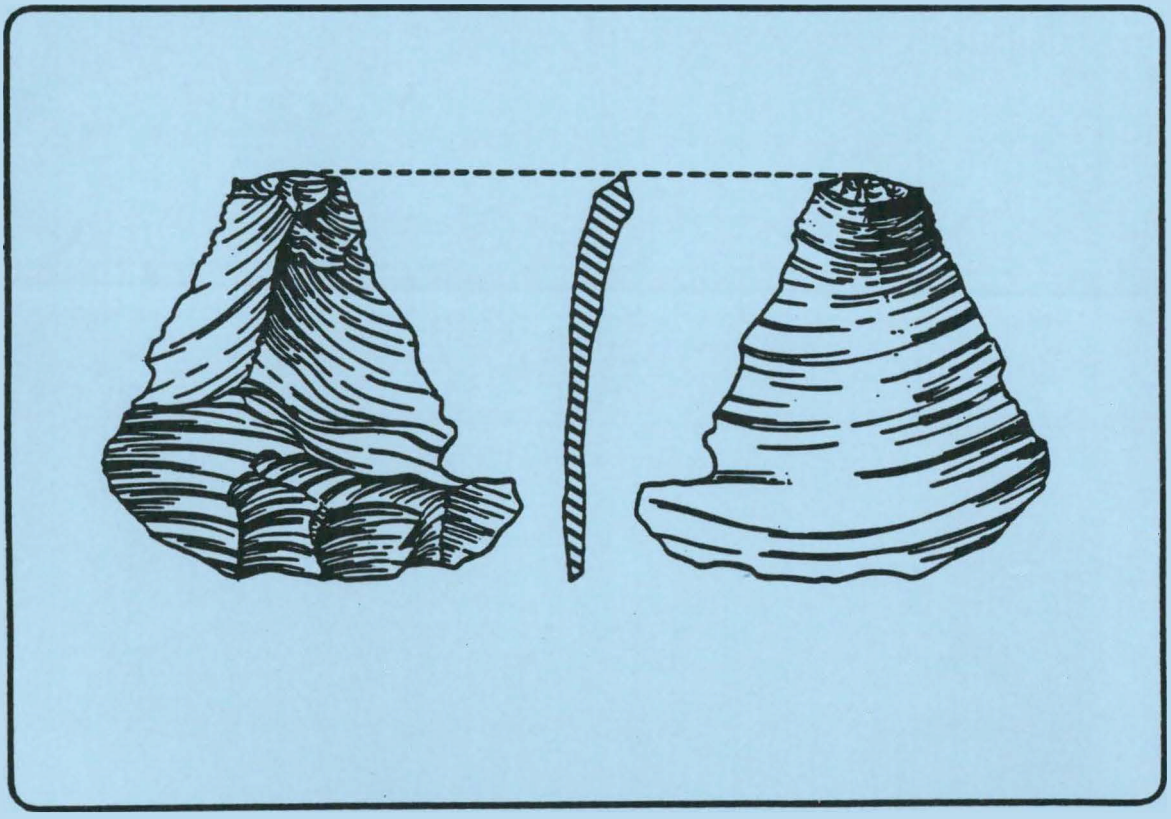
California Archaeological Resource Identification and Data Acquisition Program: Sparse Lithic Scatters

A Program For The Identification And Management Of An Archaeological Resource Class



February 1988

California Archaeological Resource Identification and Data Acquisition Program: Sparse Lithic Scatters

A Program For The Identification And Management Of An Archaeological Resource Class

Developed by:

Robert Jackson - Office of Historic Preservation
Michael Boynton - U.S.D.A. Forest Service, Region 5
William Olsen - Bureau of Land Management
Richard Weaver - Army Corps of Engineers

Illustrations by Tammara Ekness-Hoyle

February 1988

The Sparse Lithic Scatter Program is distributed for trial use. Recommendations for the improvement of this program are encouraged. Comments and questions can be directed to the Office of Historic Preservation, P.O. Box 942896, 1416 Ninth Street, Sacramento, California 94296-0001.

ACKNOWLEDGEMENTS

This program owes much to similar concepts or programs that predate it. For several years archaeological surveys conducted by the Cultural Resources Facility at Sonoma State University, under the guidance of Dr. David Fredrickson, have incorporated obsidian debitage sample collection and subsurface probing as an aspect of "enhanced survey." Goals of this approach are the collection of important research and management information early in the project planning process. It is this kind of thoughtful mixture of research and practical, efficient, planning that reflect a maturing of cultural resource management.

Over 300 questionnaires soliciting thoughts and information concerning flaked-stone scatters were distributed throughout the state in 1986. We would like to thank the 40 individuals who took the time and thought to respond to the questionnaires. Many of the responses provided useful data or suggestions, and offered important insight into current attitudes and understanding of the potential of flaked-stone studies in regional archaeological research.

Tammara Eckness-Hoyle graciously donated her time and considerable talent in creating the flake and artifact illustrations. We have developed, and will continue to refine, flake type descriptions into a clear, concise reference for field workers and students of archaeology. The illustrations depict many attributes that are otherwise difficult to describe. These "pictures" are definitely worth several thousand words.

James Gary Manieri of Public Anthropological Research, Inc. provided valuable comments and ideas on recording techniques and the draft document.

The following individuals with special knowledge in lithic technology discussed and/or reviewed the program during its development and provided useful suggestions and critical review: Peter Ainsworth, John Dougherty, John Fagan, Amy Gilreath, Marsha Kelly, Daryle Noble, Michael Rondeau, M. Steven Shackley, and Elizabeth Skinner.

The valuable comments and suggestions credited above are not to be construed as unequivocal endorsement of the approach.

Administrative support and encouragement for this program was provided by Hans Kreutzberg (Office of Historic Preservation), Sonia Tamez (Region 5, U.S.D.A. Forest Service), and Tom King (Advisory Council on Historic Preservation). Despite the contributions of many individuals the program is still new and and will surely be improved through testing, consideration, and communication.

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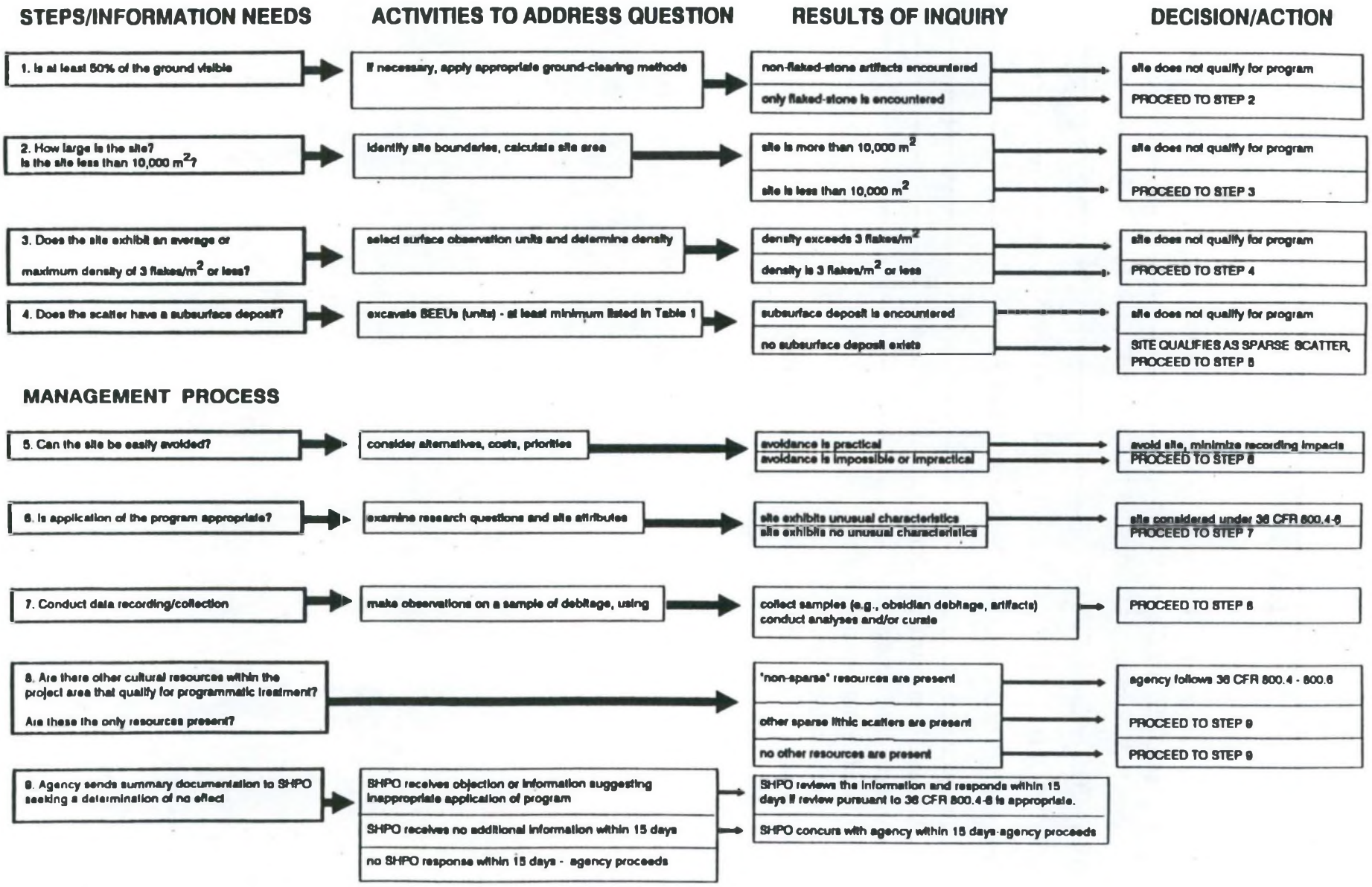

California Archaeological Resource Identification And Data Acquisition Program: Sparse Lithic Scatters

I. INTRODUCTION

A. GOALS AND GENERAL FEATURES OF THE PROGRAM

This document offers research archaeologists and cultural resource managers a tool by which this problematic resource category can be defined, recorded, and managed. Regional archaeologists are afforded the option of applying the program to qualifying resources and significantly abbreviating the historic preservation compliance process (e.g., Section 106 of the National Historic Preservation Act).

The program is designed to provide documentation to satisfy reviewing agencies that sparse scatters have been defined through prescribed field identification methods. These field methods provide sufficient information to ensure accurate site classification and evaluation of research potential. Once a resource has been established as qualifying, the regional professional is responsible for determining whether the application of the program is appropriate on a project- or site- specific basis. It offers a flexible and efficient management option when its application is appropriate, but if the professional archaeologist believes that circumstances do not warrant the use of this program, then a different management direction should be followed (e.g., 36 CFR 800.4 - 800.6).

Finally, the program recognizes that lithic scatters contain limited but useful data and establishes procedures and guidelines to efficiently recover that information.

II. IDENTIFYING SPARSE LITHIC SCATTERS

A. CRITERIA FOR CLASSIFICATION AS A SPARSE LITHIC SCATTER

The following criteria and characteristics identify lithic scatters as sparse and acceptable for programmatic treatment. To qualify as a sparse lithic scatter, an archaeological flaked-stone deposit must:

1) contain only flaked-stone and lack other classes of archaeological materials (e.g., groundstone, fire-affected rock, bone or shellfish remains, pottery);

2) lack a substantial subsurface deposit (defined below);

3) exhibit surface densities equal to or less than three flaked-stone items per square meter.

If field observations result in surface debitage density counts that conform to the density criterion, and a subsurface deposit is absent, as demonstrated through limited excavation, then the resource can be classified and treated as a sparse lithic scatter in accordance with the conditions of this program. Successful application depends on regional expertise and professional consideration. Administrative safeguards are designed to protect against the inappropriate application of this program (see Section V.).

B. METHODS OF IDENTIFICATION

Archaeological field methods related to the management of sparse lithic scatters follow a tripartite process of location (archaeological site discovery and recording), classification, and data collection. Figure 1 (page iv) presents a summary listing of the criteria and methods for field identification, data collection, and management of sparse lithic scatters. Identification, as defined here, includes the discovery and accurate classification of resources.

