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Guidelines For Archaeological Research Designs



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PREFACE

"Guidelines for Archaeological Research Designs" (GARD) is the latest in a series of OHP planning documents devoted to improving the quality and usefulness of cultural resource management in the state of California. Prepared in accordance with OHP's federal and state mandates, this guidance is specifically intended to promote the preparation of thoughtful, convincing and effective research designs for the study of archaeological properties.

Like its immediate predecessor, "Archaeological Resource Management Reports (ARMR): Recommended Contents and Format", this guidance can be understood and used constructively by professional archaeologists as well as by a broad spectrum of other professionals and decisionmakers engaged either routinely or occasionally in the management of archaeological properties. We hope it will be adopted by all levels of government and by the private sector as the standard according to which archaeological research designs will be prepared and judged. We believe that use of this guidance as intended will help to ensure that an investment in archaeology serves the public interest.

Consistent, timely and appropriate use of this publication by agencies and individuals pursuing compliance with Section 106 of the National Historic Preservation Act and implementing guidelines codified at Title 36 Code of Federal Regulations, Part 800, can enhance the efficiency of this regulatory process. The need to consult OHP during preparation of archaeological research designs can be reduced and OHP review of products prepared in accordance with this guidance can be expedited.

This publication and others in the series are major elements of the preservation planning process carried out by OHP in accordance with both state and federal requirements. A central goal of this process is to ensure that land use planning at all levels of government routinely and affirmatively takes into account the special needs and value of historic properties. We hope this guidance will be another effective contribution toward attainment of that goal.

Acknowledgements

Any effort of this scope is fraught with manifold opportunities and challenges. The development of these guidelines was prompted in large measure by the substantial benefits that will accrue from more consistent planning of public archaeological studies. The challenge has been to reconcile the diverse needs of law, archaeology, and public interest in a way that satisfactorily achieves statewide planning goals.

These guidelines reflect the thoughts of many minds. Authored by Mr. Thad M. Van Bueren, they progressed through many drafts that have benefited from the close scrutiny of OHP staff, the professional community, and public. Particular thanks go to Dr. Hans Kreutzberg and Mr. Robert Jackson who provided substantial input and support throughout the development of the guidelines.

Thanks also go to Dr. Jeanne Arnold, Dr. Leo Barker (representing the Western Region of the National Park Service), Dr. Julia Costello, Ms. Shelly Davis-King, Mr. Nicholas Del Cioppo, Dr. Robert Elston, Dr. Glenn Farris, Dr. David Fredrickson, Dr. Michael Glassow, Mr. Greg Greenway (representing the Executive Board of the Society for California Archaeology), Ms. Roberta Greenwood, Ms. Leslie Hartzell, Dr. Thomas Jackson, Dr. Makota Kowta, Dr. Thomas Layton, Dr. Kent Lightfoot, Mr. Alan Stanfill and Richard Wilshusen (representing the Western Office of Project Review, Advisory Council on Historic Preservation), Mr. Adrian Praetzellis, Dr. Christopher Raven, Mr. Michael Rondeau, Mr. Lester Ross, Mr. Steven Schwartz, Mr. William Seidel, Mr. Ric Windmiller, and Mr. Jim Woodward for their detailed and incisive comments. Many of these reviewers not only provided written comments, but also discussed aspects of the guidelines with the author in lengthy telephone conversations.

Finally, we are grateful to Ms. Jan Sockel of the California Department of Parks and Recreation for her invaluable assistance with the production of the guidelines in this final form.

GUIDELINES FOR ARCHAEOLOGICAL RESEARCH DESIGNS

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INTRODUCTION

A central principle of many laws, ordinances, and regulations that promote the consideration of archaeological properties is that studies must be carefully planned to serve the public interest effectively. Research designs play a vital role in this planning process. Thoughtful research designs reveal the logic that will be used to direct an investigation; provide explicit plans that permit regulatory and professional peer review; and improve the quality and efficiency of the studies they guide.

To provide a reasonable foundation for management decisions, all types of archaeological studies conducted to satisfy regulatory needs should be directed by research designs. The level of justification required for a particular study will vary according to its nature and scope, but all studies stand to benefit from the clear linkage of study goals with relevant theory, data, and methods. For studies of limited scope it is most efficient to develop regional and thematic research designs as a basis for this justification. However, in the absence of a suitably current and relevant regional research framework, project-specific research designs are necessary.

The quality of the research designs currently used to direct public archaeology studies in California varies considerably. While thoughtfully designed studies are increasingly common, some projects still receive little or no planning. This contributes to inconsistent management of archaeological properties. To address this problem, the California Office of Historic Preservation (OHP) has prepared these guidelines. The expectations defined here offer a means for professional archaeologists, planners, agency officials, and other interested persons with a working knowledge of archaeology to evaluate the justifications offered for proposed studies.

