593 Requirements 1,6	
I.S.P.	All sites	M.C.	0.5		0.5	E.O. 11593 Requirements 1,6	
I.S.P.	All sites	D.R.A.	3.0		3.0	E.O. 11593 Requirements 1,6	
I.S.P.	All sites	C.L.		3.0	3.0	E.O. 11593 Requirements 1,6	
I.S.P.	All sites	T.C.		7.0	7.0	E.O. 11593 Requirements 1,6	

See footnotes at end of table.

Table A.1 DAP Master Fieldwork Plan for 1982-1983--Continued

Site or operation	Temporal-functional placement	Impact feature	1982 Operations* (cw)	1983 Operations* (cw)	1982-1983 Total (cw)	Primary goals	Secondary goals goals
M.S.P.	Selected sites	S.I.F.	2.0	1.5	3.5	1,5	
P.S.P.	All sites	S.A.	2.0	1.5	3.5	1,6	
Totals			82	103	185		

* Approximate projection.
† Tentative selection.
§ Exact site assignments to be done late.
** McPhee Village units: Sites 5MT4514, 4725, 4692, 4621, 4622, 2182, 4623, 2320, 2318, 5104.

Site Specific Justifications

Justification for site specific excavation or testing will be presented for each site. Site selection was in part based on the potential of the projected operatons to address several of the specified fieldwork program goals.

Site 5MT23. We estimate approximately 47 crew weeks (adjusted for absenteeism) are needed to complete necessary fieldwork at Site 5MT23 (8.2 crew weeks to complete the probability sample, 37 crew weeks to investigate household, interhousehold and community architectural units, 1.8 crew weeks to recover a midden sample). Excavation at Site 5MT23 is the most critical component of remaining fieldwork and is necessary to achieve the following fieldwork program goals in remedying data deficiencies: Goal 2 (household patterning); Goal 4 (recovery of human remains and burial patterning); Goal 5 (residential unit patterning and investigation of

integrative structures; Goal 7 (completion of previously initiated investigations); and Goal 8 (completion of the probability sample).

Specificially, operations at Site 5MT0023 to date have resulted in the completion of the surface collection; the probability sample is complete in Areas 1, 3 through 5, and 7, and nearly complete in Area 2; Areas 6 and 8 remain to be sampled. The completion of the probability sample for Grass Mesa will provide us with critical input to the data base valuable for time-rate approaches to paleodemography as well as for quantitative characterization of site areas, different time periods, and the site as a whole. The probability sample also provides a list of partially known structures and deposits from which we can make a selection for more intensive excavations. Extensive excavations which have been completed so far have provided an adequate characterization of pitstructures of the late (post-A.D. 890 or 900) occupation, which was extensive and differs substantially from temporally correlated occupations elsewhere in the study area. There is some evidence relating to use (or nonuse) of surface structures during this late occupation at Grass Mesa, but it is equivocal and needs further refinement. It does seem clear that less use was made of surface structures at this time at this site than elsewhere in the valley, and their relationships to the pitstructures was much less formally patterned.

It is vital to the program that we complete data recovery efforts for the occupation of Site 5MT23 during the period approximately A.D. 800-890, including investigation of a selected sample of room suites, "small" pitstructures, "large" pitstructures and the possible "oversized" pitstructures in Areas 1 and 5. Because of the stratigraphic complexity of the site, we need to make very careful choices of units to be fully excavated.

These choices will be based on analysis of: (1) units partially known from the probability sampling program; (2) evidence from the analysis of surface patterning of artifacts and building stone; (3) evidence from analysis of extensive magnetometer mapping (accomplished in 1979 and 1981); and (4) evidence from a set of exploratory backhoe trenches to be dug at the outset of the 1982 field season. Planned backhoe operations also include clearance of a substantial portion of the large depression already trenched in Area 5. Two other possible "oversized" community structures in Area 5 and in Area 1 will be tested to obtain data regarding their function and dating (Goal 5). The selection of household and interhousehold units for the main A.D. 800s occupation (Goals 2 and 5) will be made based on information assembled from the four sources listed above. Areas 1 and 6 appear likely candidates at this point for the location of relatively well preserved residential and integrative units, but it is likely that some of the excavated units will be selected from some of the other areas as well.