1. Resource Location

Methods for locating (i.e., discovering) and recording archaeological sites are well-established in California. Archaeological survey and site recording standards should conform to state and federal guidelines. To ensure that this is accomplished, guidelines have been prepared for use by California archaeologists and cultural resource managers. These include the Archaeological Survey Guidelines (estimated availability, fall 1988), and the Archaeological Site Record Handbook. These guidelines can be obtained from:

The Office of Historic Preservation
P.O. Box 942896
1416 Ninth St. (Room 1442-7)
Sacramento, California 94296-0001

2. Resource Classification

Resource classification requires information obtained from field observations. Field methods must determine: 1) surface density; 2) site size; 3) lithic material types present; and 4) the presence or absence of substantial subsurface deposits.

A Flaked-Stone Scatter Attribute Record and guidelines for its use have been developed and included with this program to assist the field archaeologist in recording the information necessary for implementing this program (Appendix II). Archaeologists are encouraged to supplement the form with information that satisfies or addresses individual and/or regional research interests.

a) Surface Observations

(1) Surface Visibility and Site Boundary Definition

At least 50% of the ground surface should be visible in order to ascertain without some kind of ground clearance, if the lithic scatter is sparse and amenable to treatment under this program. If less than 50% of the ground surface on an archaeological site is visible, the field archaeologist must make a reasonable effort to determine the flaked-stone density and site extent through ground clearance or shallow excavation, so that an accurate site classification can be made and the appropriate amount of subsurface excavation can be determined. Methods for determining site boundaries and surface flaked-stone density when ground visibility is obscured, include: 1) the removal of surface vegetation or litter to expose surface soils for visual observation; 2) the screening of surface-scraped duff and soil; 3) scheduling survey to coincide with maximum surface visibility (e.g., seasonally or after events such as fires); and 4) revisiting the site during seasons of improved ground visibility. Surface visibility and the measures taken to compensate for poor visibility must be documented (Appendix II).

(2) Surface Density or Absolute Count

A Sparse Lithic Scatter is characterized by a visible surface density of no more than three flakes per square meter. This density criterion was established after considering responses to questionnaires completed by archaeologists throughout the state. The lack of intra-regional consensus or consistency, and a lack of agreement on the nature of density variation between regions, prompted the rejection of region-specific density thresholds at this time. As a result, a relatively low density threshold is proposed for statewide application with this program. A uniform density threshold will be viewed differently throughout the state due to differences in important region-specific research questions, variation in raw material types and availability, and the variable data potential of different raw lithic materials. In response to this variability, the program affords archaeologists the *option* of determining whether the density criterion established by this program is met by use of maximum or average density on a site-specific basis. This difference allows significant flexibility in light of variables that make a single measure of density inappropriately rigid.

There are many sites at which this program should not be applied, even though such sites may technically qualify for its application. Because this program affords considerable flexibility and discretion to the archaeologist, it is important to offer additional guidance by describing some of the kinds of situations to which application of the program may be inappropriate. Several such cases are discussed in Appendix I to promote a clearer understanding of the intent of this program and the circumstances under which its application is inappropriate.

Various methods of determining flaked-stone density might be employed, depending upon the size and characteristics of a site. At small sites (e.g., < 1000 square meters), recording the total number of observed flakes may be the most expeditious and accurate method of characterization. At relatively large sites, an estimate of flake density may be most practical. Methods of density estimation/determination include counting and extrapolating density from observations made on small areas within homogeneous sites (e.g., a number of square or circular observation areas ranging in size from two to ten meters). Observations along transects across a site is another method of determining average or maximum density. The selection of a particular method of identification is left to the discretion of the professional field archaeologist. However, a systematic method of determining the density of flaking debitage on a site surface and recording this density in flakes per square meter must be documented (Appendix II). Intrasite density variation must be noted during site recording, and when variations are encountered, the archaeologist should consider if application of the program is appropriate.

b) Subsurface Testing

If the surface density of a site falls under the threshold established by this program (i.e., it falls at or below the 3 flake/m^2 density threshold), and the archaeologist wishes to further explore the possibility of applying this program, then the potential for subsurface deposits must be explored. The objectives of limited excavation (i.e. testing) are to determine if the site in question has a substantial subsurface cultural deposit and determine the presence or absence of non-flaked-stone artifact classes.

Many sites will not qualify for this program based on surface content or density, or materials encountered during initial subsurface exploration (testing). Excavation of sites that do not qualify, to determine National Register eligibility, should be guided by a site- or project-specific research design.

(1) Excavation Methods

The minimum size of a Subsurface Exploratory Excavation Unit (SEEU) is a 50 cm square (i.e., 50 cm on a side) or 50 cm diameter circle. These unit sizes are small enough to excavate with relative efficiency and speed, and are minimally large enough to produce adequate amounts of soil to monitor cultural material content. SEEU sizes larger than the minimum are encouraged, and once again, archaeologists should exercise professional judgment in determining appropriate unit sizes. Excavation should proceed from the surface in consistent increments no greater than 20 cm. SEEU excavation must exercise volume control so that the amounts of materials from various depth increments can be compared. This requirement translates to square or circular units with roughly vertical sidewalls. Loosened soils must be passed through screen with a mesh size no larger than 6mm (1/4"). Once again, the purpose of SEEU excavation is the determination of presence or absence of subsurface deposits and non-flaked-stone artifact classes, not the collection of archaeological research data. Therefore, the use of this relatively large mesh size is acceptable. 1

SEEU excavation can usually be performed with considerably greater speed than "traditional" excavation. Practiced excavators can wield shovels to perform such excavation with volume control that approaches trowel excavation. Again, volume control is essential in assessing the relative diminution or increase in debitage densities with depth, but it is desirable to maximize the number of SEEUs across a site with slight sacrifice in volume control, rather than have a small number of highly controlled excavation units.

(2) Determining the Amount of Excavation

There is no formula for determining the appropriate amount of excavation to perform under this program. No reasonable amount of SEEU excavation can guarantee that a site contains no archaeological features or subsurface loci of interest. This program takes a pragmatic approach to the detection of subsurface deposits. We recognize the possibility that small but important subsurface deposits may, on rare occasion, not be detected. We believe that the benefits derived from the consistent identification and data collection methods provided by this program far outweigh the minor risk of mis-identification. SEEU numbers and distributions should minimize the risk of failing to detect substantial subsurface deposits. The experienced regional professional should ascertain, based on site characteristics and regional archaeology, if the specified minimum number of SEEUs are sufficient to maintain a reasonable level of confidence in determining the absence of a subsurface deposit.

Figure 2 presents minimum acceptable numbers of SEEUs scaled to site size. Again, archaeologists are encouraged to exercise professional judgment in determining the amount of subsurface investigation that is appropriate above these minimum amounts.

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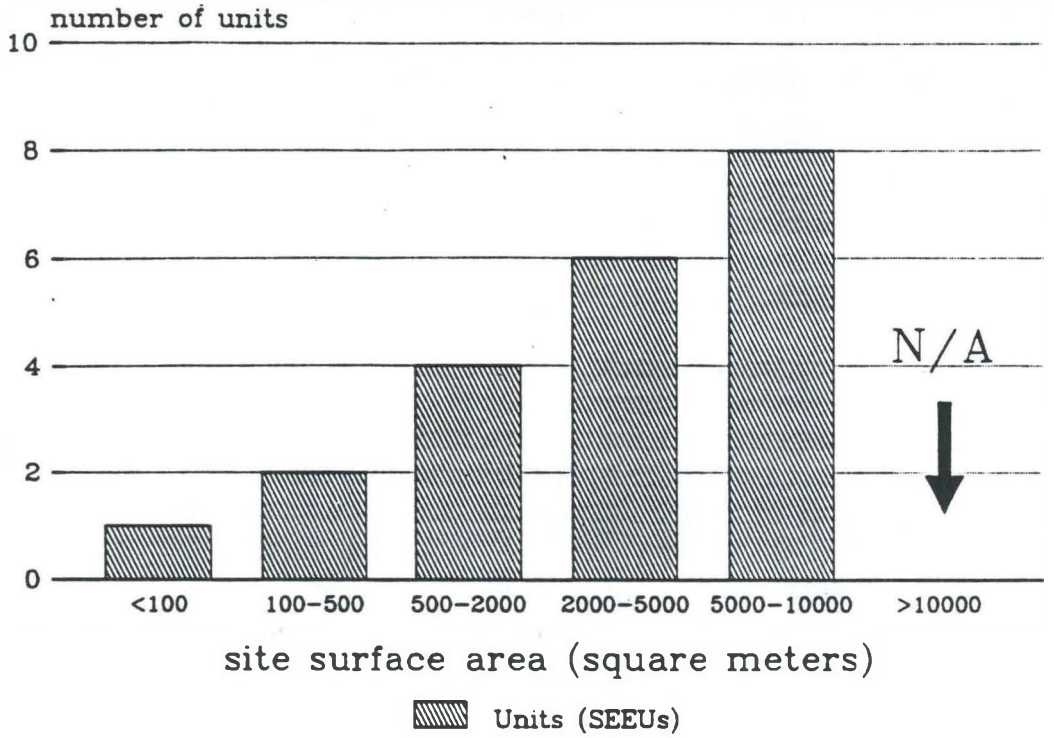
1 As stated above, the purpose of SEEU excavation is to determine the presence or absence of a substantial surface deposit. It is not intended as a research method to delineate areas with higher density microdebitage. The identification of high density areas of micro-debitage may reveal specific activity areas, such as the location of projectile point manufacture (finishing). The identification methods developed for this program are not intended to recover this type of information. While not mandated by the program, the use of smaller screen sizes such as 3mm (1/8") or 1.5mm (1/16") are encouraged if regional or individual research interests identify such information as important aspects of data recovery for sites that qualify under this program. (see Section III. Data Recovery).

Figure 2: SEEUs (minimum 50 cm square) Scaled to Site Surface Area



Site Area (square meters)	*Minimum Number of Units*[a]
< 100	1
100-500	2
500-2000	4
2000-5000	6
5000-10000	8
10,000	N/A[b]

[a] Number of SEEUs represent a minimum necessary for this program. Additional units are encouraged if judgment warrants or special conditions apply (e.g., poor ground visibility).

[b] Sites larger than 10,000 will not be considered sparse lithic scatters.

(3) Discriminating Surface From Subsurface Deposits

A number of natural and cultural factors cause downward displacement and mixing of cultural materials at many if not most California archaeological sites. Flexible criteria for distinguishing surface from substantial subsurface deposits are therefore appropriate. If the program required a complete absence of subsurface flaked-stone, few sites in California would qualify. The goal of excavating SEEUs is to determine when subsurface materials result from downward migration and mixing, and when those materials may represent older, discrete occupational strata. Therefore, a variety of potential geomorphological and bioturbational factors, too numerous to list here, should be considered in determining the nature of a deposit. This program does not attempt to absolutely define surface from subsurface deposits on the basis of flake counts. Instead, we offer rough relative measures to make this determination. Sites that qualify for consideration as sparse lithic scatters under this program exhibit substantial reductions in the amounts and densities of cultural materials encountered in subsurface test units. *Substantial reduction* is defined as a debitage count reduction of at least 50% from some quantified previous level within the top 40 cm of the deposit. Again, depth increments can be no greater than 20 cm.

The terminal depth for excavation should be conditioned by regional site characteristics, as well as site- and project- specific circumstances. For instance, some areas may have a potential for containing cultural deposits buried deeply under sterile deposits, capped by late prehistoric deposits. In such areas it would be appropriate to continue SEEU excavation below initial levels that yield little or no flaked-stone to affirm the absence of a buried deposit.

If a subsurface deposit is encountered (i.e., conditions established in this program are not satisfied), excavators should terminate site excavation after completing the unit under excavation, unless previous arrangements (e.g., a test excavation proposal with accompanying research design) have been made to continue excavation for the purpose of site evaluation. If the density threshold for subsurface debitage has been exceeded or other classes of archaeological materials are encountered, the site no longer qualifies for further consideration as a sparse lithic scatter. It should be emphasized, however, that disqualification as a sparse scatter in no way implies that a site is significant (e.g., National Register eligible). Disqualification of a site simply means that consultation with the OHP is required, in accordance with the provisions of 36 CFR 800.4 - 800.6. If it is determined that a substantial subsurface deposit is absent, using the guidelines presented above, the deposit can be considered a surface site sparse lithic scatter amenable to treatment within the context of this program.

III. DATA RECOVERY

Archaeological sites should be preserved if possible and practical. We hope that cultural resource managers will carefully consider the possibilities of site avoidance before this or any other program of data recovery is applied and sites are impacted. However, costs of avoidance must be measured against program application costs in determining the appropriate management action.