The specificity of our recommendations balance various regulatory, public, and scientific needs. On the one hand, there is a need for more detailed advice than that currently available in existing

federal regulations and guidelines (e.g., Advisory Council on Historic Preservation [ACHP] 1980, 1985, 1986; National Park Service [NPS] 1982, 1983; ACHP and NPS 1989). These guidelines thus define in relatively specific terms the kinds of information that are needed to ensure that proposed compliance studies are conducted cost-effectively and produce demonstrable societal benefits in a manner consistent with regulatory requirements.

At the same time, this guidance accommodates diverse theoretical approaches and research interests, as well as widely differing project scopes. While we define the fundamental planning principles and essential core elements needed in such documents, the specific contents of a given research design will always require careful thought and professional currency. Readers seeking more detailed information on the design of research should refer to discussions provided by Brim and Spain (1974), Kaplan (1964), Miller (1964), Pelto (1970), Willey and Phillips (1958), and others cited in the bibliography.

Although it is often appropriate to integrate historical, architectural, engineering, ethnographic, and other studies with archaeological work, no recommendations are offered for the conduct of such investigations. However, comparable levels of justification should be provided for non-archaeological studies when they are needed for the management of an archaeological property.

In the guidelines that follow, we first outline some general principles of design. The core elements needed in all types of research designs are then described. These general considerations are followed by more specific recommendations for the design of research for particular types of archaeological studies. Specific suggestions are offered regarding inventory studies, excavations, and the investigation of historic era archaeological sites. In conclusion, we discuss how these guidelines will be implemented.

GENERAL PRINCIPLES

To ensure that archaeological studies are conducted efficiently in a manner that benefits the public and is consistent with regulatory requirements, every research design should be guided by the following broad principles:

I. Appropriately qualified professionals should supervise the preparation and implementation of every research design-

While studies conducted to satisfy statutory requirements can be designed by persons without advanced training in archaeology, all compliance investigations should be supervised or reviewed by an individual that meets the Secretary of the Interior's Professional Qualifications Standards for archaeology. Those standards specify that:

The minimum professional qualifications in archaeology are a graduate degree in archaeology, anthropology, or closely related field plus:

1. At least one year of full-time professional experience or equivalent specialized training in archaeological research, administration or management;
2. At least four months of supervised field and analytic experience in general North American archaeology; and
3. Demonstrated ability to carry research to completion.

In addition to these minimum qualifications, a professional in prehistoric archaeology shall have at least one year of full-time

professional experience at a supervisory level in the study of archaeological resources of the prehistoric period. A professional in historic archaeology shall have at least one year of full-time professional experience at a supervisory level in the study of archaeological resources of the historic period (NPS 1983:44739).

II. Research designs should focus on important goals-

Archaeological studies conducted to meet legal requirements should address one or more important hypotheses that can "be shown to relate constructively to . . . such areas as current data gaps, or defensible new models or theories; priority areas identified under a state or federal agency management plan; or the correction of misapprehensions in our understanding of prehistory or history" (NPS 1982:30). These hypotheses define the public benefit that will be derived from a proposed study. It is not adequate to justify an archaeological study solely by stating that it is required by certain laws and regulations or that it is somehow inherently important. The research or other value of the information that will be gathered must be demonstrated.

The potential public benefit of a proposed study should be confirmed through professional peer review before it is implemented in a manner consistent with applicable regulations. Trivial, unrealistic, previously answered, or needlessly vague hypotheses generally do not provide an adequate basis for justifying a proposed investigation (see discussion under "Definition of Specific Hypotheses" below).

III. Proposed study goals should be realistic and attainable-

Archaeological compliance studies should focus on what can be accomplished realistically given the scope of the proposed study, available funding, and other considerations. The research hypotheses that provide the primary impetus for the study should be specifically tailored to the resource(s) that will be investigated and current knowledge about them. There is no point in developing hypotheses that are unlikely to be addressed by a proposed study. For instance, it is unrealistic to expect that limited testing at a flaked stone scatter will provide insights into seasonality of site use. Laundry lists of hypotheses that bear little relationship to a proposed study do not satisfy the need to demonstrate its public benefit.

IV. Research designs should take into account broad regional research needs and possible future study requirements-

All compliance studies should be considered in relation to relevant regional and thematic research contexts. The breadth of this perspective will depend on existing knowledge about a region or topic and the goals and scope of the proposed study. Where little is known about a particular kind of resource within a region, it may be necessary to widen the search for contextual information to studies conducted in other regions.