In addition, we propose to expend 1-2 crew weeks to recover a sample of midden deposits to gain information for reconstruction of prehistoric economies (Goal 3) and to attempt to recover human skeletal material (Goal 4).

Site 5MT2182. We propose 8 additional crew weeks of effort at Site 5MT2182. The site is a McPhee Phase village located on the east slope of the Dolores Canyon about midway between Grass Mesa and McPhee. Work at the site will address the following fieldwork program goals: Goals 1 and 6 (establishing spatial and temporal patterning within the central study area). The location of Site 5MT2182 between Grass Mesa and McPhee establishes it as an important data source in this respect. The layout of

residence units is different than McPhee or Grass Mesa and the occupational sequence exhibits variation as well. Other goals to be addressed are: Goal 5 (establishment of spatial relationships among resident units and integrative structures); Goals 2 and 3 (recovery of faunal, botanical, and human remains from midden deposits); Goal 7 (completing a necessary data component of the probability excavation sample); and Goal 8 (completing initiated investigations). To achieve these objectives, the proposed eight crew weeks will include two crew weeks to complete Pit-structure 2 (floor features must be investigated and recorded) and surface rooms in Area 1, 4.5 crew weeks to complete the probability excavation sample and 1.5 crew weeks to sample the midden deposits.

Site 5MT2216, Site 5MT2654, Site 5MT4661, Site 5MT4745, Site 5MT4774, and Site 5MT4792. This site set represents the rockshelter sample chosen to recover faunal and botanical materials from dry deposits (Goal 3) and to investigate the limited activity locus component of settlement patterns (Goal 1). Each of the above sites has evidence of multiple occupations, making it theoretically possible to investigate a broad temporal range of limited activity usage. We propose a total of nine crew weeks of effort at these rockshelters or approximately 1.5 crew weeks each.

Site 5MT2320. The site (House Creek Village) is a large McPhee Phase settlement located on a mesa top to the east of the Dolores canyon and south of House Creek. Proposed work at the site will address the following goals: Goals 1 and 6 (spatial and temporal patterning); an information sample from a mesa top village for comparison with canyon settlements is desired; Goal 2 (household and living surface patterning); Goals 3 and 4 (recovery of botanical, faunal, and human remains from

midden deposits); Goal 5 (residence unit and integrative structure patterning); and Goal 7 (completion of initiated investigations).

To achieve these goals, we plan to expend six crew weeks as follows: 1 crew week to finish the incompletely excavated roomblock in Area 1; 1.5 crew weeks to sample midden deposits; and 3.5 crew weeks to expose roomblock layouts and to test pitstructures.

Site 5MT2336. We estimate approximately 16 crew weeks are needed to conduct necessary data collection at this site. Site 5MT2336 is a McPhee Phase village containing one and probably two residential clusters. Recovered ceramic types suggest the site dates to the mid to late A.D. 800s. Data recovered from the proposed investigations are seen as critical in achieving Goal 1 (establishment of spatial patterning for the study area) and important in achieving Goal 2 (household patterning); Goal 5 (resident unit patterning and investigation of integrative structures); Goal 6 (temporal patterning); and Goal 8 (completion of the probability sample). Specifically, eight crew weeks will be allotted for surface collection and recovery of a probability sample; this work will provide another valuable data point for probability studies which can be used for time-rate population estimates, quantitative estimates of total materials, etc. The remaining eight weeks will be targeted at excavating a selected sample of room suites, plaza areas, and pitstructures; this work is critical in establishing household and residence groups patterning (Goals 2 and 5) and in further defining temporal patterning (Goal 6) in the study area. We need to determine whether the household and interhousehold patterns established for Grass Mesa and the McPhee villages are similar to those at Site 5MT2336, and determine the characteristics of the A.D. 900-950 abandonment period in the southern portion of the study area. Work at

this site will be done by WSU (Washington State University) field school, and hence at reduced cost to the government.