Once a site has been classified as a sparse lithic scatter and the responsible professional archaeologist has decided to manage the site according to the provision of the program, a minimum amount of information and materials must be collected to satisfy the program's conditions. This information supplements standard archaeological site recording.

A. DESCRIPTION

Several categories of useful information can be recovered by recording field observations on the attributes of sparse lithic scatters. These attributes include:

1. the types and frequencies of various flaked-stone material present on a site surface;

2. spatial distributions of the various material types, densities, and technologies; and,

3. rudimentary techno-morphological descriptions of the flaked-stone assemblage.

A Flaked-Stone Scatter Attribute Record and guidance for its use are attached (Appendix II). While it may be unreasonable to expect every field technician to specialize or develop expertise in lithic technology, it is not unreasonable to expect field archaeologists to develop the basic skills to make standard field observations on the attributes of technologically salient flake types. A basic premise of the ethic of archaeological site preservation is that data potential will increase with the improvement of analytic techniques. Improvement in techniques must also be reflected in the training of field technicians, not just the physical scientists studying archaeological remains.

Lithic technology workshops, fieldschools, and programs are offered in various parts of the U.S. every year, and California training sessions are being developed to ensure that archaeologists have sufficient training to record the necessary observations.

The best guidance we can offer regarding sample sizes for techno- morphological observations on flaked-stone debitage is that "more are (usually) better." It often takes only one diagnostic flake to identify the practice of a specific reduction technology in an assemblage. However, the frequency of production of such technologically diagnostic flakes vary with the technology and raw material, but is generally low. In other words, a single, technological indicator flake may occur in a ratio of one to dozens or even hundreds of flakes. Therefore, the greater the number of observations, the greater the chance that specific technologies will be identified.

Observations on the general nature of the surface debitage assemblage are appropriate, quantitative observations (Appendix II) should be obtained from all materials in circumscribed areas. Minimally, observation should be made on all flakes within the surface units from which density estimates were derived. From a practical perspective, it would be most efficient to make such observations while determining if the site qualifies as a sparse scatter. If it does qualify, then the technological observations will already have been made. If the site does not qualify, then the observations will contribute to a regional data pool. A minimum of 30 observations for each material type present is desirable (although more are better), and any site locus exhibiting higher flaked-stone densities should be sampled (see Appendix II for additional guidance).

B. COLLECTION

Debitage can offer information related on tool stone acquisition patterns and, in the case of obsidian, the temporal placement of such procurement and/or site use. In addition, new techniques of dating non-obsidian flaked stone are being developed. Because special technical analyses are often required to obtain this information, the program provides for the collection of debitage samples for such analyses.

1. Flaked-Stone Tools

All time-sensitive and/or functionally diagnostic artifacts (formal tools) observed on a site surface should be collected from qualifying sites to which the program is applied. This collection should include debitage that exhibits evidence of purposeful edge modification and/or use. We recognize the controversy and difficulty in identifying use evidence in the field. The provenience of such tools should be recorded within the site (e.g., transit, compass and tape, pacing from datum, quadrant, grid block), and stone tools and modified flakes should be noted, described, and/or sketched (see Appendix II).

While the program accommodates the presence of flaked-stone tools, the types, quantities, and distributions of flaked-stone tools should be taken into careful consideration in determining if the program is appropriate to use at specific sites or circumstances. Examples of circumstances that would make use of the program inappropriate might include sites with large numbers of tools (e.g., 10-15) or large numbers of tools relative to debitage, sites displaying intra-site patterning of tool types into what may be discrete activity areas with task-specific assemblages, or flaked-stone scatters containing a wide variety of tools of different material types. Additional examples of inappropriate program application are offered in Appendix I.

2. Non-obsidian Debitage

Non-obsidian flaked-stone detritus in certain areas of the state can reflect exchange and/or transhumance patterns, as well as contribute information relating to resource procurement scheduling. Identification of sources for some of these materials can be accomplished through visual or chemical distinctiveness of non-obsidian stone. In addition, new techniques such as cation-ratio dating may hold promise for dating non-obsidian lithic scatters in specific regions. For these reasons, the collection of small representative samples from a lithic scatter may be appropriate in some areas and not in others. Regional researchers must understand the data requirements for such techniques in determining appropriate collection sample sizes and strategies.

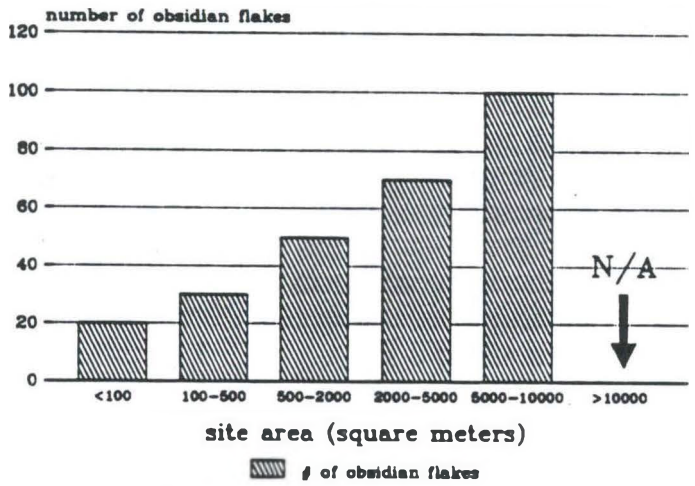
3. Obsidian Debitage

The information potential of obsidian flaked-stone has become widely recognized in California. Obsidian has the potential to provide information on the nature of prehistoric exchange, resource procurement patterns, social interaction networks, and transhumance. Information is obtained through the application of: trace element analysis or visual attribute discrimination; obsidian hydration analysis, which holds the potential to place prehistoric activity in a temporal sequence; and technological studies that complement and build on hydration and source studies. Individually, sparse lithic scatters may yield little definitive information on important research topics, but in aggregate these data may enable archaeologists to better understand regional prehistoric land-use patterns. The information potential and value of systematic regional obsidian sample collection has been demonstrated by Sonoma State University's archaeology program in the North Coast Range. This potential merits the collection of samples of obsidian debitage from sparse lithic scatters. However, the funding of obsidian source and hydration analyses for every sparse lithic scatter may not be possible for all archaeology programs or agencies, so such analyses are not required by the program, although analysis is encouraged (see Case 4 in Appendix I). In short, obsidian debitage samples can be obtained and, at the discretion of the program manager, these samples can be analyzed, or curated for future study.

The program recommends the collection of a minimum of 20 obsidian items from small sparse flake scatters, if available. Larger sample sizes should be scaled to the size and density of sites within the sparse scatter definition (Figure 3). We recognize that archaeological sites in many areas of the state may contain traces of obsidian but not enough to collect the recommended minimum sample. The many variables that may influence the decision to collect greater or lesser amounts of material make determinations of appropriate sample sizes difficult, if not impossible to specify. The method of sampling an obsidian deposit should be affected by the specific important research questions of interest as well as the nature of a deposit. The number of flaking events represented, their physical disposition (mixed or discrete) the number of obsidian sources represented, and the condition and size distributions of obsidian debitage are only a few such variables, any one of which could influence appropriate sample size and strategy. The recommended minimum number of samples is focused on obtaining gross chronological information on site use.

Figure 3 offers guidance for obsidian collection that scales minimum sample collection sizes to site dimensions. Improvements on these criteria are anticipated through use and modification of this program, as well as advances in theory, practical applications, and analytic techniques. We discourage the indiscriminant collection of large numbers of flakes without specific research goals and requirements.

Figure 3: Minimum Obsidian Debitage Collection Sample Sizes



number of flakes is recommended minimum

Site Area (square meters)	*No. of Flakes*
< 100	20
100-500	20-30
500-2000	50
2000-5000	70
5000-10000	100
> 10,000	N/A

Collection strategies should account for horizontal distributions of flaked-stone across site surfaces. For instance, the gridding of sites (e.g., in five- or ten- meter-square blocks) with collection of materials from selected grid block is one possible technique. Collecting specimens along datum axes (e.g., north- south, east-west) also may be practical at large sites. The collection of more than a single bag of obsidian debitage (e.g., 100 specimens) from any individual site could present curation problems with a comprehensive program such as this. Focused sampling concerns should determine sample size, not general anxiety over potential data loss.

Source attribution and obsidian hydration analytic studies of at least portions of collected obsidian items are strongly encouraged (see Case 4, Appendix I).

4. Curation

The curation of archaeological collections in California is a thorny problem that will not be resolved by this program. In fact, application of the proposed collection procedures may result in an increase in the amount of collected materials. We have stressed the careful consideration of important research questions as the driving force for collection and the selection of sample sizes associated with those questions. We advocate the development of agreements between institutions and/or specific collection policies at recognized curatorial facilities throughout the state. Assuming prudent collection procedures, dozens of sparse lithic scatter collections could be stored in a single archive box. Until curation policies and procedures are developed, however, agencies implementing this program should make arrangements consist with current procedures, that follow federal guidelines on curation.

IV. NATIVE AMERICAN CONSULTATION

Consultation with appropriate local Native American groups and/or individuals is a presumed aspect of preparing for archaeological fieldwork. This program in no way alters this responsibility. As an aspect of records and literature searches in compliance with 36 CFR 800.4(a), Native American concerns should still be solicited on a project-specific basis. Concerned Native Americans should be made aware of the program and the agency's intent to apply the program on a project-specific or a routine basis.

Work on federally administered lands must conform to the requirements of the Archaeological Resources Protection Act regarding notification of Native American groups (P.L. 9695 (1979); 36 CFR 296; 32 CFR 229; and 43 CFR 7).

V. THE MANAGEMENT PROCESS

The goals of this program are to explicitly define a specific class of archaeological resource, develop a series of procedures that ensures their accurate identification, and offer a management option that recovers the limited but useful information that this class of resource has to offer. The application of the program will satisfy the requirements of Section 106 of the National Historic Preservation Act, reducing the amount and duration of project-specific review of projects involving this class of resource. A summary of the steps required in applying the program is listed in Figure 1.

The application of this program will result in a far greater body of systematically collected information on flaked-stone scatters than has ever been performed, and will establish higher statewide standards for the minimum investigation and consideration of such sites than existed

previously. We would like to emphasize, once again, that the application of this program is optional. Should the Agency Official (agency archaeologist), for any reason choose not to apply the program on a site- or project-specific basis, the responsible agency simply complies with Section 106 of the National Historic Preservation Act by following the provisions of 36 CFR 800.4 - 800.6.

A. NATIONAL REGISTER ELIGIBILITY

Application of the sparse lithic scatter program to qualifying archaeological sites shall be considered adequate to identify and evaluate such resources. The evaluation for qualifying sites includes procedures to record and collect, analyze and/or curate limited samples of flaked-stone, as appropriate. Once a resource has been identified as a sparse lithic scatter and recorded/collected accordingly, the resource will be considered ineligible for inclusion on the National Register.

B. ASSESSING EFFECTS

If an undertaking involves lands that contain only sparse lithic scatters identified and treated according to this program and such lands are devoid of other types of cultural resources, the Agency Official choosing to apply this program shall submit to the OHP and interested persons who have made their concerns known to the Agency Official, documentation of the results and finding of the identification and evaluation effort, which shall be available for public inspection. This submission shall document the agency's determination that: 1) the sparse lithic scatter(s) are not eligible for inclusion in the National Register of Historic Places; and 2) the project will have No Effect on historic properties.

If the agency has not previously consulted with the OHP on a specific undertaking (36 CFR 800.4 - 800.5), the agency shall wait 15 calendar days after OHP receipt of documentation to afford the opportunity for the OHP to receive and review objections, and/or comment on the finding. If the OHP does not object or respond to the submittal by the end of 15 calendar days, the Agency Official is not required to take any further steps in the Section 106 process (cf. 36 CFR 800.5(b).

If cultural resources other than sparse lithic scatters are present within proposed projects' Areas of Potential Effects (APE), the program can be applied to the sparse lithic scatters with the assumption that such scatters will be considered ineligible for the National Register. However, compliance with Section 106 must follow the provisions of 36 CFR 800.4 - 800.6.

The program can also be incorporated as an aspect of management plans developed under Memoranda of Agreement that satisfy Section 106 requirements.