While the particular scope of a study may limit the range of hypotheses that can be addressed realistically, reasonable allowances should be made to collect data that can contribute incrementally to the resolution of broad regional research hypotheses and topics which can be expected to have future research importance (ACHP 1980:29). Advances in our knowledge of regional archaeology depend in part on the systematic collection of data that may not be readily amenable to analysis on a project-specific basis. The collection of this kind of data may serve as the primary justification for the public benefit of small-scale studies. Such studies may be justified either by reference to an existing regional or thematic research design, or through the definition of appropriate hypotheses in a project-specific research design.

V. Efficient methods should be selected to accomplish the goals of the study-

Every archaeological investigation entails the investment of funds, labor, and in the case of excavation, also the important values of the property(ies) under study. Archaeological studies should be designed to use the most effective and least costly methods needed to gather data required by the research design, so long as those methods do not needlessly destroy other data and values the resource may possess (ACHP 1980: Principle X and page 28).

VI. A research design should be understandable-

To produce the greatest public benefit and facilitate professional and regulatory review, research designs should be clearly written in language comprehensible to both professional archaeologists and other interested persons fluent in archaeological discourse. While it may not always be possible to render complex ideas in simple terms, every effort should be made to use plain English.

It is reasonable to assume that reviewing audiences will have some familiarity with archaeological terminology. Thus, the language used in research designs need not define such elementary concepts as "site," "unit," or "projectile point." However, more specialized concepts, particularly those subject to professional debate, should be defined either in the text or a glossary. This will ensure that reviewers clearly understand the assumptions that are being made.

VII. A research design should provide a thorough and well organized argument-

A carefully reasoned and logically complete presentation should be made in support of a proposed study. This presentation should be readily understandable to other professional archaeologists and persons familiar with archaeological principles. Theoretical assumptions and biases should be made explicit where they have important implications for the proposed study. Such varied activities as the choice of sampling methods (Kintigh 1988; Mueller 1975; Thomas 1983), the classification of archaeological

phenomena (Beck and Jones 1989), the interpretation of depositional processes (Schiffer 1976, 1988), and the way in which inferences are made (Fritz and Plog 1970; Renfrew et al. 1982; Salmon 1982; Schiffer 1988; Sullivan 1978; Watson et al. 1971) all may warrant discussion insofar as they may influence the outcome of a proposed study.

While every nuance of the thought process need not be explained, research designs should make adequate linkages among theory, data, and methods. The most common shortcomings in research designs include the absence of essential core elements (especially suitably phrased hypotheses, test implications, and data requirements) and/or a failure to show how proposed study methods will result in the collection of enough relevant data to meaningfully address the hypotheses that have been presented. The elements needed to develop a complete research statement are described below under "Recommended Core Elements."

VIII. Research designs should be worded concisely-

While a proposed study must be adequately justified, research

designs should at the same time be concise. Extraneous details clutter a presentation, diminishing its clarity and impact. Only information that bears directly on the goals of the study should be included. Lengthy and unfocused discourses lose the interest of reviewers, and suggest that study goals may not be clearly understood by the author.

IX. Research designs should be flexible-

Investigations regularly lead to unanticipated discoveries. As Redman (1987:251) observes, research designs are not "methodological straight-jackets." Rather, they can and should be dynamic constructs that evolve and integrate new and unexpected discoveries as they are being implemented (cf., Binford 1964; Redman 1973, 1987; Struever 1971). While reasonable efforts should be made to predict and plan for the analyses of the data that will be generated by an investigation, a research design can be amended to include new provisions or delete those that no longer appear tenable based on initial data collection activities.

RECOMMENDED CORE ELEMENTS

Every research design should include certain basic elements to ensure that the reasoning behind the proposed investigation is adequately explained. These fundamental parts of a research design include (1) a discussion of the theoretical orientation that will guide the proposed study; (2) a synthesis of existing knowledge about the study region or theme, including identification of any gaps in that knowledge (e.g., opportunities for research); (3) a description of specific hypotheses; identification of (4) test implications and (5) the data needed to address each hypothesis; (6) a description of the methods that will be used to collect and analyze relevant data; (7) a statement regarding how research priorities have been chosen; and (8) a discussion of how the research design will be implemented (e.g., project administration plans)(Figure 1). Each of these core elements is discussed in detail below.

(1) Theoretical Orientation

The theoretical approach and major research objectives of the study should be summarized in this section. Sufficient information should be provided to enable the reader to understand the focus of the study and the paradigm that will guide it. In cases where a new theoretical position will be examined, all key assumptions should be fully elaborated. Where an established theory will be used, a brief summary of that position should be provided and appropriate references cited. If a departure from the original theory is proposed, that area of difference should be clearly explained. The level of attention devoted to this section of a research design should be based upon the scale of the study and the need to clarify the theoretical stance taken.