Site 5MT2372. We propose to conduct approximately eight crew weeks of effort at this site in 1982. Surface evidence suggests the site is a habitation with a large number (10+) of residence units; preserved architecture and ceramics suggest an A.D. 900-1100 occupation. Data recovered from field operations will be used in achieving fieldwork Goals 1, 2, 5, and 6; the work will be the main source of information for reconstructing late Anasazi cultural patterns; we therefore will only attempt a limited reconstruction. Earlier components may be present and investigation of stratigraphic relationships (if present) will allow input important for achievement of Goal 6.

Site 5MT2735 (Tentative Assignment). We propose to excavate one or two Sagehen Phase sites in McPhee recreation area (located on the mesa top southwest of the Dolores canyon) to aid in establishing the nature of spacio-temporal patterning in the central study area (Goals 1 and 6). Site 5MT2735, from surface indications, has been tentatively selected for this purpose. Surface evidence indicates a possible Dos Casas Subphase (A.D. 760-850) occupation and preservation appears excellent. Information recovered during field investigations will also be used to address Goals 2 (household and living surface patterning) and 5 (residence unit and integrative structure patterning). We propose to expend 3.5 crew weeks of effort at the site. Final selection will be based on the results of the magnetometer survey.

Site 5MT4475. We propose 18 crew weeks of effort (7.4 weeks in 1982 and 10.6 weeks in 1983) to complete needed investigations at this site. Site 5MT4475 (McPhee Pueblo) is one integral residential cluster at McPhee

Village. Previous work in 1978 and 1980 indicates that the site was occupied in the late ninth and early tenth centuries; we suspect an early ninth century occupation as well. By conducting further investigations we will address seven of the eight goals of the fieldwork program; data from Site 5MT4475 serves as a temporal complement to the investigations at Grass Mesa (Site 5MT0023) and the site is a unique data source for the post-A.D. 900 Cline Subphase occupation. We plan to expend eight crew weeks in finishing the room suites begun in 1980 and to investigate several additional suites on the east and/or west side of the roomblock (Goals 2 and 5). Eight crew weeks will be expended in completing investigations in the plaza area including testing of pitstructures (Goals 2 and 5). In addition, two weeks will be expended in acquiring a midden sample (Goals 3 and 4). The McPhee response to the A.D. 900-950 abandonment period may be unique, and this phenomenon needs further investigation (Goal 6). Additional data will allow us to put the work done in 1978 and 1980 in a more enlightened perspective (Goal 7).

Site 5MT4477. We propose four additional crew weeks of effort at this site, primarily to address Goals 2, 5, 7, and 8, and secondarily to address Goals 1 and 6. Site 5MT4477 is a residential complex of McPhee Village and is immediately north of Site 5MT4475. Work begun in 1980 suggests two major occupations, one in the late A.D. 800s and another in the early A.D. 900s. The site is one of the three residential complexes (Site 5MT4475, Site 5M4476, and Site 5MT4477) in the village area (of a total of about 15) to exhibit post-A.D. 900 use. We propose to complete outlining of the roomblock, to finish the room suite area begun in 1980 and to test several pitstructures, in order to address Goals 2 and 5. We also plan to complete the probability sample, also begun in 1980 (Goal 7).

We regard completion of this site specific program (Goal 8) as an important complement to the work at McPhee Pueblo itself (Site 5MT4475).

Site 5MT4480. We propose 1.7 crew weeks of effort to complete necessary investigations at this site. Site 5MT4480 is a McPhee Phase "horseshoe" residential complex at McPhee Village; the site was occupied in the late ninth century. Work at the site will be used to achieve field program Goals 1, 2, 5, and 7. We began a testing program at the site in 1980, and cleared the surface of two-thirds of the roomblock and tested four pitstructures. Completion of the testing program (clearance of the remainder of the roomblock plus location and testing of additional pitstructures) would allow a more comprehensive data presentation (for the data files and for a site report, Goal 7) and yield additional important data regarding household patterning and residential unit patterning at McPhee Village (Goals 2 and 5).