C. USE OF THE PROGRAM WITH EXISTING AGREEMENTS

The sparse lithic scatter program can be integrated with procedures defined under existing agreements with the OHP regarding the Section 106 compliance process, including agreements such as the Bureau of Land Management's Statewide Programmatic Agreement. When an agency finds that an undertaking may impact sparse lithic scatters treated in accordance with the program, and the undertaking does not involve other cultural resources, the Agency Official can consider the project to have no effect on historic properties, following provisions of the specific agreement. The Agency Official shall report the presence of such resources and the application of the program in periodic reports scheduled under existing agreements, or in an annual report that includes information consistent with Section V(D).

D. DOCUMENTATION

Documentation of inventory efforts that use this program should conform to professional standards.Such reports should follow the standards discussed in the following guidelines:

1) Archaeology and Historic Preservation: Secretary of Interior's Standards and Guidelines;

2) 36 CFR Part 66: Recovery of Scientific, Prehistoric, Historic, and Archeological Data: Methods, Standards, and Reporting Requirements (proposed guidelines);

3) California Department of Parks and Recreation Archaeological Site Record Handbook; and

4) California Archaeological Survey Guidelines, available from the OHP.

In addition, application of the program requires supplements to archaeological site records. Completed Flaked-Stone Attribute Records (Appendix II) must be included with standard reports on identification efforts, (attached to archaeological site records) and submitted to the OHP and appropriate Information Centers of the California Archeological Inventory.

Agencies complying with Section 106 through programmatic agreements shall include in their reporting schedule a listing of the number of sites subject to programmatic treatment and their trinomials, a summary of the sites' sizes, collected materials (types and sample sizes), analyses performed subsequent to fieldwork, and the disposition of sites (e.g., destroyed, avoided).

E. USE OF FLAKED-STONE DATA

One anticipated benefit of the sparse lithic scatter program is the collection of standard observations on flaked-stone deposits. Standardized observations will allow comparisons between sites and regions in delineating patterns of lithic resource use and stone tool manufacturing technologies commonly lacking in California archaeological studies. The establishment of standard observations is an important step in exploring and further developing the potential of flaked-stone data.

The Flaked-Stone Attribute Record (Appendix II) is a first attempt to develop a standard recording form for statewide use. It is anticipated that the form will be modified and/or improved as lithic specialists and field archaeologists provide feedback on its content and application. In addition, use of the Flaked-Stone Attribute Record, or a record incorporating the listed observations, is encouraged at all sites, regardless of their classification or type.

F. MONITORING AND PERIODIC REVIEW

To safeguard against inappropriate application and to monitor effectiveness, the OHP reserves the right to request Section 106 review pursuant to 36 CFR 800.4 - 800.6 of a project involving application of the sparse lithic scatter program. This will afford an opportunity for concerned archaeologists, Native Americans, and the public to voice concerns about the application of the program to specific archaeological sites. Upon receiving an objection or concerns, the OHP shall immediately notify the Agency Official, restarting the review period specified in Section V(B). Within 15 days of receiving an objection, the OHP shall consider the concerns and respond to the objecting party of its decision to do one of the following: 1) review the National Register eligibility of the property in question; 2) review the procedures and records compiled as a result of program application; 3) request the Agency Official to follow

the provisions of 36 CFR 800.4 -800.6; 4) seek a formal determination of eligibility from the Keeper of the National Register; 5) advise the Agency Official to work with the objecting party to resolve their concerns; or 6) concur with the Agency Official.

The draft program described herein shall be subject to a trial application for a period of one year from date of issue, after which its utility and effectiveness will be examined. If appropriate, modifications will be incorporated on the basis of information provided by archaeologists who use it throughout the state.

Thereafter, the program shall be reviewed on a biennial basis to determine its effectiveness. The review will consider several aspects of the program, including: 1) the efficacy of the program for each agency in terms of meeting cultural resource management needs; 2) the nature of agency procedures and the tailoring or modification of the program to each agency; 3) the appropriateness of the identification criteria and data collection procedures, either generally or by region; and 4) the usefulness of methods of identification and data collection.

A review committee shall be established, minimally consisting of cultural resource management specialists representing the Office of Historic Preservation, two federal land-managing agencies (e.g., Bureau of Land Management, U.S. Forest Service), a lithic specialist, and a professional archaeologist in the private sector.

We hope that this program will provide a basis for the establishment of regionally-tailored criteria and procedures for identification and data collection. Comments and recommendations on improving the program should be submitted to the Office of Historic Preservation, P.O. Box 942896, 1416 Ninth Street, Sacramento, California 94296-0001.

APPENDIX I
CASE STUDIES

Introduction

The sparse lithic scatter program is flexible. It provides a definition for scatters that accomodates inter- and intra-regional differences in archaeological contexts and site-specific variables such as surface flaked-stone density and factors that affect the vertical and horizontal distribution of flaked-stone. The considerable latitude in the criteria and methods afforded by the program could, on occasion, result in its application at sites that merit alternative or expanded treatment including: 1) the review and consultation process, e.g., 36 CFR 800.4-800.6; 2) an expansion of minimum data acquisition methods established in the program; or 3) the development of additional data acquisition methods. The choice of an alternative approach to data acquisition or treatment at sites that technically qualify for program application will be made by the supervising archaeologist, using his or her professional judgement based on regional experience, or at the request of the OHP based on review of program application or objections from interested parties.

The cases presented below are offered as guidance in determining the appropriate use of the sparse lithic scatter program. We hope that these examples will convey the intended limits of the program and minimize the potential for misapplication.

The following examples are drawn either from real situations or realistic circumstances. The discussions are brief for ease of use and clarity, focusing on salient issues rather than detail. Many examples begins with a brief statement of an important research question relating to flaked-stone studies in a region. Next, a description of a specific flaked-stone assemblage, including its spatial distribution and major physical/analytic attributes is offered. The site is then discussed in light of important regional research questions and application of the sparse lithic scatter program is discussed.

It is important to note, once again, that an archaeological site is not considered important (e.g., National Register quality) simply because the program does not apply or should not be used at that site. The program is a management tool that prescribes recording and management procedures for a specific class of resource, requiring only that non-qualifying sites be evaluated and managed according to the provisions of 36 CFR 800. Many sites considered in this manner will be ultimately be determined ineligible or unimportant. The nature of such deposits, however, are simply considered differently than those treated under this program.

We have presented only a few of the many circumstances that could arise under which program application would or might be inappropriate. A few of these include: 1) a consideration of geomorphological and other natural processes that might bury archaeological deposits one velow another, and the measures that should be taken to adequately address this potential; 2) examples of excessive collection without just cause; and 3) lack of attention to potentially important non-cultural factors in recording sites and collecting data under the program. We anticipate that trial use of the program throughout the state will result in additional examples that will serve as guidance in its appropriate use.

Case 1

Flaked-stone reduction technologies, including the nature and quality of raw lithic materials, is poorly understood in the arid region discussed in this example. The region is juxtaposed between less xeric environments known to have been used extensively and seasonally by prehistoric people. Important research topics relate to the nature of resource exploitation in the arid region and its role in hunter-gatherer scheduling (decision-making). In addition, archaeologists have suspected that certain reduction technologies in the region are time- and function-sensitive, but have been afforded only a partial picture of those technologies at the sites examined thusfar in the region.

A "sparse lithic scatter" is encountered during a survey. It is situated in a surface chalcedony cobble field, which was prehistorically exploited for tool stone. The site measures 100 by 70 meters and is characterized by an overall low density scatter with a dozen discrete two-meter diameter loci of relatively high concentration (40-1000 flakes/square meter) that reflect numerous individual flaked-stone reduction incidents. In addition to manufacturing waste from native stone, many of the loci contain flaked-stone tool fragments of non-local stone.

A study of these loci could yield insight into the range of variation of reduction techniques applied to that specific raw material in the region, which might help archaeologists better understand: 1) the constraints placed on prehistoric craftsmen by raw material; 2) the attraction or role of lithic resource procurement as it related to mobility strategies; 3) information on the functions served by the resulting tools as well as insight into the activities that occurred prior to cobble quarry reduction; and 4) an improved understanding of the nature of regional flaked-stone assemblages.

The archaeologist discovering and examining the site, instead of recognizing the information potential contained therein, chooses to average the density of the concentration loci and derive a site density estimate that falls within the program threshold. The archaeologist, furthermore, chooses to examine only one of the loci, resulting in no further study of the site and a potential loss of information on the diversity of reduction techniques applied to the raw material. The special characteristics of the site, coupled with regional research questions, do not recommend the application of the program in this case.

Case 2

Case 2 involves the study of a high elevation "temporary camp" in the western Sierra. Important research topics in the site region include the role of such high elevation environments in subsistence activities, and the identities or geographic/cultural affiliations of groups using this environment. In particular, the movement and transfer of people and commodities has been identified as an important focus of study, as evidenced by the presence of western Great Basin obsidian in foothill, valley, and coastal sites west of the Sierra, and shell beads at sites east of the Sierra. A site encountered during a reservoir survey contains a low *mean* density of flaking debitage lacking a subsurface deposit. The site contains obsidian, chert and chalcedony in a variety of colors, and basalt. These materials are mixed in the deposit, although varying proportions of different materials are evident across the site in small pockets of relatively high density. Obsidian debitage comprises a high relative proportion of the site (over 40 percent) in contrast with other local sites, which contain less than 15 percent. Many of the observed

flakes are relatively large (greater than 2 cm in diameter) and three percussion-flaked obsidian bifaces were observed.

While the site qualifies as a sparse scatter under the application of mean surface densities, a more detailed examination may be warranted, as the site may represent an important nexus for the reduction and trans-Sierran exchange or movement of obsidian. Further examination, with particular focus on obsidian source proportions, ages of obsidian reduction for the various sources, and associated reduction technologies, may yield valuable information concerning the nature of seasonal transhumance, inter-regional interactions, and exchange. The minimum methods required in the sparse lithic scatter program may not be adequate to recover this information.

Case 3

Archaeologists have, for some time, speculated on the nature of seasonal occupation in a certain area along the eastern foothills of the Coast Range. Some believe the area provides few attractive resources and was used primarily for hunting. Others feel that a relatively wide range of subsistence activities took place there during a narrow but productive period in the spring.

An archaeological surveyor encounters a chert flake in ground rodent spoils on a small flat in this region. Ground visibility is extremely poor due to grass cover, so the archaeologist conducts one, two-meter-square surface scrape in the area of the find on the small 400 square-meter flat. Scraped surface vegetation and soils are passed through 6 mm (1/4 inch) mesh and a portion is examined through small mesh (1/8 inch). A sparse scatter of chert and a trace amount of small obsidian flakes are recorded. The excavation of several small SEEUs (subsurface exploratory excavation units) reveals a paucity of subsurface flakes that quickly and dramatically dwindle with depth. By definition the site qualifies as a sparse lithic scatter. However, two small biface fragments (one of obsidian), one projectile point base, a drill, and a uniface are also recovered. Field examination of the artifacts reveal smooth polish on one biface fragment and the uniface. The number of artifacts relative to debitage is relatively high.

At least two factors argue that the program application is inappropriate. Given the extent of ground cover, a larger number surface scrapes should have been conducted. Also, the diversity of the flaked-stone tool assemblage and high tool to debitage ration suggest that closer examination of the assemblage could address the question of the diversityh of subsistence activities that occurred at the site. Additional evaluation of the site is warranted.

Case 4

Over the years, several surveys have been conducted less than two miles from a major obsidian source in eastern California. Some of the survey areas overlapped, resulting in the resurvey and re-recording of several sites. One such site was recorded by two 1970s surveys as a low to moderate density deposit of chert and obsidian debitage containing several biface fragments. Under a liberal interpretation of the program criteria using mean density estimates, the site would qualify for consideration as a sparse lithic scatter. The first two site records did not grant any special significance or note any particularly unusual characteristics for the site. The third survey that recorded the site employed field methods that included flaked-stone density counts and estimates, detailed observations on the nature of the flaked-stone assemblage, a small subsurface excavation unit to determine presence or absence of a subsur-

face deposit, and a small collection of obsidian flakes for source and hydration analyses. These analyses revealed that the site was very old; perhaps one of the few late Pleistocene/early Holocene sites recorded in the eastern Sierra. Extensive, multi-phase excavations at the site have since recovered a diverse flaked-stone assemblage that suggests a seasonal, late Paleo-Indian hunting site. The assemblage includes, among other flaked-stone items, exotic (non-local) obsidian, a diverse chert assemblage, several dozen probable lance or thrusting spear point bases, and well- made unifaces. The site may prove to be type site for defining early human occupation of the region. Had the sparse lithic scatter program been applied to the site and obsidian studies not been performed on recovered materials, the importance of the site would not have been recognized and significant information might have been lost. Familiarity with regional site types and artifacts, regional research questions, and appropriate analytic techniques were responsible for identifying the site as worthy of special attention. The proximity of the site to major prehistoric obsidian quarries, considered against the nature of the assemblage, should have alerted researchers to the subsistence orientation of the site (rather than quarry exploitation). This example also stresses the benefits, in some circumstances, of technical studies on portions of collected materials before definitive management decisions and actions are taken.