(2) Cultural Context

The cultural context of the proposed study should be synthesized in sufficient detail to lay an adequate foundation for the delineation of specific hypotheses. The information provided here should be based on a thorough review of current literature, as appropriate to the scale and type of study proposed. Consistent with federal regulations and guidelines (NPS 1983, 1986), this context statement should summarize existing information about the region and its archaeological properties by theme, place, and time. A description of the implications of previous research for the proposed study, including the identification of pertinent data gaps is crucial to this presentation.

Use of existing contextual information is encouraged to the extent that it is current and relevant to the proposed study. A succinct summary and citation of that information may be entirely adequate if there is no need to supplement the data. Where the existing information is incomplete, this summary should be augmented with more detailed discussion of the new data. Agencies that carry out small, repetitive investigations involving a particular resource type or region should prepare regional and thematic research designs that can be used by reference to guide such studies.

(3) Definition of Hypotheses

All archaeological interpretations depend on the examination of hypotheses. For compliance studies it is essential that these

FIGURE 1: SCHEMATIC OF THE DESIGN PROCESS

ESTABLISH THEORETICAL ORIENTATION



SUMMARIZE CULTURAL CONTEXT



DEFINE HYPOTHESES



ESTABLISH TEST IMPLICATIONS FOR EACH HYPOTHESIS



**DEFINE THE TYPES AND QUANTITIES OF DATA NEEDED TO TEST
EACH HYPOTHESIS**



SELECT APPROPRIATE METHODS FOR COLLECTING NEEDED DATA



ESTABLISH RESEARCH PRIORITIES



DEVELOP STRATEGY FOR IMPLEMENTING THE STUDY

hypotheses are made explicit in order to demonstrate the importance of the information that will be gathered and interpreted. A hypothesis, in the sense used here, is nothing more than a possible explanation for a fact. It provides a "best guess" about the conditions that may be responsible for producing a specific phenomenon. For instance, we may hypothesize that a marked change in the kinds of artifacts present at a site over time reflect a replacement of one cultural group by another. Or, alternatively, we can hypothesize that such changes reflect the adoption of new lifestyles by the same cultural group.

Since many hypotheses can be conceived as possible explanations for any given phenomenon, it is critical that the relative merits of a hypothesis are considered. To move beyond conjecture, a hypothesis must be tested and compared to other competing hypotheses. As Brim and Spain (1974) note, "The validity of a hypothesis cannot be established simply by obtaining research results that are consistent with it. Plausible rival hypotheses must also be ruled out." It is therefore normally appropriate to examine simultaneously several competing hypotheses in order to arrive at a plausible explanation for a given phenomenon (Chamberlin 1897).

A hypothesis is tested by exposing it to a situation where it can be falsified. This is accomplished by defining a "null hypothesis" that states that the proposed explanation (the hypothesis) is false. Suitable test implications must then be defined and appropriate measurements taken to try to reject the null hypothesis. If the null hypothesis can be rejected, then support is provided for the hypothesis. This support is strengthened if further tests replicate the original results, particularly when other kinds of data and methods of measurement are employed. However, care must be taken to avoid mistakenly rejecting the null hypothesis (Type I error) or incorrectly accepting a false hypothesis (Type II error) (Kaplan 1964; Siegel 1956; Thomas 1986).

It is possible to develop many interesting hypotheses that cannot be tested. For instance, we may believe that clogged stones functioned as ceremonial objects. Or we can speculate that intentional burning was used prehistorically to foster the growth of desirable plants. Some of the hypotheses which serve as the motivation for dialectical, structural, and symbolic studies (e.g., Hodder 1982; Leone 1982; and Spriggs 1984) pose such intriguing but untestable hypotheses. While such hypotheses may be thought provoking, and perhaps true, they provide no basis for critical examination.

For this reason, testable hypotheses should serve as the primary justification for a proposed study. Each hypothesis should be carefully phrased; defensible as an important contribution to the study of history or prehistory; and reasonable to approach with the data anticipated from the investigation. These factors are discussed in greater detail below.

(A) Phrasing-

To allow meaningful testing, each hypothesis should specify a relationship between a dependent variable (the phenomenon the researcher is trying to explain) and an independent variable (the factor thought to produce changes in the dependent variable). For example, an investigator may posit that environmental stress (the

independent variable) increases exploitation of marginal resource areas (the dependent variable). The key elements of a hypothesis are: 1. the dependent variable; 2. the independent variable; and 3. the kind of relationship thought to exist between the two variables.