Site 5MT4615. The site is a lithic scatter located on a lower river terrace in the southern portion of the pool area. The site has been cut by a canal, and artifacts are eroding out along the canal bank, perhaps from a cultural stratum about one meter below the present surface. Analysis of these artifacts suggests a possible early Archaic occupation, and thus the site may constitute a unique resource for the program. We propose 2.5 crew weeks of effort at the site primarily to recover more spatial and temporal information regarding the Archaic Tradition (Goals 1 and 6).

Site 5MT4654. Refer to discussion under Site 5MT2216 heading.

Site 5MT4661. Refer to discussion under Site 5MT2216 heading.

Site 5MT4683. We propose to conduct 4.5 crew weeks of effort at Site 5MT4683. The site is a rockshelter in the House Creek drainage and surface evidence suggests two occupations: (1) a McPhee Phase occupation centered

on a possible "oversized" (great?) pitstructure; and (2) a later use episode (Sundial Phase or perhaps post-Anasazi) centered on a dry-level masonry structure. We plan to investigate both structures as they may be rare constituents of the resource base and should provide important or even critical data for the program. Preservation in the rockshelter is excellent and should provide high quality information. To establish the occupational history of the shelter, we would also test some of the other present deposits. The recovered information will be used to achieve fieldwork program Goals 1 and 6 (spatial-temporal patterning; in this case investigation of the Sundial Phase or post-Anasazi structures should provide importatant data) and Goal 5 (investigation of integrative structures; the earlier identified structure at Site 5MT4683, because of its accessability and preservation, should provide a rare opportunity for this type of work). The cave deposits might also allow recovery of perishable artifacts and ecofacts (Goal 3); a prehistoric corn cob was noted during our last reconnaissance of the shelter.

Site 5MT4729. The site consists of several rubble mounds at the base of several large fall rock boulders. It is located on the west talus slope of the river canyon in the southern portion of the central study area. The architecture and artifact assemblage collected during survey operations suggests a seasonal Sundial Phase occupation (post-A.D. 1000). The architecture patterns appear to be unique for the central study area and proposed investigations would provide important data for reconstructing post-A.D. 950 use of the canyon. Investigations (4.5 crew weeks proposed) would therefore address primarily Goals 1 and 6 (spatial-temporal patterning); there is also some potential for addressing Goal 2 (household and living surface patterning).

Site 5MT4774. Refer to discussion under Site 5MT2216 heading.

Site 5MT4792. Refer to discussion under Site 5MT2216 heading.

Site 5MT4797. We propose to expend approximately 1.5 crew weeks to complete necessary fieldwork at Site 5MT4797. The site is a rockshelter in the Dry Canyon area and contains well preserved nonceramic deposits that were briefly tested by WSU in 1980. Excavation at this site is important in achieving general fieldwork program Goals 1 (spatial patterning), 6 (temporal patterning), and 7 (completion of previously initiated investigations).

Characteristics of the artifact assemblage and in situ deposits suggest it is a late Archaic or transitional Anasazi limited activity locus. Result of carbon-14 dating attempted during the winter of 1980-81 were equivocal. One and one-half additional crew weeks at this site are proposed to obtain a larger sample of artifacts, to search for features and to obtain better carbon samples for dating. This work should be sufficient to clarify site function and dating for the late Archaic Tradition (part of Goal 1) and perhaps to add to the knowledge of the Archiac-Anasazi transition (Goal 6). The deposits in the cave are undisturbed and the potential for recovering well-preserved faunal and botanical remains is present (Goal 3). Additional work will also render the data recovered during the 1980 test excavations more valuable in terms of interpretation and data applicability (Goal 7). We propose 3.4 crew weeks of Track 2 work at the site.