Case 5

A site in western San Diego County, recorded in the mid-1970s, will be affected by a proposed highway realignment. The site measures about 40 meters in diameter and is situated in the outskirts of San Diego. It has been surface-collected by children and collectors for many years, as evidenced by small piles of quartzite and chert debitage that have been discarded during various lootings. The surface scatter is not particularly dense, and no non-flaked-stone artifacts can be found on the surface. A local archaeologist applies the identification methods specified in the program, finding that the surface density falls within the program threshold. Four one-meter square excavation units are excavated at the site, comfortably fulfilling the minimum established by the program. During excavation of the second unit, several groundstone fragments are encountered. The archaeologist finishes the unit under excavation, and then excavates not only the fourth unit, but excavates an additional two units in the area of the groundstone find. One of these units encounters a burned rock feature suggesting a fire hearth.

The excavation of units four through six may or may not have yielded information sufficient to evaluate the site's National Register eligibility or may have recovered a substantial amount of the important information the site had to offer. However, all excavation beyond the third unit (in which the groundstone was first encountered) was conducted outside the provisions of the program. If the intended goal of the excavation was National Register evaluation (under federal regulations), evaluation of significance or mitigation of potential impacts under the provisions of the California Environmental Quality Act (CEQA), then the excavation should have been guided by a research design that was subject to a review process.

Had the archaeologist (agency) made arrangements to conduct evaluative excavations beyond the identification procedures under the sparse lithic scatter program, then the excavation would be appropriate. These arrangements should include a research design for excavation of specific sites or site types. Similarly, if the excavation followed designated planning procedures (e.g., SHPO- federal agency agreement on evaluation procedures, a county element of a state plan, or county CEQA implementation procedures) then the excavation would have been appropriate.

Case 6

Prehistoric groups in a region of the western Sierra Nevada obtained eastern Sierran obsidian primarily from one source. Obsidian from this source occurs in the form of large and small finished tools, as well as a wide range of sizes and stages of production waste. However, regional research has demonstrated that small amounts of obsidian from a more remote obsidian source were imported as finished tools. Evidence of the use of this remote source occurs in the form of relatively small broken tool fragments and minute debitage that suggests rejuvenation and sharpening of finished tools rather than manufacture. Further, most regional archaeologists believe that the frequency of use of this remote source changed through time, reflecting changes in social relations and/or mobility patterns.

An archaeological firm from a different region and generally unfamiliar with western Sierran archaeology is awarded a survey contract and applies the program criteria and methods to a small, high elevation site in this area of the western Sierra. They find that it meets the criteria for a sparse lithic scatter, dutifully making observations on 100 flakes observed on the surface. They collect the suggested number of obsidian flakes according to site surface area and choose the largest flakes available within the observation areas, reasoning that these specimens would be easiest for source and hydration analysts to examine.

Unaware of the question of social relations or transhumance patterns and their changes through time as reflected in microdebitage and small tool fragments, the archaeologists in the firm fail to account for or attempt to retrieve a sample of small debitage which may contribute to the resolution of this question.

Use of the program would not be inappropriate in this case. However, modification of the data acquisition methods might recover the important information the site offers regarding the presence of obsidian from distant sources. In this case, the screening of excavation units, surface scraped material, or a sample from these units, through small mesh screen (e.g., 1/8 inch or 3 mm) might recover a suitable sample of small-size flaked-stone by which to monitor the relative frequency of various obsidian sources. This kind of program modification, arising from specific regional research questions, is the kind of regional tailoring that we encourage and anticipate will occur.

Case 7

For many, hunter-gatherer mobility strategy is a prominent research topic in the desert west. Social and work organization of hunter-gatherer groups is an important aspect of this topic.

Certain areas of the southern California and the western Great Basin deserts are characterized by stable soil surfaces that have not resulted in vertical stratification or displacement of cultural deposits (e.g., desert pavement). The patterning of occupation refuse across a site has the potential to reflect residential units and the relationship between organizational units within a site. This organization can be examined through an understanding of site formation processes and requires a consideration of how refuse size fractions are distributed across a site.

An archaeologist encounters a small flaked-stone scatter situated on desert pavement measuring about 30 meters across, although two moderately dense but diffuse loci are present. A few broken biface fragments, two of obsidian, and a scatter of chalcedony and quartize flakes are observed. While the different flaked- stone materials are not spatially segregated, she notices that most of large-size manufacturing waste occurs in discrete bands at the periphery of each locus. The sparse lithic scatter program is applied using minimum observation units, and on the technological observations on about 30 flakes from each locus are made.

A second archaeologist examines the site in greater detail. This second archaeologist decides to transect each locus with intensive observation/collection corridors. These transects record central areas within each locus containing only small-size debitage indicative of tool finishing and rejuvenation, with large-size refuse zones outside these central areas. Once this pattern is established, the second archaeologist also notices that several unmodified, fist-size cobbles occur in the large-size refuse zone but not the central area. It becomes clear to the archaeologist that two similar organizational units once occupied the site for a sufficient time that site maintenance was performed, clearing the central activity areas of cobbles, and performing early-stage manufacturing at the periphery of these areas or cleaning the activity areas to form bands of refuse at their peripheries. Data of this type, in conjunction with the nature of the flaked-stone assemblage, may yield important insight into hunter-gatherer social organization, if only at short-term seasonal camps. Application of the program, per se, may not be inappropriate, but the unusual or special characteristics of the site may warrant expanded treatment rather than minimum data acquisition.

Case 8

A forest archaeologist specifies to his district and seasonal archaeologists that during timber compartment surveys the sparse lithic scatter program is to be used at all sites that qualify, to minimize the number of sites that would have to be managed.

A 5,000 acre timber compartment includes several open meadows as well as ridges devoid of trees. The district archaeologists apply the program to all sites within the compartment, discovering that 60 percent of the sites (21 sites) qualify as sparse scatters. Thirteen of these sites occur either in the open meadows or along the treeless ridgetops. Grass cover in the meadows obscurred groud visibility, so the district crew scraped as many as 10, two-meter-square areas at some sites, passing loosened grass and soil through 6 mm screen. All observed surface debitage was collected at several small sites, consistent with the program. As an extra measure, the crew excavated twice as many SEEUs as were called for by the program.

In this case, none of the thirteen sites were affected by the timber sale, as none were situated in wooded areas nor in the path of needed logging roads. While useful information was obtained as a result of program application, site avoidance was not only possible but it occurred without project modification. The impacts to the site from the archaeology were severe and unnecessary in many cases. The forest archaeologist should have assessed the possibility of avoidance in these areas and given greater guidance to the district in how to implement the program.

This example is relatively straightforward. However, the potential for avoidance should always be assessed before a site is extensively disturbed, recognizing that project costs will be measured against the costs of avoidance or treatment.

APPENDIX II
GUIDE TO FIELD OBSERVATIONS

Completing The Flaked-Stone Scatter Attribute Record

Introduction

The following information is offered to assist archaeologists in making and recording observations on the nature of flaked-stone in archaeological deposits and recording those observations on the enclosed Flaked-Stone Attribute Record. The categories of observations and the methods for making those observations were developed for use with the California Archaeological Resource Identification and Data Acquisition Program: Sparse Lithic Scatters (program). However, one ancillary goal of the program is to establish procedures that will result in the collection of systematically recorded and comparable observations on the nature of flaked-stone assemblages. Such data would allow regional synthesis and inter-regional comparisons on patterns of exchange, resource procurement, and the nature of flaked-stone technologies. It is only through regional and inter-regional studies that the behavioral patterning evident at single archaeological sites can be understood and interpreted in light of contemporary hunter-gatherer settlement-subsistence models. Therefore, while designed for the program, we hope that these recording standards and procedures will be employed at a wide range of archaeological sites that contain flaked-stone, regardless of their qualification and use with the program. This does not mean that the collection procedures recommended for the program are appropriate for use on any site. Such collection could constitute premature impacts and adverse effects on sites that warrant different and perhaps more formal, reviewed consideration.

A form for reporting the attributes of flaked-stone assemblages on archaeological sites is included in this appendix. This form is titled the Flaked-Stone Attribute Record and Continuation Sheet. In addition to the reporting form, a worksheet for field recording is also included.

The Flaked-Stone Attribute Record (attached) is submitted as evidence of compliance with the Sparse Lithic Scatter Program. The record is intended for use as a supplement to California Deparment of Parks and Recreation Archeological Site Record forms (DPR 422 A). Blank forms that do not contain rule lines can be obtained from the Office of Historic Preservation on request. Information recorded on the Flaked-Stone Attribute Record can be presented in different formats, but site provenience information must be consistent with that provided on DPR 422, as described in the California Department of Parks and Recreation Archeological Site Record Handbook.

The field record (Flaked-Stone Scatter Attribute Field Worksheet, attached) provides space for recording debitage attributes on more than one site locus and offers additional prompts for field observations, including a scale for debitage size analysis.

Finally, a Subsurface Exploratory Excavation Unit (SEEU) Record is attached. This form was developed to assist in the recording of nature, location, and results of subsurface investigations. Once again, alternative forms can be developed and used, but such forms should offer comparable information. No further discussion of this form is offered.

General Comments/Guidance

The form offers minimum categories of observation and provides minimal space in which to record these observations. Depending upon the nature of an assemblage at a specific site or within a region, the space provided for their recording will be ample, while there will be insufficient space for other observations. This is a commonly-encountered problem in developing general data recording forms. For this reason, a continuation sheet is included. Each information category includes empty parentheses that should be checked to indicate continued discussions. Each category of information on the Flaked-Stone Attribute Record is numbered. If one needs to continue the discussion or data recording beyond the space provided on the form, the continued discussion should be referenced by number on the continuation sheet. A spacing line and number reference should be used to precede and separate subsequent observation categories on the same continuation sheet.

Information Categories

Some of the categories of information requested on the forms (referenced by number) are self-evident (e.g., permanent trinomial) and shall not be discussed further. Numbered items in the following discussions correspond to those assigned to each category on the Flaked-Stone Attribute Record.

5. Information on Loci. This category is provided to describe areas of difference within a site, if such areas are evident. For instance, a site may, within its boundaries, contain a relatively small area of higher density debitage that reflects more intensive site use or special activities. Similarly, a site locus might be characterized by distinctive stone in contrast to the deposit in general, different flake sizes, obviously distinct reduction technologies, or relatively high frequencies of flaked-stone tool fragments. While such loci should make one carefully consider the research potential of the site and the appropriateness of using the program, a site containing such loci might be amenable to programmatic treatment.

Each locus should be ascribed a separate designation (e.g., A, B, 1, 2). The horizontal dimensions of each locus should then be described, preferably in metric units derived from measurement (e.g., pacing, tape measure, transit). Finally, the distinguishing characteristics of each locus must be described (e.g., higher density, different color or type of material).

Finally, the location, size, and configuration of loci within a site should be depicted on a site sketch map. Such detail should not constitute an inordinate increase in effort or recording time. Detailed sketch maps are a necessary component of professional archaeological site recording.

6. Observation Unit Types and Areas. Surface densities and areas observed for debitage attribute recording must be described if the program is applied to a flaked-stone scatter. Depending upon the nature of the deposit, observation areas may vary in size between sites. Ground cover may require a large number of small surface observation units placed in exposed areas. Similarly, sites that exhibit variability in density may require a larger number of small units (e.g., two-meter squares) to adequately characterize the density distribution across a site, rather than a few large areas that may miss debitage concentrations. Extremely low density deposits may warrant the examination of relatvely large areas (e.g., ten meter-square blocks)

to determine surface density and make an adequate minimum number of attribute observations. On the other hand, the use of smaller observation areas may be adequate at higher density sites. Some investigators have found that radial surface examination units employing a "stake and leash" method is effective and accurate. This method requires that the field examiner tether him or herself to a stake driven in the ground, examining all material within the radius of the leash.