Questions and qualified hunches about archaeological resources usually provide the raw material out of which hypotheses are developed. For example, we may wonder why the proportion of abalone (*Haliotis* spp.) diminishes substantially through time at a coastal habitation site. Perhaps we have reason to suspect overpredation as the causal agent. We may then wish to examine a hypothesis stating that overpredation of abalone (*Haliotis* spp.) resulted in increased use of other shellfish species.

(B) Importance-

The importance of a proposed hypothesis or group of competing hypotheses should be carefully justified. Generally, this justification is made in relation to the overall goals of the study, data gaps identified in the synthesis of previous studies, and likely scientific interest in the subject. The ACHP (1985:2) has specified that important questions are those which are "defensible as potential contributions to science, the humanities, or the interests of local communities in knowledge of their past."

It is possible to develop important hypotheses at almost any level of theoretical abstraction. For instance, there may be value in examining not only such abstract issues as how land use patterns changed in response to environmental alterations, but also in challenging traditional functional interpretations of an artifact or structure, improving a method of analysis, or refining our understanding of archaeological site formation processes insofar as examining those issues will ultimately lead to important insights about broader historical events and processes.

A hypothesis generally is not considered important enough to serve as the primary justification for a compliance study if:

- (1) it has been substantially resolved by previous research. However, there is value in challenging widely accepted conclusions if adequate reasons for considering them suspect are provided;
- (2) it can be addressed more efficiently with another type of study (ACHP 1980:10). For example, it may be more efficient to use historical research methods to examine hypotheses concerning household composition in a historic "company" town;
- (3) it cannot be satisfactorily tested; or
- (4) there is likely to be little or no interest in its outcome.

(C) Reasonableness-

Project scale and the nature of existing knowledge will in most cases prescribe the level of abstraction possible when framing hypotheses. While explanations may be sought at every level of theoretical abstraction, only studies of the largest scale have the ability to address more abstract hypotheses in a realistic manner. For this reason, it is important that hypotheses are reasonably conceived in relation to the scale of the proposed investigation.

It should be possible to address the proposed hypothesis or group of competing hypotheses in a meaningful way with the data that are expected from the study. In other words, there should be

good reason to believe that appropriate physical evidence is present or likely to be present at the archaeological property or properties that will be studied (NPS 1982:30). For example, it would probably be unproductive to examine how site occupants depended on local animals for food at a site with highly acidic soil where bone preservation is poor.

While only those hypotheses which can be productively approached with the data expected from a study need be posed formally, provisions also should be made to collect data that can aid in the resolution of more abstract hypotheses that depend on regional data. Such activities generally should not constitute the primary justification for a study. Rather, they are meant to ensure the achievement of recognized regional and thematic research goals.

(4) Test Implications

Test implications specify the phenomena that will be observed as a means to reject the null hypothesis. Confidence in the validity of a hypothesis (and the explanation it offers) depends on the strength of the measures devised to test it. The more and various the test implications that can be brought to bear on a given hypothesis, and the more satisfactory the measures of those phenomena, the greater the support provided for the hypothesis.

Test implications serve as observational predictions that either must be true or are very likely true if the hypothesis is true. In other words, they specify the types of data that will serve as the basis for testing the hypothesis. For example, we would expect to observe bipolar cores in areas where bipolar lithic reduction occurred. Or we would expect several different hydration rims on an obsidian projectile point reworked long after its original use.

A reasonable basis should be offered for examining the hypothesis(es) selected for study. When a particular observational prediction is based on disputed or unresolved assumptions (e.g., a dating technique that requires further refinement), those assumptions should be discussed and a clear rationale offered for their provisional adoption. In many cases, such predictions may be appropriately framed as adjunct hypotheses.

(5) Data Requirements

This section should identify the specific types, quantities, and quality of data that will be needed to establish the validity of the hypothesis, as well as the kinds of measurements (e.g., nominal, ordinal, or interval/ratio) that will be used. Since complete data collection and analysis is usually not feasible or even necessary, some justification should be offered for the level of sampling proposed. Minimum thresholds for the acquisition of specific types and amounts of data should be explained statistically to account for the role of sampling error and chance. The reader should refer to Kneale (1952), Mueller (1975), Thomas (1986), and other references cited in the bibliography for information on sample selection.

When the data needed to address a particular hypothesis will require effort beyond the scope of the planned study, that hypothesis should normally not serve as the primary justification for the

investigation. However, it is useful to identify how the data from a study will contribute incrementally to the resolution of regional and thematic hypotheses. For instance, the study of a single sparse lithic scatter will ultimately help to resolve certain hypotheses regarding regional lithic procurement and stoneworking practices.