Sites "A," "B," and "C". Data from Sundial Phase sites in McPhee recreation area are considered vital to achieve Goals 1 and 6. We believe, based on survey data, that, unlike the valley itself, there was a substantial post-A.D. 900 and post-A.D. 1000 occupation of the southwest

mesa. We must investigate a sample of these sites to determine spatial patterning, household patterning and residence unit patterning during this period and to determine the nature of the A.D. 900-950 transition period (Goals 1 and 6). Ideally we would like to locate a site with both a pre-A.D. 900 and post-A.D. 900 component for this purpose. Recovered information will also be used to address Goals 2 and 5. We will select specific sites based on results of the magnetometer survey; at present Site 5MT2729, Site 5MT2737, and Site 5MT4751 appear to be good possibilities. We propose to expend a total of seven crew weeks to acquire this needed data.

Sites "M" and "N". We propose to test/excavate two Sagehen Phase sites in the House Creek recreation area feature (located on the mesa top east of the Dolores canyon). This work would primarily address Goals 1 and 6 (further definition of spatial-temporal patterning) and the data would also be employed to address Goals 2 (household and living surface patterning) and 5 (resident unit and integrative structures patterning). A total of six crew weeks is planned at these two sites.

Sites "Q," "R," "X," and "Y". We propose to do some site investigations in the Dove Creek canal, Reaches I and II features primarily for estimation of regional spatial and temporal patterns (Goals 1 and 6). Specifically, we wish to determine whether the initial settlement, growth, aggregation, and abandonment phenomena observed in the central study area are local or regional patterns. Data recovered from these investiations will also be used to address Goals 2 and 5. For this purpose we propose to expend a total of 10.5 crew weeks of effort at four sites; we plan to limit site selection to the A.D. 600-950 period.

Testing Program

We propose to field a testing crew during the fall of 1982 and 1983 to investigate pitstructure fills at otherwise unexcavated McPhee Phase residence complexes. The crews would be directed to recover two classes ot data: (1) human (Anasazi) burials to address Goal 4; and (2) a sample of ceramic artifacts and tree-ring samples to address Goal 6. Sites tentatively selected for the program are Site 5MT4514, Site 5MT4725, Site 5MT4692, Site 5MT4621, Site 5MT4622, Site 5MT2182 Area 4, Site 5MT4623, Site 5MT2320, Site 5MT2318, and Site 5MT5104. Total labor expended would be five crew weeks.