In addition to the type and size of the unit of observation, the method for distributing these units across site surfaces should be described. Again, site-specific circumstances should dictate the appropriate method. In some circumstances, one or two observation units placed in areas of perceived maximum density might suffice, while the placement of systematic units along major site axes may be efficient and ensure maximum areal coverage in other instances. The selected method should be described along with a brief rationale concerning the decision.

7. Controls, Methods. The extent of obscuring ground cover and the visual prominence of flaked-stone on the ground surface are two factors which should affect decisions concerning appropriate methods by which to: ensure that non-flaked-stone artifact classes are absent at a site; quantify surface flaked-stone density; identify site boundaries; make debitage attribute observations; and collect samples when appropriate.

Low grass cover may, for instance, warrant the screening of surface scraped areas to collect the information necessary for applying the program or making a reasonable number of debitage attribute observations. In other situations, light leaf or organic litter may obscure the surface soils requiring only the careful removal of the recent organic cover (e.g., by rake), allowing visual inspection of the exposed ground surface. On the other hand, careful visual examination of selected areas without soil removal/displacement may be adequate on sites where the ground surface is unobscured. We shall not attempt to exhaust the range of possible methods by which to make observations on the nature of a site surface assemblage. Methods should be tailored to site- specific circumstances as long as the data can be recorded or converted into standard measures (e.g., flakes/m^2). A description of the method(s) selected as appropriate for specific situations must be included.

9. Debitage Types. Definitions for the salient flake types listed on the form are presented later in this appendix. As stated in the program, a minimum of thirty observations per material type are desirable, and more are better. Experience with these recording methods has revealed that delineation of intra-site examination areas scaled to density conditions (i.e., sample observation units) is acceptable at sites too large or surface obscured to examine in their entirety. The surface areas examined to determine surface density are often suitable for recording flake observations as well.

Observations should be made on all of the flaked-stone within observation areas. The easiest way to accomplish this is to simply collect all observed material within these areas before recording and use the field recording sheet to tally observations and make notes on the collected material. Often, this same sample will provide specimens suitable for collection (e.g., for obsidian studies or small material type samples). Some may have a concern for disturbing the distribution of surface materials within an observation unit. If desirable, displacement of surface material can be minimized by recording debitage attribute observations *in-situ* or removing individual specimens from the ground surface long enough to record the necessary

observations and replacing them when finished. This method, of course, can lengthen field recording time but it may be appropriate in circumstances where flaked-stone observations are made on sites that do not qualify for programmatic treatment. Be reminded that we encourage the recording of flaked-stone observations on all sites to compile regional comparative data. Finally, disturbing surface flaked-stone may be undesirable where the disposition of the site (e.g., destruction or avoidance) is uncertain but satisfaction of program requirements to maintain management options is a goal.

As explained in the program, debitage types selected for the form matrix are those that satisfy three criteria: 1) when found in significant numbers they are believed to be good indicators of the nature of reduction technologies; 2) they often occur with sufficient frequency that recording their sizes and numbers yield insight into the relative intensity of specific technologies or technological stages practiced at a site; and 3) they are debitage types that non-specialists can learn to identify with relative ease.

Other flake types are important to note, although their frequency is less useful due to their relatively low frequency occurrence in assemblages (e.g., cortical flakes, notching flakes). Despite their low frequency occurrences, the presence of such flakes indicate specific reduction activities and manufacturing goals.

Flake size can provide crude information on the relative reduction stages represented at a site when raw material sources and sizes are known. A flake size sorting scale is provided on the Flaked-Stone Scatter Attribute Field Worksheet. Examined flakes are place on the grid and the minimum dimensions of the flake are examined against the most closely matching scale circle and the flake is tallied in the flake type and within the size box in which it falls. For instance, if an interior flake placed on the scale is wider than the 2 cm circle but narrower than the 4 cm circle, the flake should be tallied as a 2-4 cm interior flake. The use of square-mesh screens can, theoretically, produce inaccurate data due to the differences in length between the sides and diagonals of a square. Screens with round mesh (drilled into thin plastic sheeting) is effective but inconvenient for field use.

10. Additional Comments. This space is provided for a wide variety of observations. The degree of detail offered will depend largely on the level of experience and training of a recorder. Therefore, a specialist in lithic technology will provide significantly greater detail and more accurate observations that a field technician with little lithic training. Because this guide is not a lithic technology manual, we shall not devote much space to a discussion of the range of observations that could be made. Specialists will be aware of these observations and their value, and untrained technicians will not be able to acquire this information by text alone. Certain information bears limited discussion, however.

It is important to note the presence or absence of specific additional flake types. The presence of cortical flakes should be noted, and comments on the extent of cortical cover are desirable (e.g., primary or secondary). Observations on the nature of cortex can also reveal the formations or depositional environments from which the raw materials were extracted.

Notching flakes, indicative of late-stage pressure-flaking and near-final manufacture of specific kinds of tools, are important to note. While they usually occur in low frequency, the differences in size and configuration of notching flakes, for insance, *can* yield information on

the specific types of projectile point that were manufactured at a site, in some cases providing limited temporal information where none would otherwise exist.

Information concerning local raw material sources can be useful, providing a context for the interpretation of reduction stages not only in terms of possibilities and limitations on tool size and reduction technologies, but in terms of the possible functional roles of sites with regard to the acquisition and transport of raw material (tool stone). For instance, a site containing large size debitage, numerous cortical flakes and large biface fragments could be interpreted quite differently if it occurred close to a quarry as opposed to one hundred miles from the quarry.

Edge modification is perhaps the most difficult category of information in which to obtain consist observations. Considerable experience, training, and even experimentation is useful in discriminating purposely modified, used, and accidentally or incidentally damaged flakes. With rare exception, definitively used flakes seldom comprise more than a few percent of a flaked-stone assemblage. Flake damage resulting from post-detachment trampling, spontaneous micro-chipping (incidental manufacturing damage), and edge preparation during reduction require a trained eye. The only guidance we will offer here is that continuous lateral edge damage and dulled, smoothed, or polished edges are often indicators of use damage. As noted in the program, flakes that exhibit wear or damage that is likely related to use should be noted and collected if the program is applied.

11. Materials Collected. The types of materials collected (e.g., chert debitage raw material sample, obsidian source hydration samples), the number of such materials collected, and the site areas from which they were collected should be recorded. Again, collection guidelines are offered primarily for use with the program and may be inappropriate for non-qualifying sites.

12. Other Flaked-Stone Artifacts Noted or Collected. Flaked-stone artifacts such as projectile points, biface or uniface fragments, cores, edge modified, and used flakes observed on the site should be noted. Many of these will be collected if the program is applied, and such collection should be so noted. It may be appropriate to sketch such items, particularly if specific artifacts are not collected. Sketches may be the only enduring record of these items. Note that one of the continuation sheets provides blank space for artifact sketches.

FLAKED-STONE SCATTER ATTRIBUTE FIELD WORKSHEET (one form per unit)

STATE TRINOMIAL OR FIELD NAME: _____ DATE: _____

OBSERVATION UNIT DESIGNATION _____ NUMBER ____ of ____

TYPE (e.g., transects, blocks, radial units) _____ SIZE ____ m x ____ m

CONTROLS, METHODS: (all observed material, screened surface scrape, etc.) _____

OVERALL SITE DEBITAGE DENSITY: (flakes/m^2) _____ maximum ☐ average ☐

LOCUS: _____ SIZE AND SHAPE: _____ DENSITY _____

DEBITAGE TYPES (types may overlap with those listed in "ADDITIONAL COMMENTS" - list only once)

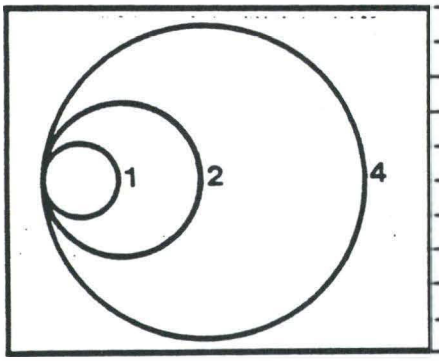
	Interior				*Biface Thinning*				*Linear*				*Angular Shatter*				*Other*
SIZES (cm)	<1	1-2	2-4	>4	<1	1-2	2-4	>4	<1	1-2	2-4	>4	<1	1-2	2-4	>4	(#broken-unident.)
Material 1: (list)																	
Broken-Identifiable.																	
Material 2:																	
Broken-Identifiable																	
Material 3:																	
Broken-Identifiable																	

ADDITIONAL COMMENTS (discuss technologies, offer interpretations - use additional sheets if needed)

list/discuss as appropriate:

- cortical flakes
- pressure flakes
- notching flakes
- alternate flakes
- bipolar flakes
- platform preparation
- thermal alteration
- material sources
- edge modification

FLAKE SIZE SORTING SCALE (cm)



Recorded by: _____ page ____ of ____

Rev. 7/88

FLAKED-STONE SCATTER ATTRIBUTE FORM (one form per observation unit)

STATE TRINOMIAL OR FIELD NAME: _____ DATE: _____

OBSERVATION UNIT DESIGNATION _____ NUMBER ____ of ____

TYPE (e.g., transects, blocks, radial units) _____ SIZE ____ m x ____ m

CONTROLS, METHODS: (all observed material, screened surface scrape, etc.) _____

OVERALL SITE DEBITAGE DENSITY: (flakes/m^2) _____ maximum ☐ average ☐

LOCUS: _____ SIZE AND SHAPE: _____ DENSITY _____

DEBITAGE TYPES (types may overlap with those listed in "ADDITIONAL COMMENTS" - list only once)

	Interior				*Biface Thinning*				*Linear*				*Angular Shatter*				*Other*
SIZES (cm)	<1	1-2	2-4	>4	<1	1-2	2-4	>4	<1	1-2	2-4	>4	<1	1-2	2-4	>4	(#broken-unident.)
Material 1: (list)																	
Broken-Identifiable																	
Material 2:																	
Broken-Identifiable																	
Material 3:																	
Broken-Identifiable																	

ADDITIONAL COMMENTS (discuss technologies, offer interpretations - use additional sheets if needed)

list/discuss as appropriate:

- cortical flakes ____
- pressure flakes ____
- notching flakes ____
- alternate flakes ____
- bipolar flakes ____
- platform preparation
- thermal alteration
- material sources
- edge modification

Recorded by: _____ page ____ of ____

Rev. 7/88

Permanent Trinomial: _____ Supplement ☐

FLAKED-STONE ATTRIBUTE RECORD CONTINUATION SHEET

Other Designations _____

Page____ of _____

_____

(reference continued discussion item by number)

Permanent Trinomial: ________________ Supplement ☐

Other Designations: ________________

____

SUBSURFACE EXPLORATORY EXCAVATION UNIT (SEEU) RECORD

Page___ of ___

SITE CHARACTERISTICS

Site Size (lxw): ____________ Site Area (m^2): ________________ Loci Identified (#): ____________

METHODS

SEEU Size(s): ____________ SEEU Depth Increments: ____________ Screen Size(s): ____________

SEEU Distribution (e.g., within grid blocks, intuitive, within loci; depict locations on sketch map):

____

____

SEEU (designation):_____

Number of Flakes	Level (cm):						
Microcrystalline							
Obsidian							
Other:							
Other:							

Other artifacts/materials recovered: ________________________________

Soil Characteristics: ________________________________

SEEU: _____

Number of Flakes	Level (cm):						
Microcrystalline							
Obsidian							
Other:							
Other:							

Other artifacts/materials recovered: ________________________________

Soil Characteristics: ________________________________

SEEU: _____

Number of Flakes	Level (cm):						
Microcrystalline							
Obsidian							
Other:							
Other:							

Other artifacts/materials recovered: ________________________________

Soil Characteristics: ________________________________

SEEU: _____

Number of Flakes:	Level (cm:						
Microcrystalline							
Obsidian							
Other:							
Other:							

Other artifacts/materials recovered: ________________________________

Soil Characteristics: ________________________________

Recorder/Affiliation: ________________________ Date: ____________

GUIDE TO FLAKED-STONE OBSERVATIONS

The collection of useful information using the procedures specified in the sparse lithic scatter program depends upon a basic understanding of lithic technology. California archaeological training should include schooling in the fundamentals of flintknapping and lithic analysis. Over 90% of the archaeological material we examine in California consists of flaked-stone; most of that comprising the residues of stone tool manufacture.