(6) Define Study Methods

The next step is to identify the most suitable and efficient methods for collecting and analyzing relevant data. Study methods should be designed to recover enough information to meet the data requirements of the study, while at the same time limiting costs and adverse effects on the historic property(ies) (ACHP 1980:15-16, 28-29; 1986:5).

In selecting study methods, consideration should be given to: (a) collecting enough data to meet the needs of the investigation in an efficient manner; (b) making allowances for future research needs through conservation of the archaeological property(ies) under investigation (i.e., limiting destructive analyses to the extent possible), adequate documentation of study methods, and maintenance of any collected data and/or materials; and (c) planning for unanticipated discoveries (ACHP 1980:28-29).

(7) Establish Research Priorities

While the data expected from a particular study may contribute to a wide range of research questions, most investigations will need to balance the importance of the expected information yield against financial, regulatory, and other constraints. The ACHP (1980:28) notes that "it is not necessary, and is often counterproductive, to give the same level of effort to all hypotheses."

The selection of research priorities should take into account: (a) the relative importance of the hypotheses posed for study; (b) the scarcity and/or impermanence of the various data proposed for collection; (c) public or ethnic group interests in the research hypothesis (on the national, state, or local level); (d) cost factors; and (e) the amount and fruitfulness of previous research on the same hypothesis (NPS 1983:44720). Generally, emphasis should be placed on the investigation of those hypotheses which can be addressed most efficiently and productively with data known or reasonably expected to be present in the archaeological property itself, or in archival or testimonial sources that relate to that property.

(8) Implementation of the Research

Once scientific considerations have been adequately addressed, it is essential that provisions be made for bringing the proposed research to successful fruition. This portion of the research design should discuss staffing needs and personnel qualifications (including any consultants); scheduling, logistics, and permits; regulatory review needs; an agreement concerning treatment of human remains and associated artifacts (if appropriate); necessary facilities and equipment; preparation of reports, exhibits, and interpretive programs; curation plans for any collected materials, following the

standards set forth in 36 CFR Part 79; and the costs of the proposed study (ACHP 1980:29; NPS 1983:44737).

Every archaeological compliance study should be directed by a research design that devotes at least some attention to each of the core elements defined above. However, planning efforts should be scaled to the size and research limitations of the proposed study. The amount of detail offered in a research design and the emphasis placed on each core element will depend on the theoretical ap-

proach taken, the particular scope and goals of the proposed study, and the availability of other research designs and pertinent contextual information. For example, the justification offered for a small survey may be very brief, particularly when it is conducted under the auspices of a regional research design, while the research design for a data recovery investigation at multiple sites may be considerably more elaborate.

SPECIAL CONSIDERATIONS FOR SPECIFIC TYPES OF STUDIES

While every archaeological study must be designed to satisfy a unique blend of circumstances, more detailed recommendations can be offered for specific kinds of investigations. In this section supplementary guidance is offered for the design of research for inventory and excavation studies, as well as investigations of historic period archaeological resources. These supplementary recommendations build upon the general principles and core elements already described.

Inventory Studies

Inventory studies are activities that can and should be used to address important research questions. As such, they require the direction provided by research designs (NPS 1983:44721). Hypotheses concerning settlement patterning and resource exploitation can often be productively examined using inventory data. When archaeological specimens are collected and analyzed during an inventory study, an even wider range of hypotheses may be examined. For example, obsidian samples collected from the surface of prehistoric archaeological sites may provide insights into regional exchange patterns.

To examine such topics productively and ensure the adequacy of the identification effort, research designs for inventory studies must carefully select identification methods consistent with the objectives of the study, the character of the area to be investigated, and the types of resources expected. Unless separate studies are being conducted for other types of cultural resources, an archaeological inventory study should seek to identify all types of historic properties, including features of the built environment (e.g., buildings, structures, objects, landscapes) and localities with ethnic or religious significance.

The planning for every inventory study should include a record search at the appropriate Information Center of the California Archaeological Inventory and/or the relevant regional office of any state and federal land managing agencies that maintain historic property records. Additional background research is usually necessary for most archaeological studies (see ACHP and NPS [1989:26-28] for recommendations regarding appropriate sources of background information). For instance, it is often helpful to consult historic records, knowledgeable persons, and the Sacred Lands files at the California Native American Heritage Commission before conducting inventory fieldwork.

The level of effort devoted to the design of an inventory study will depend on the scale and type of survey and the kinds of resources expected. Smaller inventories may refer to an existing regional research design where that document is relevant and current. In the absence of a relevant regional design, predictions about the types and expected distribution of particular resources should be summarized from available background data. Agencies conducting repetitive small surveys in a given area should prioritize the development of a regional research design.