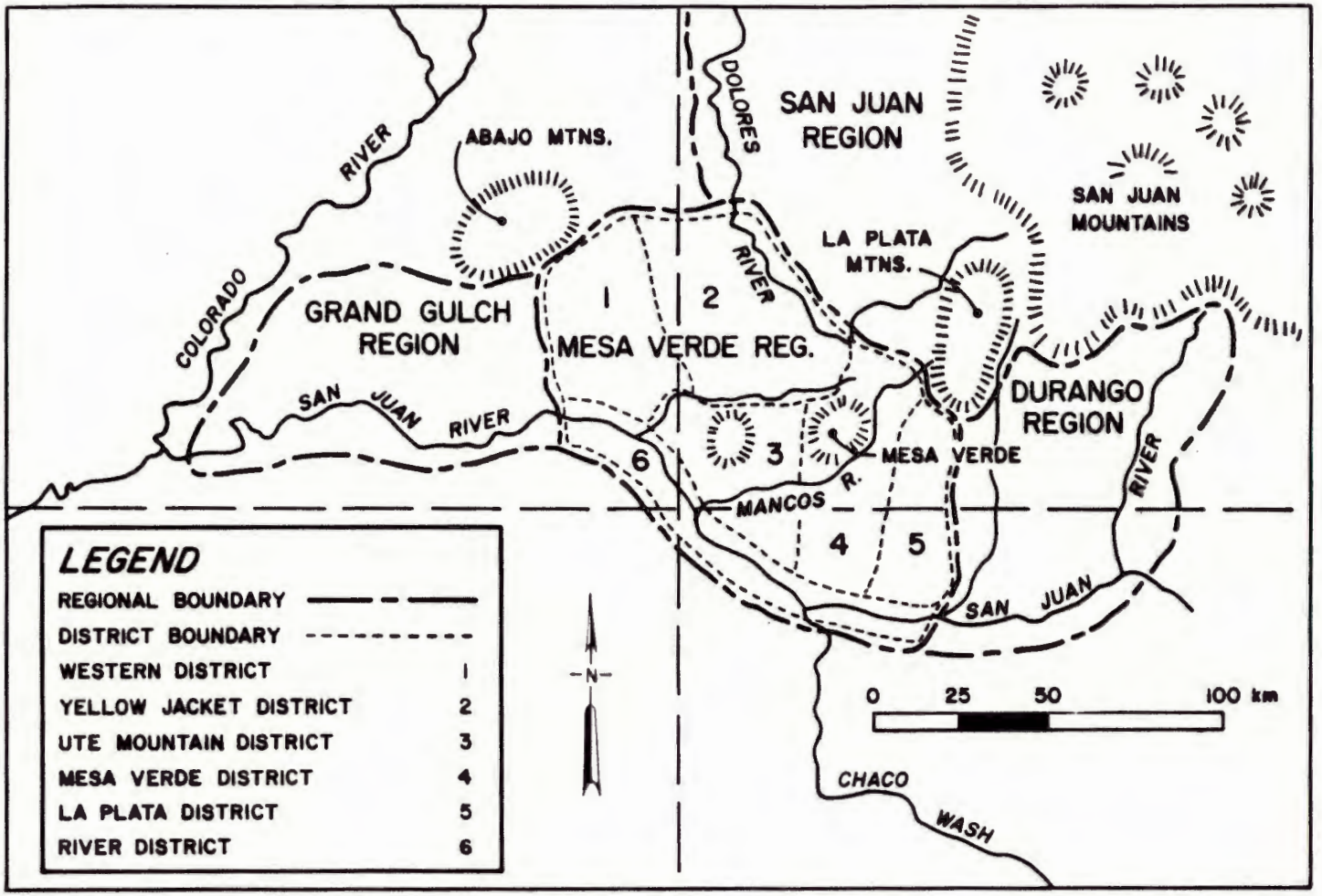

Figure 1. The northern San Juan Area of the Anasazi Tradition.

Table 13. Temporal-functional matrix of Anasazi (indeterminate phase) sites within Reach I, Dove Creek Canal, Dolores Project

Site #	Function	Sector	Rationale	Confidence	FSE
6060	small hamlet	Yellowjacket	decorated white ware, gray ware	high (80/20)	20
6062	?/limited activity	Yellowjacket	2 Chapin sherds	high (80/20)	1

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Total: 2 components, 21 FSE.

Table 14. Temporal-functional matrix of Basketmaker III (A.D. 500-700) sites within Reach I, Dove Creek Canal, Dolores Project

Site #	Function	Sector	Rationale	Confidence	FSE
6059	small hamlet	Yellowjacket	ceramic/ground stone/topography	low (40/60)	10
2162	small hamlet	Escalante	ceramic/excavation	high (100/0)	10
2382	small hamlet	Yellowjacket	ceramic/no architecture	medium (50/50)	15
2378	small hamlet	Yellowjacket	ceramics (Mancos sherds surface scatter)/no architecture	medium (60/40)	15
*2376	?/limited activity	Yellowjacket	ceramics	medium (60/40)	2
6064	small hamlet	Yellowjacket	ceramics	high (80/20)	10
*5462	small hamlet	Yellowjacket	ceramics	low (50/50)	10
5463	small hamlet	Yellowjacket	ceramics/no architecture	medium (70/30)	10
6066	small hamlet	Yellowjacket	ceramics/no architecture	medium (70/30)	10
6068	small hamlet	Yellowjacket	ceramics	high (80/20)	10
*6069	small hamlet	Yellowjacket	ceramics/no architecture	high (80/20)	10
6076	small hamlet	Yellowjacket	ceramics	medium (70/30)	10

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Total: 12 components, 122 FSE.