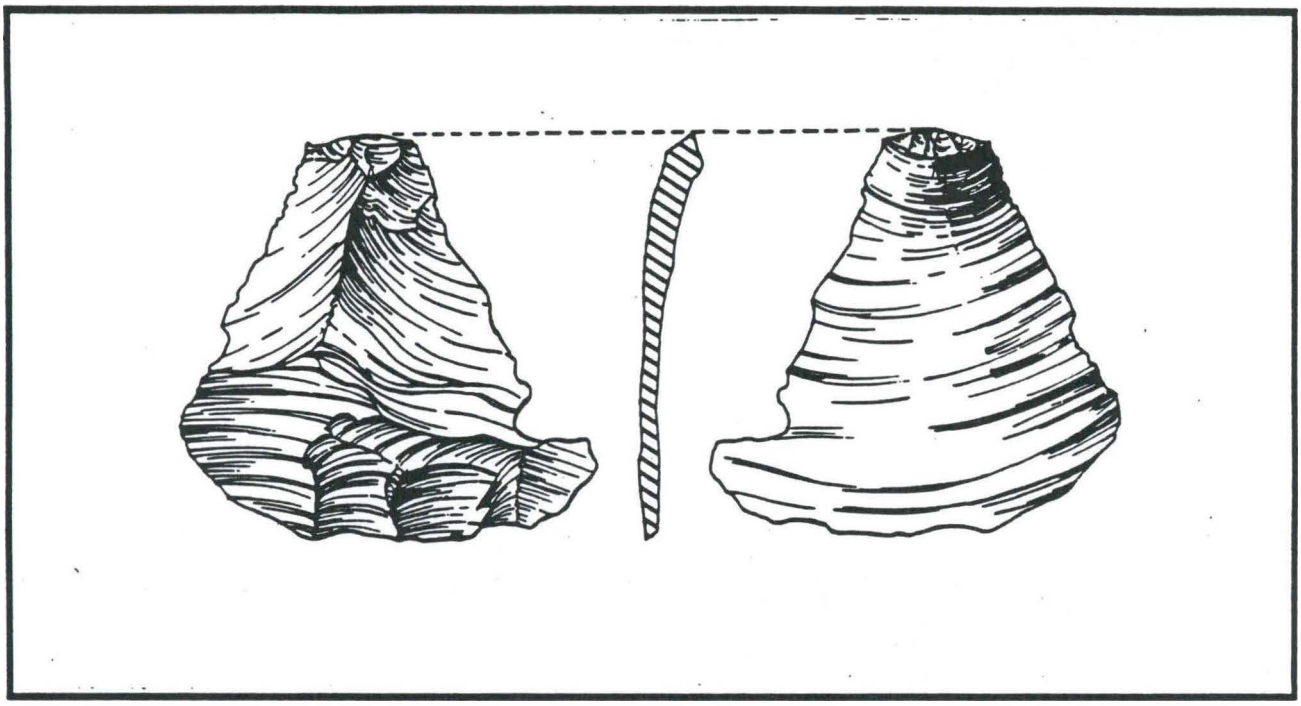
While we encourage agencies and archaeological contractors to employ archaeologists with lithic training for implementing this program, it is unlikely that this will occur in the immediate future. Therefore, this appendix has been developed to accomplish two goals. The first goal is to afford field archaeologists without formal lithic training that intend to use the program, with some basic guidance in making basic observations. The second goal is to begin to develop generally accepted definitions for various flake types and reduction technologies that can be used by California archaeologists and lithic analysts.We anticipate that this appendix will evolve into a much more comprehensive manual that defines basic terms and definitions for lithic analysis.

In the interim, fieldschools and training sessions on lithic analysis are offered annually and we encourage all those who wish to employ this program to examine the following discussions concerning flaked-stone debitage types. Those trained in lithic analysis will immediately notice that many flake types are not mentioned or discussed, and others are discussed as ideal types. From the numerous flake types and definitions that could have been discussed, we have selected only a few as both technologically sensitive and easy to teach with little training. The omission of certain flake types or observations should not prevent more experienced archaeologists from developing procedures and incorporating more flake types as well.

Flake Type Definitions

Biface Thinning Flakes

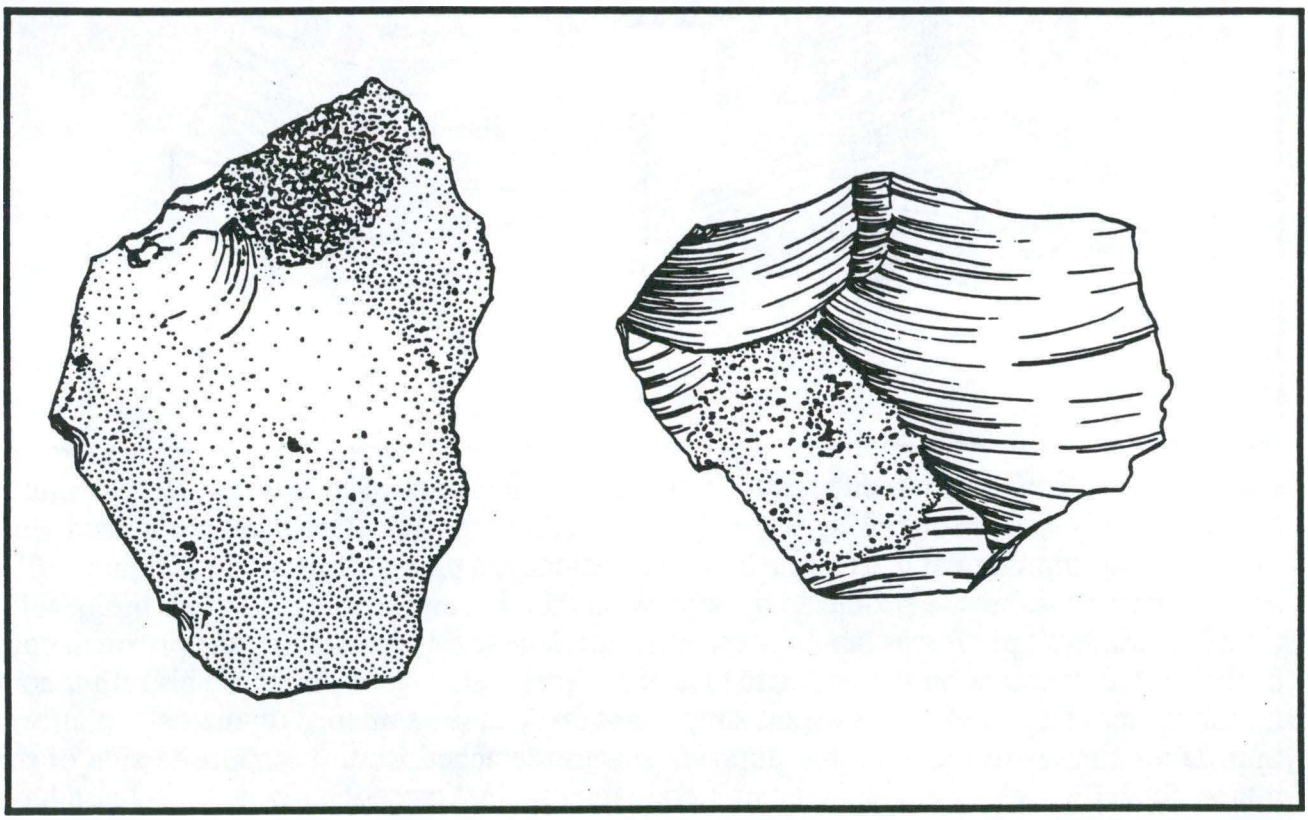
The manufacture of bifacial tools was probably the most common objective of prehistoric stoneworking. Biface reduction involved a variety of specific techniques and stages. While much of the flaking debitage resulting from biface production is difficult to discriminate from



that resulting from other reduction technologies, some stages of biface reduction produce technologically diagnostic flakes. Biface thinning flakes are characteristically produced after the biface has obtained at least a rough oval to leaf-shaped plan profile and lenticular profile. Biface thinning flakes are produced by percussion thinning and shaping. Obvious biface thinning flakes exhibit platforms that bear the remnant flake scars representing the proximal ends of thinning flake scars on the opposite face of the (pre-detachment) biface. This rather confusing technological definition means simply that one can see evidence on the flake platform that flakes similar to those on the dorsal face were detached from the opposite side of the biface. Such flakes may also have an excurvate longitudinal cross-section, and may also have distal dorsal flake scars representing the terminations or distal ends of flakes detached from the opposing edge and same face of the biface. Any two of these characteristics are adequate for classifying a flake as a biface thinning flake. Many flakes classified as interior flakes were often produced during biface reduction, although they lack the necessary characteristics to confirm their technological origin. The most important characteristic for identifying biface thinning flakes is large remnant platform scars. The characteristics that distinguish biface thinning flakes described above are best manifested in obsidian or other highly siliceous, homogeneous material.

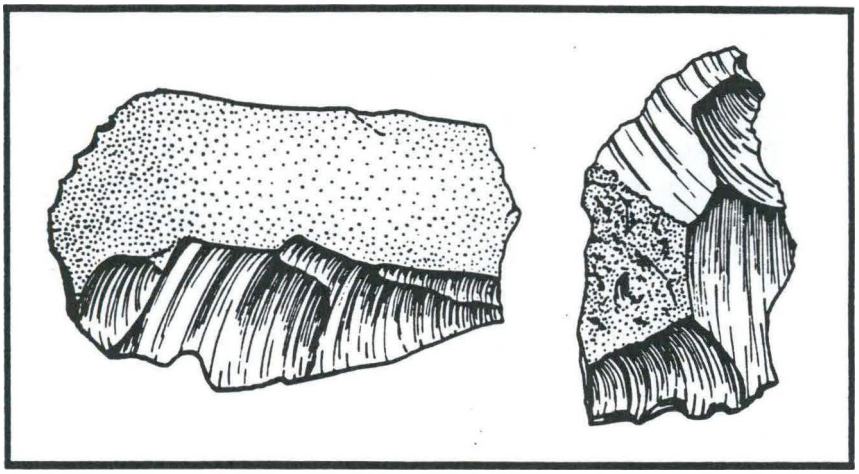
Cortical Flakes

Cortical flakes are among the easiest to identify. Cortex is the outer rind or weathered surface of unmodified stone, analogous to the rind or skin on an orange. Cortex often contains cracks, impurities, and irregularities, in addition to obscuring the often attractive visual qualities of the stone. Therefore, an early goal of stoneworking often was/is the removal of this outer cortex. This process is termed "decortication". Flakes that retain cortex on their dorsal surfaces are called cortical flakes. Cortex varies in appearance greatly, depending upon the type of material involved, the geologic formation in which the stone formed or was deposited, or the duration and type of weathering to which the stone was subjected. Cortex can exhibit pitting, rough texture, patination, dull surfaces, crustiness, or embedded impurities. It is important to note that some of these features, such as heavy patina and embedded impurities, are not exclusive to cortex. Cortex will, however, generally lack evidence of concoidal fracture. Cortex on some materials is difficult to distinguish from interior stone, requiring familiarity with regional geology or the parent material to identify.



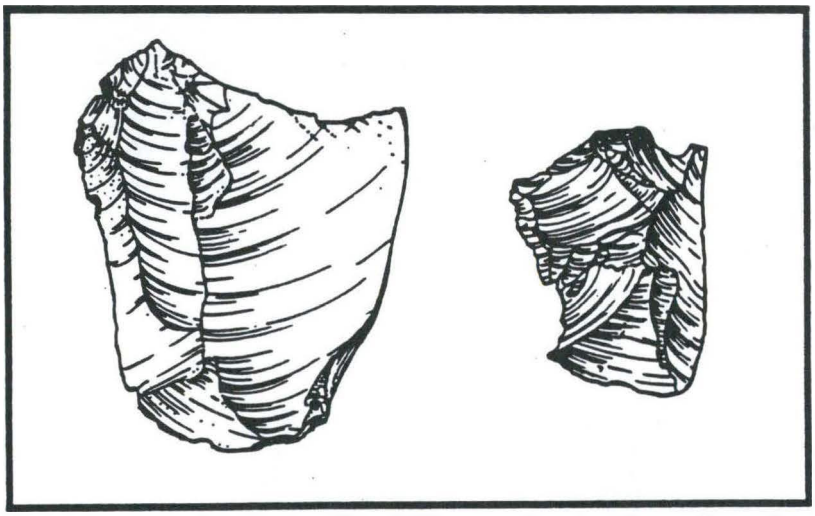
In general, the quantity and frequency of cortical flakes and the degree to which cortex covers the dorsal surfaces conveys information regarding the stage of flaked-stone reduction that occurred at a location. A large number of cortical flakes often indicates the initial or early-stage detachment of flakes from parent stone. If the examined sample of debitage contains large-size cortical flakes (relative to other flakes), the interpretation of early-stage stone tool manufacture is further supported. Not surprisingly, stone quarries contain relatively high frequencies of cortical flakes. *Cortical flakes* have also been called *decortication flakes*, and have been further classified as primary or secondary. Primary cortical or decortication flakes ex-

hibit cortex on the majority of their dorsal surface. Lithic analysts have arbitrarily established the frequency of cortex cover, such as 50% or 75%. Secondary cortical flakes exhibit cortex covering less than half the dorsal surface. though such cover is not extensive. Caution must be excersized, however. Small portions of cortex can remain on a stone tool until relatively late in the reduction process, so the minor occurrence of small secondary cortical flakes should not be prematurely construed as evidence of early reduction.