The research design for every inventory study should begin by summarizing all previous studies in the vicinity of the proposed investigation. Expected property types that share physical or associative characteristics should then be defined (e.g., sparse lithic scatters, ditches, rock art, trash scatters, etc.) and predictions offered regarding the distribution of each resource type. Projects of larger scope can and should address a broader set of research hypotheses that will require additional context development.

Once these data have been summarized, suitable methods can then be selected to discover, classify, record, and analyze relevant inventory data. Careful scrutiny should be given to untested assumptions regarding the adequacy of previous identification efforts in the proposed study region. For instance, surface inspection alone may be inadequate to discover archaeological resources obscured by alluvium, colluvium, duff, vegetation, inundation, pavement, or other agents. Mechanical exploration, remote sensing, and other methods may be needed to inventory areas where such concealed, buried, or submerged resources are reasonably expected.

As noted in the Secretary of the Interior's Guidelines for Identification (NPS 1983:44722), "it is important that the selection of field survey techniques and level of effort be responsive to the management needs and preservation goals that direct the survey effort." Studies designed to evaluate project alternatives during their early stages of planning may benefit from successive stages of sampling. When sample surveys are conducted for compliance studies, it is crucial that the predictions derived from such surveys are tested. Complete identification should be accomplished in areas subject to direct effects from an undertaking, except in cases where a previously confirmed predictive model has established that an area has a very low potential to contain important cultural resources.

Provisions also should be made for inventory data to be "systematically gathered and recorded, and made available to those responsible for preservation planning" (NPS 1983:44721). In this regard, certain minimum documentation standards have been established for historic resources (OHP 1986, 1989b) and archaeological sites (OHP 1989a). These data should be furnished to the OHP and the appropriate regional Information Center of the California Archaeological Inventory. Permanent state trinomial designations should be promptly requested for all newly discovered archaeological sites, and inventory reports should incorporate those numbers whenever possible.

Excavation Studies

Research designs are always needed for archaeological excavation studies. Excavations ranging from very limited augering or shovel testing to major data recovery at multiple sites should be planned in accordance with these guidelines. The scope of a particular research design will depend on the complexity and purpose of the study and the amount and type of sampling proposed. As we have previously emphasized, the goals of a study should be realistic given the state of existing knowledge about the resources and the data expected from the study.

The cultural context for an excavation study should provide detailed information on the site or sites that will be investigated, in addition to the regional and thematic information previously described. This description of existing knowledge about the property or group of properties should include a discussion of its location, physical characteristics (e.g., size, depth, stratification, cultural constituents, etc.), integrity, and the major findings of any previous investigations there.

Excavations designed to evaluate the research importance of archaeological resources and/or to plan for subsequent data recovery should concentrate on assessing a site's ability to address specific study hypotheses. This assessment should be made in relation to hypotheses that are reasonably specific given the limitations of existing regional, topical, and site-specific information. Since the hypotheses for testing programs are usually based on fairly limited site-specific data, they should draw heavily on existing knowledge of the region and that resource type. The use of regional research designs is encouraged where they are relevant to a proposed study.

The hypotheses for a test excavation should encompass issues that have some prospect of being addressed at the site(s). However, those hypotheses should not be restricted exclusively to issues that can be addressed with testing data alone. In other words, the data requirements for many or all of the hypotheses posed need not be fulfilled by the testing program. Testing programs are intended to assess a site's ability to address research hypotheses, not to fully realize that potential.

While the physical characteristics of archaeological sites should be explored in testing programs as a foundation for assessing research potential, gathering such data is not the primary justification for conducting a study and should not be confused with formal study hypotheses. For example, the following goals should not be considered formal study hypotheses:

- (1) Estimation of site depth and horizontal extent;
- (2) Preliminary characterization of site structure and site development processes;
- (3) Definition of site content (artifacts, ecofacts, features, etc.);
- (4) Preliminary characterization of intrasite patterning of cultural materials and features;
- (5) Definition of the nature and age(s) of all occupational components identified at the site; and
- (6) Gross characterization of the integrity of the site and the condition and preservation of the material remains found therein.

Data recovery excavations must be based on fairly detailed knowledge of an archaeological resource. Thus, greater specificity is usually possible (and appropriate) in the hypotheses posed. Hypotheses for data recovery studies should be tailored to the site or sites being studied. Some hypotheses posed during the test excavation of a site may remain viable for a data recovery study. However, additional hypotheses should also be posed to address issues that have come to light as a result of the previous phase of investigation.