Table 15. Temporal-functional matrix of Basketmaker III-Pueblo I (A.D. 700-775) sites within Reach I, Dove Creek Canal, Dolores Project

Site #	Function	Sector	Rationale	Confidence	FSE
*2162	small hamlet	Escalante	ceramics/excavation	high (100/0)	4
2380	small hamlet	Yellowjacket	ceramics/no architecture	medium (50/50)	15
*2384	small hamlet	Yellowjacket	ceramics/architecture/ analogy to pool area sites	medium (50/50)	15
*2372	small hamlet	Yellowjacket	Chapin Black-on-white suggests earlier component	low (40/60)	15
6058	?/limited activity	Yellowjacket	ceramics/no architecture	medium (60/40)	15
*2370	small hamlet	Yellowjacket	ceramics/no architecture	medium (60/40)	15
*5461	small hamlet	Yellowjacket	ceramics/architecture	medium (50/50) (could be Pueblo I)	15
5464	small hamlet	Yellowjacket	ceramics/rubble present	high (80/20)	15
*2356	small hamlet	Yellowjacket	ceramics/rubble present	medium (70/30)	15
2351	small hamlet	Yellowjacket	ceramics	low (50/50)	15

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Total: 10 components, 139 FSE.

Table 16. Temporal-functional matrix of late Pueblo I (A.D. 775-900) sites within Reach I, Dove Creek Canal, Dolores Project

Site #	Function	Sector	Rationale	Confidence	FSE
2376	?/limited activity	Yellowjacket	ceramic/topography	medium (70/30)	2
2384*	large hamlet	Yellowjacket	ceramic/architecture	high (95/5)	40
2364	small hamlet	Yellowjacket	ceramic/architecture	high (85/15)	20
6075	large hamlet	Yellowjacket	ceramic/architecture/ amount of material	medium (75/25)	35

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Total: 4 components, 97 FSE.

Table 17. Temporal-functional matrix of early Pueblo II (A.D. 900-1000) sites within Reach I, Dove Creek Canal, Dolores Project

Site #	Function	Sector	Rationale	Confidence	FSE
6065	water control/limited activity	Yellowjacket	physical evidence, water control = Pueblo II	low (40/60)	6
*6063	small hamlet	Yellowjacket	ceramics	high (80/20)	15

* Multicomponent site.

NOTE: Total: 2 components, 21 FSE.

Table 18. Temporal-functional matrix of late Pueblo II-early Pueblo III (A.D. 1000-1100) sites within Reach I, Dove Creek Canal, Dolores Project

Site #	Function	Sector	Rationale	Confidence	FSE
*2372	village	Yellowjacket	ceramics/architecture	high (95/5)	60
*2370	small hamlet	Yellowjacket	ceramics	medium (60/40)	10
*6063	large hamlet	Yellowjacket	ceramics/architecture	medium (70/30)	20
2386	tower(?)/seasonal	Yellowjacket	ceramics/architecture	high (85/15)	6
*6065	?/limited activity	Yellowjacket	ceramics	high (90/10)	1
2366	?/seasonal	Yellowjacket	ceramics/no architecture	high (80/20)	4
*5461	?/limited activity	Yellowjacket	ceramics	medium (70/30)	1
*6069	?/limited activity	Yellowjacket	ceramics	high (80/20)	1
6070	small hamlet	Yellowjacket	ceramics/architecture	high (85/15)	20
6071	?/limited activity	Yellowjacket	ceramics	low (50/50)	2
*2356	?/limited activity	Yellowjacket	ceramics	high (80/20)	1
6073	?/limited activity	Yellowjacket	ceramics	low (50/50)	2

* Multicomponent site.

NOTES: Function is defined by a two-component term: the specific site function is noted first, followed by the general site type. A "?" indicates that the specific site function is uncertain or unknown.

Total: 12 components, 128 FSE.

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