Interior Flakes

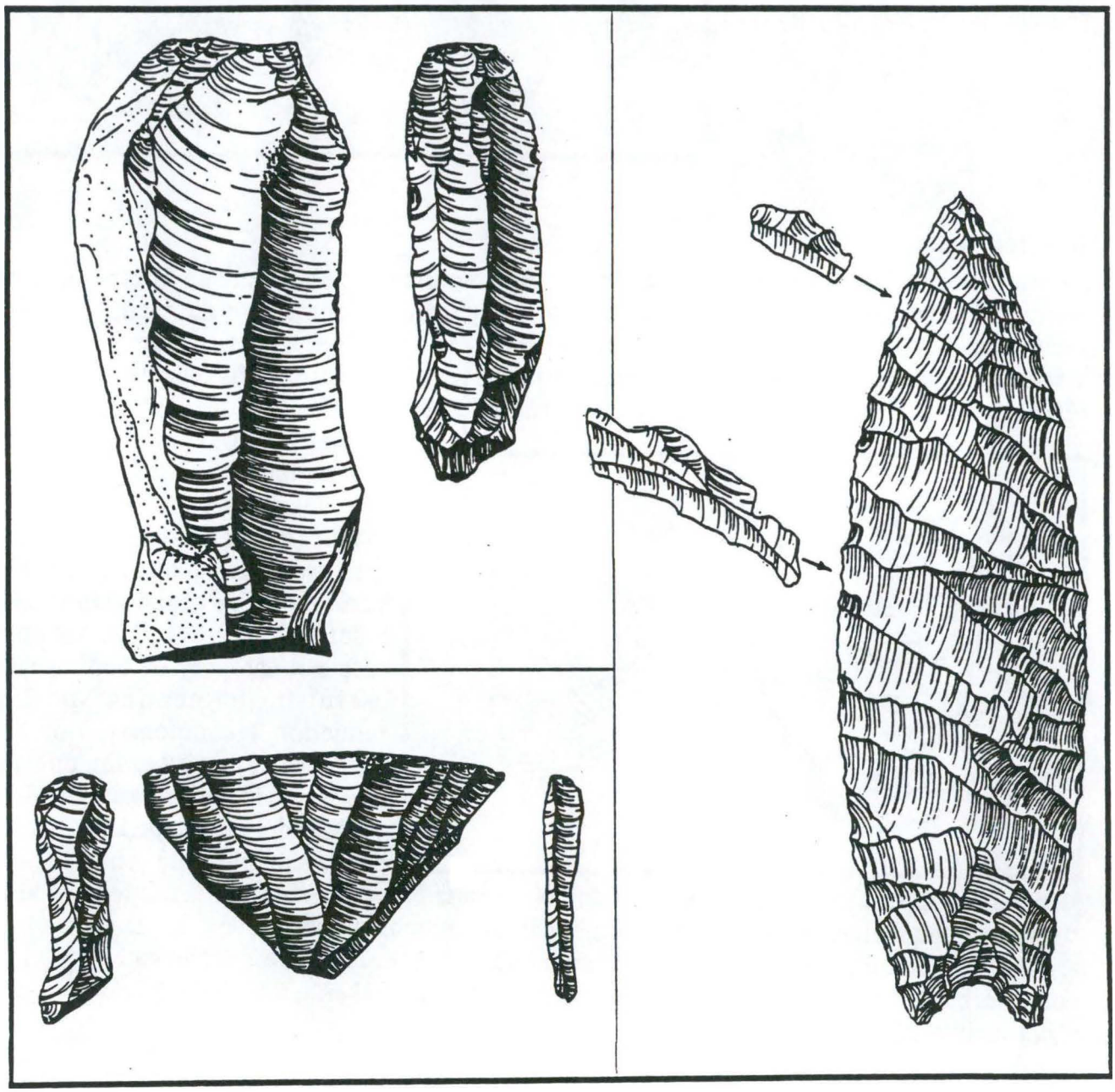
Interior flakes are usually the most common type of unbroken debitage in an assemblage. Interior flakes include a wide variety of forms and result from a number of different reduction technologies. As such, the interior flake category is a "catch- all" category that simply identifies stone tool manufacture that does not evidence initial reduction. Interior flakes often are called *thinning flakes*. Crabtree (1971:94) defines thinning flakes as "Flakes removed from a preform either by pressure or percussion to thin the piece for artifact manufacture. Thinning flakes are removed to thin a biface or a uniface. Usually shows special platform preparation." Even this broad definition is insufficiently detailed to constitute a category of debitage be useful in delineating specific reduction technologies. For the purposes of this program, interior flakes also include flakes detached during core reduction by freehand percussion, if a core tool is the object of reduction, as well as biface reduction by percussion or pressure flaking. Interior flakes could technically include biface thinning, linear, and notching flakes. These other flake types are more technologically diagnostic and should be placed in their respective category when possible, but the misassignment of biface thinning or linear flakes to the interior flake category is *not* incorrect, it is simply imprecise.



Linear Flakes

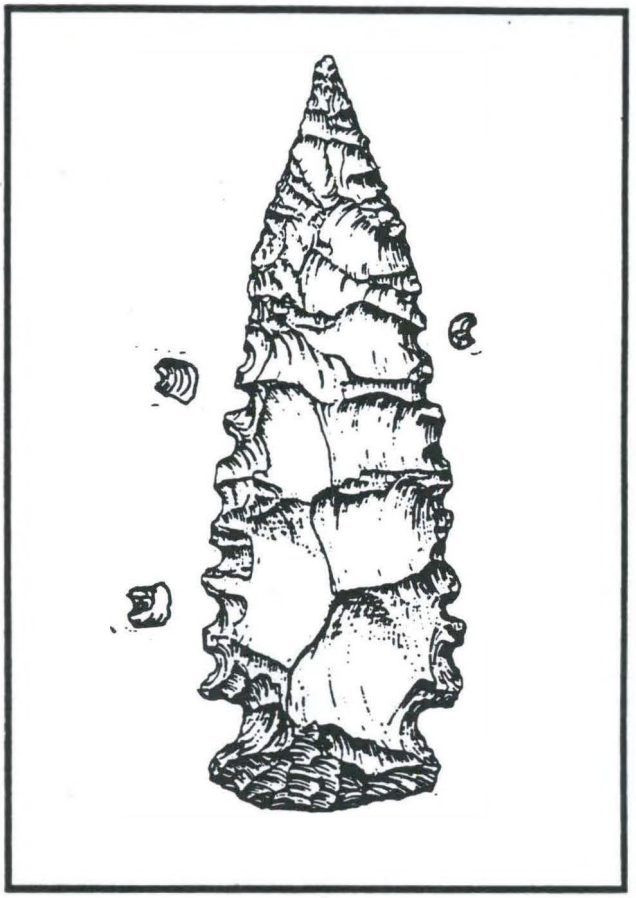
Linear flakes are physically identical to "blades" with regard to formal attributes. Crabtree (1971:42) defines blades as "flakes with parallel or sub-parallel lateral edges; the length being equal to, or more than twice the width. Cross-sections are plano- convex, triangular, sub-triangulate, rectangular, trapezoidal. Some have more than two crests or ridges."

Blade-like flakes are an incidental byproducts of almost any flaked-stone technology, but are technologically salient when they comprise a significant proportion of a lithic assemblage (We won't get into what constitutes *significant*). Linear flakes can be incidentally produced during biface production, core/flake production, and bipolar reduction, to name a few technologies.



Notching Flakes

Notching flakes are produced when notches or pronounced (narrow) indentations are flaked into bifaces. The identification of notching flakes in a debitage assemblage usually signals identifies the late stages of projectile point manufacture at a site. In some instances, the size and configuration of notching flakes can yield insight into the morphology (type) of projectile point, making this flake type potentially useful for determining the time period of site use. Notching flakes are usually produced by pressure flaking. "They are characterized in their ideal form by a circular shape with a lunate platform area: 'In planar view they are shaped like a pie with 1/6 to 1/3 removed [Gilreath 1984:157]'...In reality they can be quite varied, depending upon the size and configuration of the biface being notched. The one attribute they do have in common is that nearly all are removed from an area of low mass." (Skinner 1986:491). Notching flakes are usually smaller than 10 mm in diameter.



Shatter

Shatter is defined as "cubical and irregular shaped chunks that frequently lack any well-defined bulbs of percussion or systematic alignment of cleavage scars on the various faces" (Binford and Quimby 1972:347). One can expect shatter to occur in small amounts with any lithic reduction technology, particularly during initial stages of percussion flaking when relatively large amounts of force and velocity are applied. An abundance of shatter may indicate early stages of reduction. The physical properties of specific lithic materials will play an important role in the amount of shatter that is produced. Obsidian, for instance, is extremely brittle and prone to a greater degree of shatter than many high quality cherts. Isotrophy is another important property that determines the degree of shatter. The greater the number of inclusions and impurities in lithic material, the less predictable the outcome of imparted force and the greater the amount of shatter. The difficulty with this category is discriminating shatter from naturally occurring stone when the tool stone used in the area is indigenous.

Other Flake-Stone Debitage and Artifact Types

A number of additional flaked-stone debitage and tool types could be discussed. However, this is *not* a textbook on lithic technology. We hope that users of this program will have or obtain training in lithic technology. However, the following abbreviated discussion mention additional flake types that yield information regarding the nature of lithic technology represented by assemblages. These additional flake types are included in the Flaked-Stone Attribute Record Field Worksheet. Their inclusion is discretionary but encouraged. The reader is referred to Skinner (1986, Appendix A.2), Gilreath 1984, and Jackson 1981 for additional categories and descriptions. Some salient flaked-stone artifact types that should be recorded on the Flaked-Stone Attribute Record or attached sheets are listed and briefly described below.

Cores and Core Fragments

Cores are defined as central lithic masses (they are thick relative to their length and width) from which three or more flakes have been detached. Core fragments are usually cubical and exhibit portions of two or more negative flake scars. During the course of manufacturing flakes from a core, fragments of that core may be intentionally or accidentally detached. These core fragments are characterized by two or more surfaces that exhibit previous fracture, usually in the form of negative flake scars, and are usually quite thick in relation to their width. There is some morphological overlap with shatter on occasion, but shatter is generally less patterned.

Biface and Uniface Fragments

Formal flaked-stone tools are relatively symmetrical in plan outline, and usually exhibit intrusive secondary flake scars. Tool fragments are portions of recognizable and technologically complex end-products, whose forms are repeated and relatively reconstructible from the fragment. In most cases, tools and tool fragments are classified by morphological attributes that avoid functional implications. Bifaces have been defined as artifacts "bearing flake scars on both faces" (Crabtree 1971:38). In most instances, bifaces are thin relative to their width (thickness is usually less than twice the width). Unifaces, artifacts "flaked on one surface only" (Crabtree 1971:97), need not be thin relative to width or length, but unifaces are often thin and plano-convex, and exhibit intrusive, secondary flake scars.

Edge-modified Flakes

Flakes which exhibit secondary modification of their lateral edges, although the origin of that modification is unclear, are classified as edge-modified. This type of debitage may include flakes whose edges have been damaged by post-manufacture trampling, edge preparation during stone tool manufacture, purposeful but limited edge flaking, use, or detachment damage as a result of production force or unintentional contact. This group of flakes is subject to further examination for use-related damage or purposeful edge modification.