Since the ultimate purpose of a data recovery study is to preserve for the public the important information contained in a site, it is critical that the results of such studies are adequately interpreted and disseminated. This means, first, that the results of a study should be evaluated in relation to the research design which motivated and directed the investigation. Second, both professional archaeologists and the public should be apprised of the research findings in manner comprehensible and useful to each.

Studies of Historic Period Archaeological Sites

All aspects of an archaeological study involving a historic period archaeological resource must be considered in relation to relevant archival evidence and oral testimony. The importance of historic period archaeological sites may encompass factors other than research value alone. Therefore, suitable research hypotheses for such resources must consider the potential commemorative, aesthetic, or other values, they may embody. For this reason, a professional historical archaeologist should supervise or review every research design that involves the study of historic period archaeological resources.

When designing research for a historic period archaeological resource, it is necessary to assess its information potential through an integrated analysis of relevant archaeological, historic, and architectural/engineering data. The level of background research needed to prepare a research design for a particular project will depend on the kind of study proposed (e.g., inventory, testing, or data recovery), the scale of the project, and the availability of

historical information. Appropriate background historical research, when combined with a record search at the relevant Information Center of the California Archaeological Inventory, should provide an adequate basis for context development and the creation of specific research hypotheses.

Background historical research for inventory studies normally focuses on identifying the types and distribution of historic period resources and their component features, as well as the broad themes and periods of activity each expected resource type represents. In areas where there is a high potential for such resources (e.g., portions of towns or cities more than 45 years old, mining districts, etc.) it is usually appropriate to conduct detailed background historical research prior to even the smallest inventories. Without this information, resources may easily be missed using traditional inventory techniques.

More detailed historical information should be sought when designing excavations of historic period archaeological resources. This historical data gathering should proceed in an integrated fashion that informs the archaeological studies. Since historical data sources (whether archival or living testimony) must be explored to determine their research potential just like archaeological sites, the level of data gathering needed for a particular investigation must be determined on a case-specific basis. It is usually appropriate to look for historical data that can shed light on:

- (1) The specific types and locations of features and artifact-bearing deposits present at the site or sites under investigation;
- (2) The history of land ownership of the site or sites;
- (3) The types of activities which occurred at the site throughout the historic period;
- (4) The socio-economic, ethnic, gender, and age composition of

previous site occupants (or labor organization scheme for commercial/industrial sites);

- (5) The period(s) during which each occupation/use took place at the site;
- (6) The major historical themes that have a bearing on the use of the site;

Suitable background data should then be used to establish a cultural context for the proposed study, identify archaeological and historical data gaps, and formulate important study hypotheses. To be considered important, a research hypothesis for a historic period archaeological resource must be able to "supplement, confirm, refute, or identify a new perspective" by amplifying the historical record in some way (NPS 1988:10). Thus, the archaeological study must be able to reveal information inaccessible by archival and interview methods alone.

Sites about which little is known historically, as well as those amply documented by archival data and interviews both may potentially be the focus of important research. Research at extensively documented archaeological sites may explore the validity of the historic record or pursue inquiries into previously ignored research hypotheses. For instance, well documented sites may provide the opportunity to test archaeological principles (ethnoarchaeology and "middle range theory"), teach those principles to the interested public, test historic assumptions and biases, and approach other questions of interest to scientists and the public.

Sites lacking detailed, resource-specific historic information may also contribute to the resolution of important research questions. For instance, archaeological study of Chinese mining camps may provide insights into the activities of an ethnic group for which only limited documentary and interview data is available.

IMPLEMENTATION OF GUIDELINES

These guidelines provide recommendations for the design of archaeological studies conducted in accordance with various legal requirements in California. The recommendations made here apply equally to studies necessitated by federal and state laws and regulations. In particular, these guidelines should be used in the context of compliance with the California Environmental Quality Act (CEQA) and its Guidelines, as well as in connection with activities intended to fulfill the requirements of Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR Part 800).

These guidelines depend on professional peer review for successful implementation. The professional staff at OHP presently review only those archaeological studies conducted in the

context of compliance with Section 106 of the NHPA. Therefore, local officials charged with oversight of CEQA compliance should retain qualified staff or establish professional peer review committees to ensure proper implementation of these guidelines. OHP will use these guidelines in the review of studies undertaken to meet the requirements of Section 106.

OHP developed this document with considerable input from professional archaeologists and the public, as required by law. These guidelines have been adopted by the State Historical Resources Commission as official policy pursuant to Public Resource Code Section 5020. Implementation of these guidelines will ensure that the public interest is served effectively through more consistent and clearly justified management of archaeological resources.

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